Diane Roy
Director, Regulatory Affairs - Gas
FortisBC Energy Inc.

16705 Fraser Highway
Surrey, B.C. V4N 0E8
Tel: (604) 576-7349
Cell: (604) 908-2790
Fax: (604) 576-7074
Email: diane.roy@fortisbc.com
www.fortisbc.com

Regulatory Affairs Correspondence
Email: gas.regulatory.affairs@fortisbc.com

August 30, 2011

British Columbia Utilities Commission
6th Floor, 900 Howe Street
Vancouver, BC
V6Z 2N3

Attention: Ms. Alanna Gillis, Acting Commission Secretary

Dear Ms. Gillis:

Re: FortisBC Energy Utilities[1] (the "FEU" or "Companies") 2012 and 2013 Revenue Requirements and Natural Gas Rates Application (the "Application")

Working Tables and Spreadsheets on the Public Record

On May 4, 2011, the FEU submitted the Application and subsequent responses to information requests ("IRs"). The FEU filed Confidential Energy Efficiency and Conservation ("EEC") working financial models in response to BCUC IRs 1.189.1, 1.189.2, 1.196.1, 1.201.1, and 1.208.6.1 as Attachments 189.1, 189.2, 196.1, 201.1, and 208.6.1.

As discussed in the response to BCUC IR 2.94.2, the nature of the EEC working financial models and the significant investment in them on behalf of customers is the reason the Companies believe they are proprietary, and therefore, submitted them confidentially.

As a result of discussions with Commission Staff, the FEU are submitting the output from the spreadsheets as well as the Program Details into the public record of this proceeding. As a result of having filed some of the output spreadsheets in response to IRs in round two, the following list provides specific details for each attachment, the marked exhibit number to which the latest version was filed, and if the spreadsheet output has already been submitted, in which marked exhibit the information was filed on the record.

EEC Financial Models filed in Response to BCUC IRs No. 1	Latest Version Exhibit No.	Status
Attachment 189.1	Exhibit B-10	filed in Exhibit B-17, response to BCUC IR 2.94.4, Attachment 94.4
Attachment 189.2	Exhibit B-10-1	Included in this submission
Attachment 196.1	Exhibit B-10	Included in this submission
Attachment 201.1	Exhibit B-10-1	filed in Exhibit B-16, response to ESAC IR 2.1.1, Attachment 1.1
Attachment 208.6.1	Exhibit B-10	Included in this submission

[1] Comprised of FortisBC Energy Inc. ("FEI"), FortisBC Energy Inc. Fort Nelson Service Area ("Fort Nelson"), FortisBC Energy (Vancouver Island) Inc. ("FEVI") and FortisBC Energy (Whistler) Inc. ("FEW").

This submission, therefore, includes four components, the Program Details, and the output from Attachments 189.2, 196.1, and 208.6.1. In order to conserve paper, the Companies are only submitting these on the record in electric format.

If you require further information or have any questions regarding this submission, please contact the undersigned.

Yours very truly,

on behalf of the FORTISBC ENERGY UTILITIES

Original signed by: Ilva Bevacqua

For: Diane Roy

Attachments

Fortis BC

New Initiatives Furnace Scrap It, TRC Calculation

	PROGRAM															ALTERNATE		NET PRESENT VALUE									BENEFIT/COST							PARAMETERS											
	COSTS ($000)											SAVINGS (GJ)			LIFE	Impact		Levelized Cost	Utility Benefits (Costs)		Participant Benefits (Costs)			Program Net Savings				Participant							UTILITY				PARTICIPANT							
	Utility			Partners																																											
	Incentives	Administration	Total	Incentives	Administration	Total	Participant	Total	% Utility	% Partner	% Participant	Gross	Net-to-Gross	Net	Years	Energy	Capacity	($/GJ)	Program	Alternate	Program	Carbon Tax	Alternate	Natural Gas	Alternate Energy	Alternate Capacity	Natural Gas	Total Costs	Total Benefits	Benefit/Cost	Natural Gas	Total Resource	TRC Net Benefits	Natural Gas Utility Discount Rate	Natural Gas Supply	Alternate Discount Rate	Alternate Supply	Discount Rate	Natural Gas NPV	Carbon Tax NPV	Alternate Energy NPV	Alternate Capacity NPV	Natural Gas Tariff	Energy Tariff	Capacity Tariff
																MWh	kW		($'000s)	($'000s)	($'000s)	($'000s)	($'000s)	(GJ)	(MWh)	(kW)	Utility	($'000s)	($'000s)		Rate Impact		($'000s)		$/GJ		$/kWh		$/GJ	$/GJ	$/kWh	$/kW/a	$/GJ	$/kWh	$/kW/a
Label	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT
Source Sheet or Calculation	Program	Program	B+C	Program	Program	E+F	Program	D+G+H	D/I	G/I	H/I	Program	Program	MxN	Program	Program	Program	D/Y	OxAJ	Q x N x AL	M x N x AN	M x N x AO	N x (QxAP + RxAQ)	PV(AL,P,-O)	PV(AK,P,-Q*N)	PV(AK,P,-R)	T/D	H>0, (V+W)<0	H<0, (V+W)>0, X	AD/AC	T/(V+D)	(T+U)/I	(T+U)-I	Input	Program	Input	Input	Input	PV(AM,P,-InputD25)	Input	PV(AM,P,-InputD28)	PV(AM,P,-InputD29)	Input	Input	Input
2011																																															
Scrap It																																															
Scrap It	0	0	0	0	0	0	4	4	4%	0%	96%	9	100%	9	18	1	-	2	1	1	1	0	1	86	11	-	5.6	4	2	0.5	0.8	0.6	(2)	7.15%	105.31	6%	1.30	6.0%	108.27	15.06	0.90	0.00	9.999	0.083	-

Row	A	B	C	D
1	**UTILITY**		**Fortis BC**	
4			**Year**	**2010**
5			Units	
6		**NATURAL GAS**		
7		Incremental Cost of Gas (nominal)	$ Per GJ	$5.50
8	1		*Year*	*0*
9		carbon tax	$ per GJ	*0.75*
10		Distribution adder	$ per GJ	*0.16*
11		Total incremental cost of gas including carbon		*6.41*
12	2	GDP Deflator		1.00
13	3	Incremental Cost of Gas (Real)		$6.41
14	4	Net Present Value -2010		
15	5	Net Present Value -2011		
16	6	Net Present Value -2012		
19		**ELECTRICITY**		
20		Incremental Cost of Elec	$ Per kWh	$0.12
21		Incremental Cost of E Capacity	$ Per kW/a	$170.00
25	**RETAIL**			
26				Rate
27		Residential Retail		
28		**TGI**	$ Per MJ	$0.0100
29		**TGVI**	$ Per MJ	$0.0143
30		**Electricity**	$ Per MJ	$0.0230
31		**Electricity**	$ per kWh	$0.0827
32		**Electricity**	$ per kW per year	
33		Commercial Retail		
34		**TGI**	$ Per MJ	$0.0094
35		**TGVI**	$ Per MJ	$0.0169
36		**Electricity**	$ Per MJ	$0.0214
37		**Electricity**	$ per kWh	$0.0769
38		**Electricity**	$ per kW per year	$52.0000
40	**TAX**			
41			**Year**	**2009**
42	1		*Year*	
43	2	Carbon	$ Per tonne	
44	3	Carbon	$ Per GJ	
45	4	GDP Deflator		
46	5	Carbon (Real)		
47	6	Net Present Value -2010		
48	7	Net Present Value -2011		
49	8	Net Present Value -2012		
51		**Discount Rate (real)**[1]		
52		**TERASEN GAS**		
53		**Rate of Inflation**	1.90%	
54		**TGI**	7.15%	
55		**TGVI**	6.89%	
56		**BC HYDRO**		
57		**Rate of Inflation**	2.00%	
58		**BC Hydro**	6.00%	
59		**Customer**	6.00%	
60		*Footnote 1: Source LR 070531*		

Row	E	F	G	H	I	J	K	L
26	Customers		789,928	Total Customers in BC		80,000	Total Residential and Commercial Customers on VI	
27	*000's*							
28	640		712,304	Total Residential Customers in BC				
29	72							
31	1,511		1,511,435	Total BCH Residential Customers in BC				89%
34	78		77,624	Total Commercial Customers in BC				
35	8							
37	190		189,764	Total Light Industrial and Commercial Customers in BC				
38	15							

Row	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
4	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
7	$6.17	$6.81	$7.35	$7.87	$8.26	$8.56	$8.78	$8.99	$9.19	$9.40	$9.60	$9.81	$10.03	$10.25	$10.47
8	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*
9	*1.00*	*1.25*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*
10	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*
11	*7.32*	*8.21*	*9.01*	*9.52*	*9.92*	*10.22*	*10.43*	*10.64*	*10.85*	*11.05*	*11.26*	*11.47*	*11.68*	*11.90*	*12.13*
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
13	$7.32	$8.21	$9.01	$9.52	$9.92	$10.22	$10.43	$10.64	$10.85	$11.05	$11.26	$11.47	$11.68	$11.90	$12.13
14	$12.36	$19.03	$25.87	$32.61	$39.16	$45.47	$51.47	$57.19	$62.63	$67.80	$72.71	$77.39	$81.83	$86.05	$90.07
15		$13.99	$21.31	$28.54	$35.56	$42.31	$48.75	$54.87	$60.70	$66.24	$71.51	$76.51	$81.27	$85.80	$90.10
16			$15.51	$23.25	$30.78	$38.01	$44.91	$51.47	$57.71	$63.65	$69.29	$74.66	$79.76	$84.61	$89.22

Row	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ
4	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**	
7	$10.70	$10.93	$11.17	$11.42	$11.67	$11.92	$12.19	$12.45	$12.73	$13.01	$13.29	$13.58	$13.88	$14.19	$14.50	$14.82	$15.14
8	*16*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*	*31*	
9	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	
10	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*		
11	*12.35*	*12.59*	*12.83*	*13.07*	*13.32*	*13.58*	*13.84*	*14.11*	*14.38*	*14.66*	*14.95*	*15.24*	*15.54*	*15.84*	*16.15*	*16.31*	
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
13	$12.35	$12.59	$12.83	$13.07	$13.32	$13.58	$13.84	$14.11	$14.38	$14.66	$14.95	$15.24	$15.54	$15.84	$16.15	$16.31	
14	$93.89	$97.52	$100.98	$104.26	$107.39	$110.36	$113.19	$115.88	$118.43	$120.87	$123.18	$125.39	$127.49	$129.48	$131.38	$133.17	
15	$94.20	$98.09	$101.79	$105.31	$108.66	$111.84	$114.87	$117.75	$120.49	$123.10	$125.59	$127.95	$130.19	$132.33	$134.37	$136.28	
16	$93.61	$97.78	$101.74	$105.51	$109.10	$112.51	$115.76	$118.85	$121.79	$124.58	$127.24	$129.77	$132.18	$134.47	$136.65	$138.70	

Row	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
41	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
42	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*
43	$20.00	$25.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00
44	$0.9976	$1.2470	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964
45	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
46	$1.00	$1.25	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50
47		$2.02	$3.23	$4.37	$5.43	$6.42	$7.34	$8.20	$9.00	$9.75	$10.45	$11.11	$11.72	$12.29	$12.82
48			$2.47	$3.68	$4.82	$5.88	$6.87	$7.79	$8.65	$9.45	$10.20	$10.90	$11.56	$12.17	$12.74
49				$2.70	$3.92	$5.05	$6.11	$7.10	$8.02	$8.88	$9.69	$10.44	$11.14	$11.79	$12.40

Row	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI
41	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**
42	*15*	*16*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*
43	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00
44	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964
45	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
46	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50
47	$13.31	$13.78	$14.21	$14.61	$14.99	$15.34	$15.67	$15.97	$16.26	$16.52	$16.77	$17.00	$17.22	$17.42	$17.61	$17.79
48	$13.27	$13.76	$14.23	$14.66	$15.06	$15.44	$15.79	$16.12	$16.42	$16.71	$16.97	$17.22	$17.45	$17.67	$17.87	$18.06
49	$12.97	$13.50	$14.00	$14.46	$14.89	$15.29	$15.67	$16.02	$16.35	$16.65	$16.94	$17.21	$17.45	$17.69	$17.90	$18.10

Fortis BC

only enter in boxes marked in blue

Measure Data for Scrap It

PER MEASURE			Utility Incentive to the participant	partner incentive
Incremental Cost	$ 3,708			
Total Incentive	$ -			
Participant	**$ 3,708**			

Annual Impact Per Measure

Energy Savings per installation	**8.6**	GJ		Average Annnual Energy Savings per Measure
Free Rider Rate / Net-to-Gross	**0%**	1.00		Net-to-Gross
Alternate Energy Impact	**4**	GJ	976	kWh
Alternate Capacity Impact		kW/a		
Measure Lifetime	**18**	Years	Estimated lifespan of measure	

ANNUAL ACTIVITY	2010 NPV	Total	2010	2011	2012	Explanatory Notes
Number of Installations						
	1	1	**0**	**1**		Estimated Participatation
Impact						
Gross Energy Savings (GJ)	8	9	0	9	0	Extension of Unit Savings x No. of Upgrades
Net Energy Savings (GJ)	8	9	0	9	0	Gross Energy Savings less Free Riders
Alternate Energy Impact (Increase) (kWh)	921	976	0	976	0	Other Utility Billed energy impact
Alternate Capacity Impact (Increase) (kW/a)	$0.00	-				Other Utility Billed capacity impact

Benefit Cost Summary

	2010 NPV	*$ Total*	2010	2011	2012	
Avoided Revenue Requirements						
PV $ per GJ			$100.98	$105.31	$109.10	
Energy Purchases	$ 908	$ 908	$ -	$ 908	$ -	
Utility Program Costs						
DSM Incentives		$ -	$ -	$ -	$ -	
Administration		$ 162	**$ -**	**$ 162**		
Subtotal	$ 151	$ 162	$ -	$ 162	$ -	
Partner Program Costs						
DSM Incentives		$ -	$ -	$ -	$ -	
Administration		$ -	**$ -**	**$ -**	**$ -**	
Subtotal	$ -	$ -	$ -	$ -	$ -	
Participants' Net Costs						
Incremental Cost		$ 3,708	$ -	$ 3,708	$ -	
Subtotal	$ 3,460	$ 3,708	$ -	$ 3,708	$ -	
Alternate Savings - Net						
Energy (Purchases)		$ 1,268	$ -	$ 1,268	$ -	$1.299 PV $ per kWh
Capacity (Purchases)		$ -	$ -	$ -	$ -	PV$ per kW/a
Subtotal	$ 1,268	$ 1,268	$ -	$ 1,268	$ -	
Total Resource Net Benefit (Cost)	$ (1,435)		$ -	$ (1,693)	$ -	Avoided Revenue Requirement less Utility less Partners less Participant Costs plus Alternate Savings
Utility Levelized Cost per GJ (Lifetime)	**$ 45.1**		**$ -**	**$ 45.1**	**$ -**	Informational (for comparison with supply options)

Fortis BC

New Initiatives Solar Air, TRC Calculation

	PROGRAM															ALTERNATE		NET PRESENT VALUE									BENEFIT/COST							PARAMETERS											
	COSTS ($000)											SAVINGS (GJ)			LIFE	Impact		Levelized Cost	Utility Benefits (Costs)		Participant Benefits (Costs)			Program Net Savings				Participant							UTILITY				PARTICIPANT							
	Utility			Partners																																										
	Incentives	Administration	Total	Incentives	Administration	Total	Participant	Total	% Utility	% Partner	% Participant	Gross	Net-to-Gross	Net	Years	Energy	Capacity	($/GJ)	Program	Alternate	Program	Carbon Tax	Alternate	Natural Gas	Alternate Energy	Alternate Capacity	Natural Gas	Total Costs	Total Benefits	Benefit/Cost	Natural Gas	Total Resource	TRC Net Benefits	Natural Gas Utility Discount Rate	Natural Gas Supply	Alternate Discount Rate	Alternate Supply	Discount Rate	Natural Gas NPV	Carbon Tax NPV	Alternate Energy NPV	Alternate Capacity NPV	Natural Gas Tariff	Energy Tariff	Capacity Tariff
																MWh	kW		($'000s)	($'000s)	($'000s)	($'000s)	($'000s)	(GJ)	(MWh)	(kW)	Utility	($'000s)	($'000s)		Rate Impact		($'000s)	$/GJ		$/kWh		$/GJ	$/GJ	$/kWh	$/kW/a	$/GJ	$/kWh	$/kW/a
Label	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT
Source Sheet or Calculation	Program	Program	B+C	Program	Program	E+F	Program	D+G+H	D/I	G/I	H/I	Program	Program	MxN	Program	Program	Program	D/Y	OxAJ	Q x N x AL	M x N x AN	M x N x AO	N x (QxAP + RxAQ)	PV(AL,P,-O)	PV(AK,P,-Q*N)	PV(AK,P,-R)	T/D	H>0, (V+W)<0	H<0, (V+W)>0, X	AD/AC	T/(V+D)	(T+U)/I	(T+U)-I	Input	Program	Input	Input	Input	PV(AM,P,-InputD25)	Input	PV(AM,P,-InputD28)	PV(AM,P,-InputD29)	Input	Input	Input
2011																																														
Solar Air																																														
Solar Air	0	5	5	0	0	0	39	45	12%	0%	88%	48	100%	48	25	0	-	10	6	N/A	6	1	N/A	549	-	-	1.1	39	7	0.2	0.5	0.1	(39)	7.15%	125.59	6%	1.53	6.0%	127.82	17.22	1.06	0.00	9.999	0.083	-

Row	A	B	C	D	E	F	G	H	I	J	K	L
1	**UTILITY**		**Fortis BC**									
2												
3												
4			**Year**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
5			Units									
6		**NATURAL GAS**										
7		Incremental Cost of Gas (nominal)	$ Per GJ	$5.50	$6.17	$6.81	$7.35	$7.87	$8.26	$8.56	$8.78	$8.99
8	1		*Year*	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
9		carbon tax	$ per GJ	*0.75*	*1.00*	*1.25*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*
10		Distribution adder	$ per GJ	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*
11		Total incremental cost of gas including carbon		*6.41*	*7.32*	*8.21*	*9.01*	*9.52*	*9.92*	*10.22*	*10.43*	*10.64*
12	2	GDP Deflator		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
13	3	Incremental Cost of Gas (Real)		$6.41	$7.32	$8.21	$9.01	$9.52	$9.92	$10.22	$10.43	$10.64
14	4	Net Present Value -2010			$12.36	$19.03	$25.87	$32.61	$39.16	$45.47	$51.47	$57.19
15	5	Net Present Value -2011				$13.99	$21.31	$28.54	$35.56	$42.31	$48.75	$54.87
16	6	Net Present Value -2012					$15.51	$23.25	$30.78	$38.01	$44.91	$51.47
17												
18												
19		**ELECTRICITY**										
20		Incremental Cost of Elec	$ Per kWh	$0.12								
21		Incremental Cost of E Capacity	$ Per kW/a	$170.00								
22												
23												
24												
25	**RETAIL**											
26				Rate	Customers		789,928	Total Customers in BC			80,000	Total Residential and Commercial Customers on VI
27		Residential Retail			*000's*							
28		**TGI**	$ Per MJ	$0.0100	640		712,304	Total Residential Customers in BC				
29		**TGVI**	$ Per MJ	$0.0143	72							
30		**Electricity**	$ Per MJ	$0.0230								
31		**Electricity**	$ per kWh	$0.0827	1,511		1,511,435	Total BCH Residential Customers in BC				89%
32		**Electricity**	$ per kW per year									
33		Commercial Retail										
34		**TGI**	$ Per MJ	$0.0094	78		77,624	Total Commercial Customers in BC				
35		**TGVI**	$ Per MJ	$0.0169	8							
36		**Electricity**	$ Per MJ	$0.0214								
37		**Electricity**	$ per kWh	$0.0769	190		189,764	Total Light Industrial and Commercial Customers in BC				
38		**Electricity**	$ per kW per year	$52.0000	15							
39												
40	**TAX**											
41			**Year**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
42	1		*Year*		*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*
43	2	Carbon	$ Per tonne		$20.00	$25.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00
44	3	Carbon	$ Per GJ		$0.9976	$1.2470	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964
45	4	GDP Deflator			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
46	5	Carbon (Real)			$1.00	$1.25	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50
47	6	Net Present Value -2010				$2.02	$3.23	$4.37	$5.43	$6.42	$7.34	$8.20
48	7	Net Present Value -2011					$2.47	$3.68	$4.82	$5.88	$6.87	$7.79
49	8	Net Present Value -2012						$2.70	$3.92	$5.05	$6.11	$7.10
50												
51		**Discount Rate (real)**[1]										
52		**TERASEN GAS**										
53		**Rate of Inflation**	1.90%									
54		**TGI**	7.15%									
55		**TGVI**	6.89%									
56		**BC HYDRO**										
57		**Rate of Inflation**	2.00%									
58		**BC Hydro**	6.00%									

Row	M	N	O	P	Q	R	S	T	U	V	W	X
4	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**
7	$9.19	$9.40	$9.60	$9.81	$10.03	$10.25	$10.47	$10.70	$10.93	$11.17	$11.42	$11.67
8	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*
9	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*
10	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*
11	*10.85*	*11.05*	*11.26*	*11.47*	*11.68*	*11.90*	*12.13*	*12.35*	*12.59*	*12.83*	*13.07*	*13.32*
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
13	$10.85	$11.05	$11.26	$11.47	$11.68	$11.90	$12.13	$12.35	$12.59	$12.83	$13.07	$13.32
14	$62.63	$67.80	$72.71	$77.39	$81.83	$86.05	$90.07	$93.89	$97.52	$100.98	$104.26	$107.39
15	$60.70	$66.24	$71.51	$76.51	$81.27	$85.80	$90.10	$94.20	$98.09	$101.79	$105.31	$108.66
16	$57.71	$63.65	$69.29	$74.66	$79.76	$84.61	$89.22	$93.61	$97.78	$101.74	$105.51	$109.10
41	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**
42	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*
43	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00
44	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964
45	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
46	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50
47	$9.00	$9.75	$10.45	$11.11	$11.72	$12.29	$12.82	$13.31	$13.78	$14.21	$14.61	$14.99
48	$8.65	$9.45	$10.20	$10.90	$11.56	$12.17	$12.74	$13.27	$13.76	$14.23	$14.66	$15.06
49	$8.02	$8.88	$9.69	$10.44	$11.14	$11.79	$12.40	$12.97	$13.50	$14.00	$14.46	$14.89

Row	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ
4	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**	
7	$11.92	$12.19	$12.45	$12.73	$13.01	$13.29	$13.58	$13.88	$14.19	$14.50	$14.82	$15.14
8	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*	*31*	
9	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	
10	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*		
11	*13.58*	*13.84*	*14.11*	*14.38*	*14.66*	*14.95*	*15.24*	*15.54*	*15.84*	*16.15*	*16.31*	
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
13	$13.58	$13.84	$14.11	$14.38	$14.66	$14.95	$15.24	$15.54	$15.84	$16.15	$16.31	
14	$110.36	$113.19	$115.88	$118.43	$120.87	$123.18	$125.39	$127.49	$129.48	$131.38	$133.17	
15	$111.84	$114.87	$117.75	$120.49	$123.10	$125.59	$127.95	$130.19	$132.33	$134.37	$136.28	
16	$112.51	$115.76	$118.85	$121.79	$124.58	$127.24	$129.77	$132.18	$134.47	$136.65	$138.70	
41	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	
42	*20*	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*	
43	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	
44	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	
45	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
46	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	
47	$15.34	$15.67	$15.97	$16.26	$16.52	$16.77	$17.00	$17.22	$17.42	$17.61	$17.79	
48	$15.44	$15.79	$16.12	$16.42	$16.71	$16.97	$17.22	$17.45	$17.67	$17.87	$18.06	
49	$15.29	$15.67	$16.02	$16.35	$16.65	$16.94	$17.21	$17.45	$17.69	$17.90	$18.10	

Fortis BC

only enter in boxes marked in blue

Measure Data for Solar Air

PER MEASURE			Utility Incentive to the participant	partner incentive
Incremental Cost	$	39,400		
Total Incentive	$	-		
Participant	**$**	**39,400**		

Annual Impact Per Measure

Energy Savings per installation	**47.8**	GJ		Average Annnual Energy Savings per Measure
Free Rider Rate / Net-to-Gross	**0%**	1.00		Net-to-Gross
Alternate Energy Impact		GJ	0	kWh
Alternate Capacity Impact		kW/a		
Measure Lifetime	**25**	Years	Estimated lifespan of measure	

ANNUAL ACTIVITY	2010 NPV	Total	2010	2011	2012	Explanatory Notes
Number of Installations	1	1	**0**	**1**		Estimated Participatation
Impact						
Gross Energy Savings (GJ)	45	48	0	48	0	Extension of Unit Savings x No. of Upgrades
Net Energy Savings (GJ)	45	48	0	48	0	Gross Energy Savings less Free Riders
Alternate Energy Impact (Increase) (kWh)	0	0	0	0	0	Other Utility Billed energy impact
Alternate Capacity Impact (Increase) (kW/a)	$0.00	-				Other Utility Billed capacity impact

Benefit Cost Summary

	2010 NPV	*$ Total*	2010	2011	2012	
Avoided Revenue Requirements						
PV $ per GJ			$120.87	$125.59	$129.77	
Energy Purchases	$ 5,999	$ 5,999	$ -	$ 5,999	$ -	
Utility Program Costs						
DSM Incentives		$ -	$ -	$ -	$ -	
Administration		$ 5,250	**$ -**	**$ 5,250**		
Subtotal	$ 4,900	$ 5,250	$ -	$ 5,250	$ -	
Partner Program Costs						
DSM Incentives		$ -	$ -	$ -	$ -	
Administration		$ -	**$ -**	**$ -**	**$ -**	
Subtotal	$ -	$ -	$ -	$ -	$ -	
Participants' Net Costs						
Incremental Cost		$ 39,400	$ -	$ 39,400	$ -	
Subtotal	$ 36,771	$ 39,400	$ -	$ 39,400	$ -	
Alternate Savings - Net						
Energy (Purchases)		$ -	$ -	$ -	$ -	$1.534 PV $ per kWh
Capacity (Purchases)		$ -	$ -	$ -	$ -	PV$ per kW/a
Subtotal	$ -	$ -	$ -	$ -	$ -	
Total Resource Net Benefit (Cost)	$ (35,672)		$ -	$ (38,651)	$ -	Avoided Revenue Requirement less Utility less Partners less Participant Costs plus Alternate Savings
Utility Levelized Cost per GJ (Lifetime)	**$ 81.3**		**$ -**	**$ 81.3**	**$ -**	Informational (for comparison with supply options)

Fortis BC

New Initiatives Solar Commercial, TRC Calculation

	PROGRAM															ALTERNATE		NET PRESENT VALUE									BENEFIT/COST							PARAMETERS											
	COSTS ($000)											SAVINGS (GJ)			LIFE	Impact		Levelized Cost	Utility Benefits (Costs)		Participant Benefits (Costs)			Program Net Savings				Participant							UTILITY				PARTICIPANT							
	Utility			Partners																																										
	Incentives	Administration	Total	Incentives	Administration	Total	Participant	Total	% Utility	% Partner	% Participant	Gross	Net-to-Gross	Net	Years	Energy	Capacity	($/GJ)	Program	Alternate	Program	Carbon Tax	Alternate	Natural Gas	Alternate Energy	Alternate Capacity	Natural Gas	Total Costs	Total Benefits	Benefit/Cost	Natural Gas	Total Resource	TRC Net Benefits	Natural Gas Utility Discount Rate	Natural Gas Supply	Alternate Discount Rate	Alternate Supply	Discount Rate	Natural Gas NPV	Carbon Tax NPV	Alternate Energy NPV	Alternate Capacity NPV	Natural Gas Tariff	Energy Tariff	Capacity Tariff
																MWh	kW		($'000s)	($'000s)	($'000s)	($'000s)	($'000s)	(GJ)	(MWh)	(kW)	Utility	($'000s)	($'000s)		Rate Impact		($'000s)	$/GJ		$/kWh		$/GJ	$/GJ	$/kWh	$/kW/a	$/GJ	$/kWh	$/kW/a
Label	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT
Source Sheet or Calculation	Program	Program	B+C	Program	Program	E+F	Program	D+G+H	D/I	G/I	H/I	Program	Program	MxN	Program	Program	Program	D/Y	OxAJ	Q x N x AL	M x N x AN	M x N x AO	N x (QxAP + RxAQ)	PV(AL,P,-O)	PV(AK,P,-Q*N)	PV(AK,P,-R)	T/D	H>0, (V+W)<0	H<0, (V+W)>0, X	AD/AC	T/(V+D)	(T+U)/I	(T+U)-I	Input	Program	Input	Input	Input	PV(AM,P,-InputD25)	Input	PV(AM,P,-InputD28)	PV(AM,P,-InputD29)	Input	Input	Input
2011																																														
Solar Commercial																																														
Solar Commercial	0	4	4	0	0	0	55	59	6%	0%	94%	76	100%	76	25	0	-	4	10	N/A	10	1	N/A	879	-	-	2.6	55	11	0.2	0.7	0.2	(49)	7.15%	125.59	6%	1.53	6.0%	127.82	17.22	1.06	0.00	9.999	0.083	-

Row	A	B	C	D	E	F	G	H	I	J
1	**UTILITY**		**Fortis BC**							
2										
3										
4			**Year**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
5			Units							
6		**NATURAL GAS**								
7		Incremental Cost of Gas (nominal)	$ Per GJ	$5.50	$6.17	$6.81	$7.35	$7.87	$8.26	$8.56
8	1		*Year*	*0*	*1*	*2*	*3*	*4*	*5*	*6*
9		carbon tax	$ per GJ	*0.75*	*1.00*	*1.25*	*1.50*	*1.50*	*1.50*	*1.50*
10		Distribution adder	$ per GJ	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*
11		Total incremental cost of gas including carbon		*6.41*	*7.32*	*8.21*	*9.01*	*9.52*	*9.92*	*10.22*
12	2	GDP Deflator		1.00	1.00	1.00	1.00	1.00	1.00	1.00
13	3	Incremental Cost of Gas (Real)		$6.41	$7.32	$8.21	$9.01	$9.52	$9.92	$10.22
14	4	Net Present Value -2010			$12.36	$19.03	$25.87	$32.61	$39.16	$45.47
15	5	Net Present Value -2011				$13.99	$21.31	$28.54	$35.56	$42.31
16	6	Net Present Value -2012					$15.51	$23.25	$30.78	$38.01
17										
18										
19		**ELECTRICITY**								
20		Incremental Cost of Elec	$ Per kWh	$0.12						
21		Incremental Cost of E Capacity	$ Per kW/a	$170.00						
22										
23										
24										
25	**RETAIL**									
26				Rate	Customers		789,928	Total Customers in BC		80,000
27		Residential Retail			*000's*					
28		**TGI**	$ Per MJ	$0.0100	640		712,304	Total Residential Customers in BC		
29		**TGVI**	$ Per MJ	$0.0143	72					
30		**Electricity**	$ Per MJ	$0.0230						
31		**Electricity**	$ per kWh	$0.0827	1,511		1,511,435	Total BCH Residential Customers in BC		
32		**Electricity**	$ per kW per year							
33		Commercial Retail								
34		**TGI**	$ Per MJ	$0.0094	78		77,624	Total Commercial Customers in BC		
35		**TGVI**	$ Per MJ	$0.0169	8					
36		**Electricity**	$ Per MJ	$0.0214						
37		**Electricity**	$ per kWh	$0.0769	190		189,764	Total Light Industrial and Commercial Customers in BC		
38		**Electricity**	$ per kW per year	$52.0000	15					
39										
40	**TAX**									
41			**Year**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
42	1		*Year*		*0*	*1*	*2*	*3*	*4*	*5*
43	2	Carbon	$ Per tonne		$20.00	$25.00	$30.00	$30.00	$30.00	$30.00
44	3	Carbon	$ Per GJ		$0.9976	$1.2470	$1.4964	$1.4964	$1.4964	$1.4964
45	4	GDP Deflator			1.00	1.00	1.00	1.00	1.00	1.00
46	5	Carbon (Real)			$1.00	$1.25	$1.50	$1.50	$1.50	$1.50
47	6	Net Present Value -2010				$2.02	$3.23	$4.37	$5.43	$6.42
48	7	Net Present Value -2011					$2.47	$3.68	$4.82	$5.88
49	8	Net Present Value -2012						$2.70	$3.92	$5.05
50										
51		**Discount Rate (real)**[1]								
52		**TERASEN GAS**								
53		**Rate of Inflation**	1.90%							
54		**TGI**	7.15%							
55		**TGVI**	6.89%							
56		**BC HYDRO**								
57		**Rate of Inflation**	2.00%							
58		**BC Hydro**	6.00%							
59		**Customer**	6.00%							
60		*Footnote 1: Source LR 070531*								
61										

Row	K	L	M	N	O	P	Q	R	S	T	U	V
4	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**
7	$8.78	$8.99	$9.19	$9.40	$9.60	$9.81	$10.03	$10.25	$10.47	$10.70	$10.93	$11.17
8	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*
9	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*
10	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*
11	*10.43*	*10.64*	*10.85*	*11.05*	*11.26*	*11.47*	*11.68*	*11.90*	*12.13*	*12.35*	*12.59*	*12.83*
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
13	$10.43	$10.64	$10.85	$11.05	$11.26	$11.47	$11.68	$11.90	$12.13	$12.35	$12.59	$12.83
14	$51.47	$57.19	$62.63	$67.80	$72.71	$77.39	$81.83	$86.05	$90.07	$93.89	$97.52	$100.98
15	$48.75	$54.87	$60.70	$66.24	$71.51	$76.51	$81.27	$85.80	$90.10	$94.20	$98.09	$101.79
16	$44.91	$51.47	$57.71	$63.65	$69.29	$74.66	$79.76	$84.61	$89.22	$93.61	$97.78	$101.74
26	Total Residential and Commercial Customers on VI											
31		89%										
41	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**
42	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*
43	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00
44	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964
45	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
46	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50
47	$7.34	$8.20	$9.00	$9.75	$10.45	$11.11	$11.72	$12.29	$12.82	$13.31	$13.78	$14.21
48	$6.87	$7.79	$8.65	$9.45	$10.20	$10.90	$11.56	$12.17	$12.74	$13.27	$13.76	$14.23
49	$6.11	$7.10	$8.02	$8.88	$9.69	$10.44	$11.14	$11.79	$12.40	$12.97	$13.50	$14.00

Row	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ
4	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**	
7	$11.42	$11.67	$11.92	$12.19	$12.45	$12.73	$13.01	$13.29	$13.58	$13.88	$14.19	$14.50	$14.82	$15.14
8	*19*	*20*	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*	*31*	
9	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	
10	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*		
11	*13.07*	*13.32*	*13.58*	*13.84*	*14.11*	*14.38*	*14.66*	*14.95*	*15.24*	*15.54*	*15.84*	*16.15*	*16.31*	
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
13	$13.07	$13.32	$13.58	$13.84	$14.11	$14.38	$14.66	$14.95	$15.24	$15.54	$15.84	$16.15	$16.31	
14	$104.26	$107.39	$110.36	$113.19	$115.88	$118.43	$120.87	$123.18	$125.39	$127.49	$129.48	$131.38	$133.17	
15	$105.31	$108.66	$111.84	$114.87	$117.75	$120.49	$123.10	$125.59	$127.95	$130.19	$132.33	$134.37	$136.28	
16	$105.51	$109.10	$112.51	$115.76	$118.85	$121.79	$124.58	$127.24	$129.77	$132.18	$134.47	$136.65	$138.70	
41	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	
42	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*	
43	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	
44	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	
45	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
46	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	
47	$14.61	$14.99	$15.34	$15.67	$15.97	$16.26	$16.52	$16.77	$17.00	$17.22	$17.42	$17.61	$17.79	
48	$14.66	$15.06	$15.44	$15.79	$16.12	$16.42	$16.71	$16.97	$17.22	$17.45	$17.67	$17.87	$18.06	
49	$14.46	$14.89	$15.29	$15.67	$16.02	$16.35	$16.65	$16.94	$17.21	$17.45	$17.69	$17.90	$18.10	

Fortis BC

only enter in boxes marked in blue

Measure Data for Solar Commercial

PER MEASURE			Utility Incentive to the participant	partner incentive
Incremental Cost	$ 54,772			
Total Incentive	$ -			
Participant	**$ 54,772**			

Annual Impact Per Measure

Energy Savings per installation	76.4	GJ		Average Annnual Energy Savings per Measure
Free Rider Rate / Net-to-Gross	0%	1.00		Net-to-Gross
Alternate Energy Impact		GJ	0	kWh
Alternate Capacity Impact		kW/a		
Measure Lifetime	25	Years	Estimated lifespan of measure	

ANNUAL ACTIVITY	2010 NPV	Total	2010	2011	2012	Explanatory Notes
Number of Installations	1	1	0	1		Estimated Participatation
Impact						
Gross Energy Savings (GJ)	71	76	0	76	0	Extension of Unit Savings x No. of Upgrades
Net Energy Savings (GJ)	71	76	0	76	0	Gross Energy Savings less Free Riders
Alternate Energy Impact (Increase) (kWh)	0	0	0	0	0	Other Utility Billed energy impact
Alternate Capacity Impact (Increase) (kW/a)	$0.00	-				Other Utility Billed capacity impact

Benefit Cost Summary

	2010 NPV	*$ Total*	2010	2011	2012	
Avoided Revenue Requirements						
PV $ per GJ			$120.87	$125.59	$129.77	
Energy Purchases	$ 9,598	$ 9,598	$ -	$ 9,598	$ -	
Utility Program Costs						
DSM Incentives		$ -	$ -	$ -	$ -	
Administration		$ 3,750	$ -	$ 3,750		
Subtotal	$ 3,500	$ 3,750	$ -	$ 3,750	$ -	
Partner Program Costs						
DSM Incentives		$ -	$ -	$ -	$ -	
Administration		$ -	$ -	$ -	$ -	
Subtotal	$ -	$ -	$ -	$ -	$ -	
Participants' Net Costs						
Incremental Cost		$ 54,772	$ -	$ 54,772	$ -	
Subtotal	$ 51,117	$ 54,772	$ -	$ 54,772	$ -	
Alternate Savings - Net						
Energy (Purchases)		$ -	$ -	$ -	$ -	$1.534 PV $ per kWh
Capacity (Purchases)		$ -	$ -	$ -	$ -	PV$ per kW/a
Subtotal	$ -	$ -	$ -	$ -	$ -	
Total Resource Net Benefit (Cost)	$ (45,019)		$ -	$ (48,924)	$ -	Avoided Revenue Requirement less Utility less Partners less Participant Costs plus Alternate Savings
Utility Levelized Cost per GJ (Lifetime)	**$ 66.6**		**$ -**	**$ 66.6**	**$ -**	Informational (for comparison with supply options)

Fortis BC

New Initiatives Solar Residential Hot Water Pilot, TRC Calculation

	PROGRAM															ALTERNATE		NET PRESENT VALUE									BENEFIT/COST							PARAMETERS										
	COSTS ($000)											SAVINGS (GJ)			LIFE	Impact		Levelized Cost	Utility Benefits (Costs)		Participant Benefits (Costs)			Program Net Savings			Natural Gas	Participant			Natural Gas		TRC Net Benefits	UTILITY				PARTICIPANT							
	Utility			Partners																																									
	Incentives	Administration	Total	Incentives	Administration	Total	Participant	Total	% Utility	% Partner	% Participant	Gross	Net-to-Gross	Net	Years	Energy	Capacity	($/GJ)	Program	Alternate	Program	Carbon Tax	Alternate	Natural Gas	Alternate Energy	Alternate Capacity	Utility	Total Costs	Total Benefits	Benefit/Cost	Rate Impact	Total Resource	($'000s)	Natural Gas Utility Discount Rate	Natural Gas Supply	Alternate Discount Rate	Alternate Supply	Discount Rate	Natural Gas NPV	Carbon Tax NPV	Alternate Energy NPV	Alternate Capacity NPV	Natural Gas Tariff	Energy Tariff	Capacity Tariff
																MWh	kW		($'000s)	($'000s)	($'000s)	($'000s)	($'000s)	(GJ)	(MWh)	(kW)		($'000s)	($'000s)					$/GJ		$/kWh		$/GJ	$/GJ	$/kWh	$/kW/a	$/GJ	$/kWh	$/kW/a
Label	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT
Source Sheet or Calculation	Program	Program	B+C	Program	Program	E+F	Program	D+G+H	D/I	G/I	H/I	Program	Program	MxN	Program	Program	Program	D/Y	OxAJ	Q x N x AL	M x N x AN	M x N x AO	N x (QxAP + RxAQ)	PV(AL,P,-O)	PV(AK,P,-Q*N)	PV(AK,P,-R)	T/D	H=0, (V+W)=0	H=0, (V+W)=0, X	AD/AC	T/(V+D)	(T+U)/I	(T+U)-I	Input	Program	Input	Input	Input	PV(AM,P,-InputD25)	Input	PV(AM,P,-InputD28)	PV(AM,P,-InputD29)	Input	Input	Input
2011																																													
Solar Residential Hot Water Pilot Program																																													
Solar Residential Hot Water Pilot Program	0	0	0	0	0	0	0	0	-	-	-	0	100%	0	0	0	-	-	LB	N/A	N/A	N/A	N/A	-	-	-	#DIV/0!	-	-	N/A	#DIV/0!	#DIV/0!	N/A	7.15%	0.00	6%	0.00	6.0%	0.00	0.00	0.00	0.00	9.999	0.083	-

Row	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	UTILITY		Fortis BC													
4			Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
5			Units													
6		NATURAL GAS														
7		Incremental Cost of Gas (nominal)	$ Per GJ	$5.50	$6.17	$6.81	$7.35	$7.87	$8.26	$8.56	$8.78	$8.99	$9.19	$9.40	$9.60	$9.81
8	1		*Year*	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*
9		carbon tax	$ per GJ	*0.75*	*1.00*	*1.25*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*
10		Distribution adder	$ per GJ	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*
11		Total incremental cost of gas including carbon		*6.41*	*7.32*	*8.21*	*9.01*	*9.52*	*9.92*	*10.22*	*10.43*	*10.64*	*10.85*	*11.05*	*11.26*	*11.47*
12	2	GDP Deflator		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
13	3	Incremental Cost of Gas (Real)		$6.41	$7.32	$8.21	$9.01	$9.52	$9.92	$10.22	$10.43	$10.64	$10.85	$11.05	$11.26	$11.47
14	4	Net Present Value -2010			$12.36	$19.03	$25.87	$32.61	$39.16	$45.47	$51.47	$57.19	$62.63	$67.80	$72.71	$77.39
15	5	Net Present Value -2011				$13.99	$21.31	$28.54	$35.56	$42.31	$48.75	$54.87	$60.70	$66.24	$71.51	$76.51
16	6	Net Present Value -2012					$15.51	$23.25	$30.78	$38.01	$44.91	$51.47	$57.71	$63.65	$69.29	$74.66

Row	Q	R	S	T	U	V	W	X	Y	Z	AA	AB
4	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
7	$10.03	$10.25	$10.47	$10.70	$10.93	$11.17	$11.42	$11.67	$11.92	$12.19	$12.45	$12.73
8	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*
9	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*
10	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*
11	*11.68*	*11.90*	*12.13*	*12.35*	*12.59*	*12.83*	*13.07*	*13.32*	*13.58*	*13.84*	*14.11*	*14.38*
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
13	$11.68	$11.90	$12.13	$12.35	$12.59	$12.83	$13.07	$13.32	$13.58	$13.84	$14.11	$14.38
14	$81.83	$86.05	$90.07	$93.89	$97.52	$100.98	$104.26	$107.39	$110.36	$113.19	$115.88	$118.43
15	$81.27	$85.80	$90.10	$94.20	$98.09	$101.79	$105.31	$108.66	$111.84	$114.87	$117.75	$120.49
16	$79.76	$84.61	$89.22	$93.61	$97.78	$101.74	$105.51	$109.10	$112.51	$115.76	$118.85	$121.79

Row	AC	AD	AE	AF	AG	AH	AI	AJ
4	2035	2036	2037	2038	2039	2040	2041	
7	$13.01	$13.29	$13.58	$13.88	$14.19	$14.50	$14.82	$15.14
8	*25*	*26*	*27*	*28*	*29*	*30*	*31*	
9	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	
10	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*		
11	*14.66*	*14.95*	*15.24*	*15.54*	*15.84*	*16.15*	*16.31*	
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
13	$14.66	$14.95	$15.24	$15.54	$15.84	$16.15	$16.31	
14	$120.87	$123.18	$125.39	$127.49	$129.48	$131.38	$133.17	
15	$123.10	$125.59	$127.95	$130.19	$132.33	$134.37	$136.28	
16	$124.58	$127.24	$129.77	$132.18	$134.47	$136.65	$138.70	

Row	A	B	C	D	E	G	H	J	K	L
19		**ELECTRICITY**								
20		Incremental Cost of Elec	$ Per kWh	$0.12						
21		Incremental Cost of E Capacity	$ Per kW/a	$170.00						
25	RETAIL									
26				Rate	Customers	789,928	Total Customers in BC	80,000	Total Residential and Commercial Customers on VI	
27		Residential Retail			*000's*					
28		**TGI**	$ Per MJ	$0.0100	640	712,304	Total Residential Customers in BC			
29		**TGVI**	$ Per MJ	$0.0143	72					
30		**Electricity**	$ Per MJ	$0.0230						
31		**Electricity**	$ per kWh	$0.0827	1,511	1,511,435	Total BCH Residential Customers in BC			89%
32		**Electricity**	$ per kW per year							
33		Commercial Retail								
34		**TGI**	$ Per MJ	$0.0094	78	77,624	Total Commercial Customers in BC			
35		**TGVI**	$ Per MJ	$0.0169	8					
36		**Electricity**	$ Per MJ	$0.0214						
37		**Electricity**	$ per kWh	$0.0769	190	189,764	Total Light Industrial and Commercial Customers in BC			
38		**Electricity**	$ per kW per year	$52.0000	15					

Row	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
40	TAX															
41			Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
42	1		*Year*		*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*
43	2	Carbon	$ Per tonne		$20.00	$25.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00
44	3	Carbon	$ Per GJ		$0.9976	$1.2470	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964
45	4	GDP Deflator			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
46	5	Carbon (Real)			$1.00	$1.25	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50
47	6	Net Present Value -2010				$2.02	$3.23	$4.37	$5.43	$6.42	$7.34	$8.20	$9.00	$9.75	$10.45	$11.11
48	7	Net Present Value -2011					$2.47	$3.68	$4.82	$5.88	$6.87	$7.79	$8.65	$9.45	$10.20	$10.90
49	8	Net Present Value -2012						$2.70	$3.92	$5.05	$6.11	$7.10	$8.02	$8.88	$9.69	$10.44

Row	Q	R	S	T	U	V	W	X	Y	Z	AA	AB
41	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
42	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*21*	*22*	*23*
43	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00
44	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964
45	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
46	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50
47	$11.72	$12.29	$12.82	$13.31	$13.78	$14.21	$14.61	$14.99	$15.34	$15.67	$15.97	$16.26
48	$11.56	$12.17	$12.74	$13.27	$13.76	$14.23	$14.66	$15.06	$15.44	$15.79	$16.12	$16.42
49	$11.14	$11.79	$12.40	$12.97	$13.50	$14.00	$14.46	$14.89	$15.29	$15.67	$16.02	$16.35

Row	AC	AD	AE	AF	AG	AH	AI
41	2034	2035	2036	2037	2038	2039	2040
42	*24*	*25*	*26*	*27*	*28*	*29*	*30*
43	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00
44	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964
45	1.00	1.00	1.00	1.00	1.00	1.00	1.00
46	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50
47	$16.52	$16.77	$17.00	$17.22	$17.42	$17.61	$17.79
48	$16.71	$16.97	$17.22	$17.45	$17.67	$17.87	$18.06
49	$16.65	$16.94	$17.21	$17.45	$17.69	$17.90	$18.10

Row	B	C
51	**Discount Rate (real)[1]**	
52	**TERASEN GAS**	
53	**Rate of Inflation**	1.90%
54	**TGI**	7.15%
55	**TGVI**	6.89%
56	**BC HYDRO**	
57	**Rate of Inflation**	2.00%
58	**BC Hydro**	6.00%
59	**Customer**	6.00%
60	*Footnote 1: Source LR 070531*	

Fortis BC

only enter in boxes marked in blue

Measure Data for Solar Residential Hot Water Pilot Program

PER MEASURE			Utility Incentive to the participant	partner incentive
Incremental Cost	$ -			
Total Incentive	$ -			
Participant	$ -			

Annual Impact Per Measure

Energy Savings per installation	0.0	GJ		Average Annnual Energy Savings per Measure
Free Rider Rate / Net-to-Gross	0%	1.00		Net-to-Gross
Alternate Energy Impact		GJ	0	kWh
Alternate Capacity Impact		kW/a		
Measure Lifetime	0	Years	Estimated lifespan of measure	

ANNUAL ACTIVITY	2010 NPV	Total	2010	2011	2012	Explanatory Notes
Number of Installations	1	1	0	1		Estimated Participatation
Impact						
Gross Energy Savings (GJ)	0	0	0	0	0	Extension of Unit Savings x No. of Upgrades
Net Energy Savings (GJ)	0	0	0	0	0	Gross Energy Savings less Free Riders
Alternate Energy Impact (Increase) (kWh)	0	0	0	0	0	Other Utility Billed energy impact
Alternate Capacity Impact (Increase) (kW/a)	$0.00	-				Other Utility Billed capacity impact

Benefit Cost Summary

	2010 NPV	*$ Total*	2010	2011	2012	
Avoided Revenue Requirements						
PV $ per GJ			$0.00	$0.00	$0.00	
Energy Purchases	$ -	$ -	$ -	$ -	$ -	
Utility Program Costs						
DSM Incentives		$ -	$ -	$ -	$ -	
Administration		$ -	$ -	$ -		
Subtotal	$ -	$ -	$ -	$ -	$ -	
Partner Program Costs						
DSM Incentives		$ -	$ -	$ -	$ -	
Administration		$ -	$ -	$ -	$ -	
Subtotal	$ -	$ -	$ -	$ -	$ -	
Participants' Net Costs						
Incremental Cost		$ -	$ -	$ -	$ -	
Subtotal	$ -	$ -	$ -	$ -	$ -	
Alternate Savings - Net						
Energy (Purchases)		$ -	$ -	$ -	$ -	$0.000 PV $ per kWh
Capacity (Purchases)		$ -	$ -	$ -	$ -	PV$ per kW/a
Subtotal	$ -	$ -	$ -	$ -	$ -	
Total Resource Net Benefit (Cost)	$ -		$ -	$ -	$ -	Avoided Revenue Requirement less Utility less Partners less Participant Costs plus Alternate Savings
Utility Levelized Cost per GJ (Lifetime)	$ -		$ -	$ -	$ -	Informational (for comparison with supply options)

Fortis BC

New Initiatives TES Geoexchange Schools Average, TRC Calculation

	PROGRAM															ALTERNATE		NET PRESENT VALUE									BENEFIT/COST							PARAMETERS											
	COSTS ($000)											SAVINGS (GJ)			LIFE	Impact		Levelized Cost	Utility Benefits (Costs)		Participant Benefits (Costs)			Program Net Savings				Participant							UTILITY				PARTICIPANT							
	Utility			Partners																																										
	Incentives	Administration	Total	Incentives	Administration	Total	Participant	Total	% Utility	% Partner	% Participant	Gross	Net-to-Gross	Net	Years	Energy	Capacity	($/GJ)	Program	Alternate	Program	Carbon Tax	Alternate	Natural Gas	Alternate Energy	Alternate Capacity	Natural Gas	Total Costs	Total Benefits	Benefit/Cost	Natural Gas	Total Resource	TRC Net Benefits	Natural Gas Utility Discount Rate	Natural Gas Supply	Alternate Discount Rate	Alternate Supply	Discount Rate	Natural Gas NPV	Carbon Tax NPV	Alternate Energy NPV	Alternate Capacity NPV	Natural Gas Tariff	Energy Tariff	Capacity Tariff
																MWh	kW		($'000s)	($'000s)	($'000s)	($'000s)	($'000s)	(GJ)	(MWh)	(kW)	Utility	($'000s)	($'000s)		Rate Impact		($'000s)	$/GJ		$/kWh		$/GJ	$/GJ	$/kWh	$/kW/a	$/GJ	$/kWh	$/kW/a
Label	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT
Source Sheet or Calculation	Program	Program	B+C	Program	Program	E+F	Program	D+G+H	D/I	G/I	H/I	Program	Program	MxN	Program	Program	Program	D/Y	OxAJ	Q x N x AL	M x N x AN	M x N x AO	N x (QxAP + RxAQ)	PV(AL,P,-O)	PV(AK,P,-Q*N)	PV(AK,P,-R)	T/D	H>0, (V+W)<0	H<0, (V+W)>0, X	AD/AC	T/(V+D)	(T+U)/I	(T+U)-I	Input	Program	Input	Input	Input	PV(AM,P,-InputD25)	Input	PV(AM,P,-InputD28)	PV(AM,P,-InputD29)	Input	Input	Input
2011																																														
Geoexchange Schools Average																																														
Geoexchange Schools Average	0	30	30	0	0	0	310	340	9%	0%	91%	3,330	100%	3,330	20	(260)	-	1	372	(326)	349	53	(225)	34,872	(2,719)	-	12.4	310	176	0.6	1.0	0.1	(293)	7.15%	111.84	7%	1.26	7.2%	104.71	15.79	0.87	0.00	9.999	0.083	-

Row	A	B	C	D	E	F	G	H	I	J	K	L
1	**UTILITY**		**Fortis BC**									
2												
3												
4			**Year**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
5			Units									
6		**NATURAL GAS**										
7		Incremental Cost of Gas (nominal)	$ Per GJ	$5.50	$6.17	$6.81	$7.35	$7.87	$8.26	$8.56	$8.78	$8.99
8	1		*Year*	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
9		carbon tax	$ per GJ	*0.75*	*1.00*	*1.25*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*
10		Distribution adder	$ per GJ	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*
11		Total incremental cost of gas including carbon		*6.41*	*7.32*	*8.21*	*9.01*	*9.52*	*9.92*	*10.22*	*10.43*	*10.64*
12	2	GDP Deflator		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
13	3	Incremental Cost of Gas (Real)		$6.41	$7.32	$8.21	$9.01	$9.52	$9.92	$10.22	$10.43	$10.64
14	4	Net Present Value -2010			$12.36	$19.03	$25.87	$32.61	$39.16	$45.47	$51.47	$57.19
15	5	Net Present Value -2011				$13.99	$21.31	$28.54	$35.56	$42.31	$48.75	$54.87
16	6	Net Present Value -2012					$15.51	$23.25	$30.78	$38.01	$44.91	$51.47
17												
18												
19		**ELECTRICITY**										
20		Incremental Cost of Elec	$ Per kWh	$0.12								
21		Incremental Cost of E Capacity	$ Per kW/a	$170.00								
22												
23												
24												
25	**RETAIL**											
26				Rate	Customers		789,928	Total Customers in BC		80,000	Total Residential and Commercial Customers on VI	
27		Residential Retail			*000's*							
28		**TGI**	$ Per MJ	$0.0100	640		712,304	Total Residential Customers in BC				
29		**TGVI**	$ Per MJ	$0.0143	72							
30		**Electricity**	$ Per MJ	$0.0230								
31		**Electricity**	$ per kWh	$0.0827	1,511		1,511,435	Total BCH Residential Customers in BC				89%
32		**Electricity**	$ per kW per year									
33		Commercial Retail										
34		**TGI**	$ Per MJ	$0.0094	78		77,624	Total Commercial Customers in BC				
35		**TGVI**	$ Per MJ	$0.0169	8							
36		**Electricity**	$ Per MJ	$0.0214								
37		**Electricity**	$ per kWh	$0.0769	190		189,764	Total Light Industrial and Commercial Customers in BC				
38		**Electricity**	$ per kW per year	$52.0000	15							
39												
40	**TAX**											
41			**Year**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
42	1		*Year*		*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*
43	2	Carbon	$ Per tonne		$20.00	$25.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00
44	3	Carbon	$ Per GJ		$0.9976	$1.2470	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964
45	4	GDP Deflator			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
46	5	Carbon (Real)			$1.00	$1.25	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50
47	6	Net Present Value -2010				$2.02	$3.23	$4.37	$5.43	$6.42	$7.34	$8.20
48	7	Net Present Value -2011					$2.47	$3.68	$4.82	$5.88	$6.87	$7.79
49	8	Net Present Value -2012						$2.70	$3.92	$5.05	$6.11	$7.10
50												
51		**Discount Rate (real)**[1]										
52		**TERASEN GAS**										
53		**Rate of Inflation**	1.90%									
54		**TGI**	7.15%									
55		**TGVI**	7.15%									
56		**BC HYDRO**										
57		**Rate of Inflation**	2.00%									
58		**BC Hydro**	7.15%									
59		**Customer**	7.15%									
60		*Footnote 1: Source LR 070531*										
61												
62												
63												

Row	B	M	N	O	P	Q	R	S	T	U	V	W	X	Y
4		**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**
7	Incremental Cost of Gas (nominal)	$9.19	$9.40	$9.60	$9.81	$10.03	$10.25	$10.47	$10.70	$10.93	$11.17	$11.42	$11.67	$11.92
8		*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*21*
9	carbon tax	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*
10	Distribution adder	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*
11	Total incremental cost of gas including carbon	*10.85*	*11.05*	*11.26*	*11.47*	*11.68*	*11.90*	*12.13*	*12.35*	*12.59*	*12.83*	*13.07*	*13.32*	*13.58*
12	GDP Deflator	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
13	Incremental Cost of Gas (Real)	$10.85	$11.05	$11.26	$11.47	$11.68	$11.90	$12.13	$12.35	$12.59	$12.83	$13.07	$13.32	$13.58
14	Net Present Value -2010	$62.63	$67.80	$72.71	$77.39	$81.83	$86.05	$90.07	$93.89	$97.52	$100.98	$104.26	$107.39	$110.36
15	Net Present Value -2011	$60.70	$66.24	$71.51	$76.51	$81.27	$85.80	$90.10	$94.20	$98.09	$101.79	$105.31	$108.66	$111.84
16	Net Present Value -2012	$57.71	$63.65	$69.29	$74.66	$79.76	$84.61	$89.22	$93.61	$97.78	$101.74	$105.51	$109.10	$112.51
41		**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**
42		*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*
43	Carbon	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00
44	Carbon	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964
45	GDP Deflator	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
46	Carbon (Real)	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50
47	Net Present Value -2010	$9.00	$9.75	$10.45	$11.11	$11.72	$12.29	$12.82	$13.31	$13.78	$14.21	$14.61	$14.99	$15.34
48	Net Present Value -2011	$8.65	$9.45	$10.20	$10.90	$11.56	$12.17	$12.74	$13.27	$13.76	$14.23	$14.66	$15.06	$15.44
49	Net Present Value -2012	$8.02	$8.88	$9.69	$10.44	$11.14	$11.79	$12.40	$12.97	$13.50	$14.00	$14.46	$14.89	$15.29

Row	B	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ
4		**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**	
7	Incremental Cost of Gas (nominal)	$12.19	$12.45	$12.73	$13.01	$13.29	$13.58	$13.88	$14.19	$14.50	$14.82	$15.14
8		*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*	*31*	
9	carbon tax	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	
10	Distribution adder	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*		
11	Total incremental cost of gas including carbon	*13.84*	*14.11*	*14.38*	*14.66*	*14.95*	*15.24*	*15.54*	*15.84*	*16.15*	*16.31*	
12	GDP Deflator	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
13	Incremental Cost of Gas (Real)	$13.84	$14.11	$14.38	$14.66	$14.95	$15.24	$15.54	$15.84	$16.15	$16.31	
14	Net Present Value -2010	$113.19	$115.88	$118.43	$120.87	$123.18	$125.39	$127.49	$129.48	$131.38	$133.17	
15	Net Present Value -2011	$114.87	$117.75	$120.49	$123.10	$125.59	$127.95	$130.19	$132.33	$134.37	$136.28	
16	Net Present Value -2012	$115.76	$118.85	$121.79	$124.58	$127.24	$129.77	$132.18	$134.47	$136.65	$138.70	
41		**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	
42		*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*	
43	Carbon	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	
44	Carbon	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	
45	GDP Deflator	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
46	Carbon (Real)	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	
47	Net Present Value -2010	$15.67	$15.97	$16.26	$16.52	$16.77	$17.00	$17.22	$17.42	$17.61	$17.79	
48	Net Present Value -2011	$15.79	$16.12	$16.42	$16.71	$16.97	$17.22	$17.45	$17.67	$17.87	$18.06	
49	Net Present Value -2012	$15.67	$16.02	$16.35	$16.65	$16.94	$17.21	$17.45	$17.69	$17.90	$18.10	

Fortis BC

only enter in boxes marked in blue

Measure Data for Geoexchange Schools Average

PER MEASURE			Utility Incentive to the participant	partner incentive
Incremental Cost	$ 309,667			
Total Incentive	$ -			
Participant	**$ 309,667**			

Annual Impact Per Measure

Energy Savings per installation	**3330.1**	GJ		Average Annnual Energy Savings per Measure
Free Rider Rate / Net-to-Gross	**0%**	1.00		Net-to-Gross
Alternate Energy Impact	**-935**	GJ	-259,611	kWh
Alternate Capacity Impact		kW/a		
Measure Lifetime	**20**	Years	Estimated lifespan of measure	

ANNUAL ACTIVITY	2010 NPV	Total	2010	2011	2012	Explanatory Notes
Number of Installations						
	1	1	**0**	**1**		Estimated Participatation
Impact						
Gross Energy Savings (GJ)	3,108	3,330	0	3,330	0	Extension of Unit Savings x No. of Upgrades
Net Energy Savings (GJ)	3,108	3,330	0	3,330	0	Gross Energy Savings less Free Riders
Alternate Energy Impact (Increase) (kWh)	(242,288)	(259,611)	0	(259,611)	0	Other Utility Billed energy impact
Alternate Capacity Impact (Increase) (kW/a)	$0.00	-				Other Utility Billed capacity impact

Benefit Cost Summary

	2010 NPV	*$ Total*	2010	2011	2012	
Avoided Revenue Requirements						
PV $ per GJ			$107.39	$111.84	$115.76	
Energy Purchases	$ 372,443	$ 372,443	$ -	$ 372,443	$ -	
Utility Program Costs						
DSM Incentives		$ -	$ -	$ -	$ -	
Administration		$ 30,000	**$ -**	**$ 30,000**		
Subtotal	$ 27,998	$ 30,000	$ -	$ 30,000	$ -	
Partner Program Costs						
DSM Incentives		$ -	$ -	$ -	$ -	
Administration		$ -	**$ -**	**$ -**	**$ -**	
Subtotal	$ -	$ -	$ -	$ -	$ -	
Participants' Net Costs						
Incremental Cost		$ 309,667	$ -	$ 309,667	$ -	
Subtotal	$ 289,003	$ 309,667	$ -	$ 309,667	$ -	
Alternate Savings - Net						
Energy (Purchases)		$ (326,226)	$ -	$ (326,226)	$ -	$1.257 PV $ per kWh
Capacity (Purchases)		$ -	$ -	$ -	$ -	PV$ per kW/a
Subtotal	$ (326,226)	$ (326,226)	$ -	$ (326,226)	$ -	
Total Resource Net Benefit (Cost)	$ (270,784)		$ -	$ (293,450)	$ -	Avoided Revenue Requirement less Utility less Partners less Participant Costs plus Alternate Savings
Utility Levelized Cost per GJ (Lifetime)	**$ 9.7**		**$ -**	**$ 9.7**	**$ -**	Informational (for comparison with supply options)

Fortis BC

New Initiatives TES Geoexchange
Elementary Schools, TRC Calculation

	PROGRAM															ALTERNATE		NET PRESENT VALUE									BENEFIT/COST							PARAMETERS											
	COSTS ($000)											SAVINGS (GJ)			LIFE	Impact		Levelized Cost	Utility Benefits (Costs)		Participant Benefits (Costs)			Program Net Savings				Participant							UTILITY				PARTICIPANT							
	Utility			Partners																																										
	Incentives	Administration	Total	Incentives	Administration	Total	Participant	Total	% Utility	% Partner	% Participant	Gross	Net-to-Gross	Net	Years	Energy	Capacity	($/GJ)	Program	Alternate	Program	Carbon Tax	Alternate	Natural Gas	Alternate Energy	Alternate Capacity	Natural Gas	Total Costs	Total Benefits	Benefit/Cost	Natural Gas	Total Resource	TRC Net Benefits	Natural Gas Utility Discount Rate	Natural Gas Supply	Alternate Discount Rate	Alternate Supply	Discount Rate	Natural Gas NPV	Carbon Tax NPV	Alternate Energy NPV	Alternate Capacity NPV	Natural Gas Tariff	Energy Tariff	Capacity Tariff
																MWh	kW		($'000s)	($'000s)	($'000s)	($'000s)	($'000s)	(GJ)	(MWh)	(kW)	Utility	($'000s)	($'000s)		Rate Impact		($'000s)	$/GJ		$/kWh		$/GJ	$/GJ	$/kWh	$/kW/a	$/GJ	$/kWh	$/kW/a
Label	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT
Source Sheet or Calculation	Program	Program	B+C	Program	Program	E+F	Program	D+G+H	D/I	G/I	H/I	Program	Program	MxN	Program	Program	Program	D/Y	OxAJ	Q x N x AL	M x N x AN	M x N x AO	N x (QxAP + RxAQ)	PV(AL,P,-O)	PV(AK,P,-Q*N)	PV(AK,P,-R)	T/D	H>0, (V+W)<0	H<0, (V+W)>0, X	AD/AC	T/(V+D)	(T+U)/I	(T+U)-I	Input	Program	Input	Input	Input	PV(AM,P,-InputD25)	Input	PV(AM,P,-InputD28)	PV(AM,P,-InputD29)	Input	Input	Input
2011																																														
Geoexchange - Elementary																																														
Geoexchange - Elementary	0	30	30	0	0	0	167	197	15%	0%	85%	1,011	100%	1,011	20	(153)	-	3	113	(193)	106	16	(133)	10,587	(1,606)	-	3.8	167	(11)	(0.1)	0.8	(0.4)	(276)	7.15%	111.84	7%	1.26	7.2%	104.71	15.79	0.87	0.00	9.999	0.083	-

Row	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	**UTILITY**		**Fortis BC**											
2														
3														
4			**Year**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
5			Units											
6		**NATURAL GAS**												
7		Incremental Cost of Gas (nominal)	$ Per GJ	$5.50	$6.17	$6.81	$7.35	$7.87	$8.26	$8.56	$8.78	$8.99	$9.19	$9.40
8	1		*Year*	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
9		carbon tax	$ per GJ	*0.75*	*1.00*	*1.25*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*
10		Distribution adder	$ per GJ	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*
11		Total incremental cost of gas including carbon		*6.41*	*7.32*	*8.21*	*9.01*	*9.52*	*9.92*	*10.22*	*10.43*	*10.64*	*10.85*	*11.05*
12	2	GDP Deflator		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
13	3	Incremental Cost of Gas (Real)		$6.41	$7.32	$8.21	$9.01	$9.52	$9.92	$10.22	$10.43	$10.64	$10.85	$11.05
14	4	Net Present Value -2010			$12.36	$19.03	$25.87	$32.61	$39.16	$45.47	$51.47	$57.19	$62.63	$67.80
15	5	Net Present Value -2011				$13.99	$21.31	$28.54	$35.56	$42.31	$48.75	$54.87	$60.70	$66.24
16	6	Net Present Value -2012					$15.51	$23.25	$30.78	$38.01	$44.91	$51.47	$57.71	$63.65
17														
18														
19		**ELECTRICITY**												
20		Incremental Cost of Elec	$ Per kWh	$0.12										
21		Incremental Cost of E Capacity	$ Per kW/a	$170.00										
22														
23														
24														
25	**RETAIL**													
26				Rate	Customers		789,928	Total Customers in BC		80,000	Total Residential and Commercial Customers on VI			
27		Residential Retail			*000's*									
28		**TGI**	$ Per MJ	$0.0100	640		712,304	Total Residential Customers in BC						
29		**TGVI**	$ Per MJ	$0.0143	72									
30		**Electricity**	$ Per MJ	$0.0230										
31		**Electricity**	$ per kWh	$0.0827	1,511		1,511,435	Total BCH Residential Customers in BC				89%		
32		**Electricity**	$ per kW per year											
33		Commercial Retail												
34		**TGI**	$ Per MJ	$0.0094	78		77,624	Total Commercial Customers in BC						
35		**TGVI**	$ Per MJ	$0.0169	8									
36		**Electricity**	$ Per MJ	$0.0214										
37		**Electricity**	$ per kWh	$0.0769	190		189,764	Total Light Industrial and Commercial Customers in BC						
38		**Electricity**	$ per kW per year	$52.0000	15									
39														
40	**TAX**													
41			**Year**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
42	1		*Year*		*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
43	2	Carbon	$ Per tonne		$20.00	$25.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00
44	3	Carbon	$ Per GJ		$0.9976	$1.2470	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964
45	4	GDP Deflator			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
46	5	Carbon (Real)			$1.00	$1.25	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50
47	6	Net Present Value -2010				$2.02	$3.23	$4.37	$5.43	$6.42	$7.34	$8.20	$9.00	$9.75
48	7	Net Present Value -2011					$2.47	$3.68	$4.82	$5.88	$6.87	$7.79	$8.65	$9.45
49	8	Net Present Value -2012						$2.70	$3.92	$5.05	$6.11	$7.10	$8.02	$8.88
50														
51		**Discount Rate (real)**[1]												
52		**TERASEN GAS**												
53		**Rate of Inflation**	1.90%											
54		**TGI**	7.15%											
55		**TGVI**	7.15%											
56		**BC HYDRO**												
57		**Rate of Inflation**	2.00%											
58		**BC Hydro**	7.15%											
59		**Customer**	7.15%											
60		*Footnote 1: Source LR 070531*												
61														
62														

Row	B	O	P	Q	R	S	T	U	V	W	X	Y
4		**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**
7	Incremental Cost of Gas (nominal)	$9.60	$9.81	$10.03	$10.25	$10.47	$10.70	$10.93	$11.17	$11.42	$11.67	$11.92
8		*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*21*
9	carbon tax	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*
10	Distribution adder	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*
11	Total incremental cost of gas including carbon	*11.26*	*11.47*	*11.68*	*11.90*	*12.13*	*12.35*	*12.59*	*12.83*	*13.07*	*13.32*	*13.58*
12	GDP Deflator	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
13	Incremental Cost of Gas (Real)	$11.26	$11.47	$11.68	$11.90	$12.13	$12.35	$12.59	$12.83	$13.07	$13.32	$13.58
14	Net Present Value -2010	$72.71	$77.39	$81.83	$86.05	$90.07	$93.89	$97.52	$100.98	$104.26	$107.39	$110.36
15	Net Present Value -2011	$71.51	$76.51	$81.27	$85.80	$90.10	$94.20	$98.09	$101.79	$105.31	$108.66	$111.84
16	Net Present Value -2012	$69.29	$74.66	$79.76	$84.61	$89.22	$93.61	$97.78	$101.74	$105.51	$109.10	$112.51
41		**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**
42		*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*
43	Carbon	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00
44	Carbon	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964
45	GDP Deflator	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
46	Carbon (Real)	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50
47	Net Present Value -2010	$10.45	$11.11	$11.72	$12.29	$12.82	$13.31	$13.78	$14.21	$14.61	$14.99	$15.34
48	Net Present Value -2011	$10.20	$10.90	$11.56	$12.17	$12.74	$13.27	$13.76	$14.23	$14.66	$15.06	$15.44
49	Net Present Value -2012	$9.69	$10.44	$11.14	$11.79	$12.40	$12.97	$13.50	$14.00	$14.46	$14.89	$15.29

Row	B	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ
4		**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**	
7	Incremental Cost of Gas (nominal)	$12.19	$12.45	$12.73	$13.01	$13.29	$13.58	$13.88	$14.19	$14.50	$14.82	$15.14
8		*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*	*31*	
9	carbon tax	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	
10	Distribution adder	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*		
11	Total incremental cost of gas including carbon	*13.84*	*14.11*	*14.38*	*14.66*	*14.95*	*15.24*	*15.54*	*15.84*	*16.15*	*16.31*	
12	GDP Deflator	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
13	Incremental Cost of Gas (Real)	$13.84	$14.11	$14.38	$14.66	$14.95	$15.24	$15.54	$15.84	$16.15	$16.31	
14	Net Present Value -2010	$113.19	$115.88	$118.43	$120.87	$123.18	$125.39	$127.49	$129.48	$131.38	$133.17	
15	Net Present Value -2011	$114.87	$117.75	$120.49	$123.10	$125.59	$127.95	$130.19	$132.33	$134.37	$136.28	
16	Net Present Value -2012	$115.76	$118.85	$121.79	$124.58	$127.24	$129.77	$132.18	$134.47	$136.65	$138.70	
41		**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	
42		*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*	
43	Carbon	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	
44	Carbon	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	
45	GDP Deflator	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
46	Carbon (Real)	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	
47	Net Present Value -2010	$15.67	$15.97	$16.26	$16.52	$16.77	$17.00	$17.22	$17.42	$17.61	$17.79	
48	Net Present Value -2011	$15.79	$16.12	$16.42	$16.71	$16.97	$17.22	$17.45	$17.67	$17.87	$18.06	
49	Net Present Value -2012	$15.67	$16.02	$16.35	$16.65	$16.94	$17.21	$17.45	$17.69	$17.90	$18.10	

Fortis BC

only enter in boxes marked in blue

Measure Data for Geoexchange - Elementary

PER MEASURE			Utility Incentive to the participant	partner incentive
Incremental Cost	$ 166,631			
Total Incentive	$ -			
Participant	**$ 166,631**			

Annual Impact Per Measure

Energy Savings per installation	**1011.0**	GJ		Average Annnual Energy Savings per Measure
Free Rider Rate / Net-to-Gross	**0%**	1.00		Net-to-Gross
Alternate Energy Impact	**-552**	GJ	-153,333	kWh
Alternate Capacity Impact		kW/a		
Measure Lifetime	**20**	Years	Estimated lifespan of measure	

ANNUAL ACTIVITY	2010 NPV	Total	2010	2011	2012	Explanatory Notes
Number of Installations						
	1	1	**0**	**1**		Estimated Participatation
Impact						
Gross Energy Savings (GJ)	944	1,011	0	1,011	0	Extension of Unit Savings x No. of Upgrades
Net Energy Savings (GJ)	944	1,011	0	1,011	0	Gross Energy Savings less Free Riders
Alternate Energy Impact (Increase) (kWh)	(143,102)	(153,333)	0	(153,333)	0	Other Utility Billed energy impact
Alternate Capacity Impact (Increase) (kW/a)	$0.00	-				Other Utility Billed capacity impact

Benefit Cost Summary

	2010 NPV	*$ Total*	2010	2011	2012	
Avoided Revenue Requirements						
PV $ per GJ			$107.39	$111.84	$115.76	
Energy Purchases	$ 113,072	$ 113,072	$ -	$ 113,072	$ -	
Utility Program Costs						
DSM Incentives		$ -	$ -	$ -	$ -	
Administration		$ 30,000	**$ -**	**$ 30,000**		
Subtotal	$ 27,998	$ 30,000	$ -	$ 30,000	$ -	
Partner Program Costs						
DSM Incentives		$ -	$ -	$ -	$ -	
Administration		$ -	**$ -**	**$ -**	**$ -**	
Subtotal	$ -	$ -	$ -	$ -	$ -	
Participants' Net Costs						
Incremental Cost		$ 166,631	$ -	$ 166,631	$ -	
Subtotal	$ 155,512	$ 166,631	$ -	$ 166,631	$ -	
Alternate Savings - Net						
Energy (Purchases)		$ (192,678)	$ -	$ (192,678)	$ -	$1.257 PV $ per kWh
Capacity (Purchases)		$ -	$ -	$ -	$ -	PV$ per kW/a
Subtotal	$ (192,678)	$ (192,678)	$ -	$ (192,678)	$ -	
Total Resource Net Benefit (Cost)	$ (263,116)		$ -	$ (276,237)	$ -	Avoided Revenue Requirement less Utility less Partners less Participant Costs plus Alternate Savings
Utility Levelized Cost per GJ (Lifetime)	**$ 18.6**		**$ -**	**$ 18.6**	**$ -**	Informational (for comparison with supply options)

Fortis BC

New Initiatives TES Geoexchange
Secondary Schools, TRC Calculation

	PROGRAM															ALTERNATE		NET PRESENT VALUE									BENEFIT/COST							PARAMETERS										
	COSTS ($000)											SAVINGS (GJ)			LIFE	Impact		Levelized Cost	Utility Benefits (Costs)		Participant Benefits (Costs)			Program Net Savings				Participant							UTILITY				PARTICIPANT							
	Utility			Partners																																									
	Incentives	Administration	Total	Incentives	Administration	Total	Participant	Total	% Utility	% Partner	% Participant	Gross	Net-to-Gross	Net	Years	Energy	Capacity	($/GJ)	Program	Alternate	Program	Carbon Tax	Alternate	Natural Gas	Alternate Energy	Alternate Capacity	Natural Gas	Total Costs	Total Benefits	Benefit/Cost	Natural Gas	Total Resource	TRC Net Benefits	Natural Gas Utility Discount Rate	Natural Gas Supply	Alternate Discount Rate	Alternate Supply	Discount Rate	Natural Gas NPV	Carbon Tax NPV	Alternate Energy NPV	Alternate Capacity NPV	Natural Gas Tariff	Energy Tariff	Capacity Tariff
																MWh	kW		($'000s)	($'000s)	($'000s)	($'000s)	($'000s)	(GJ)	(MWh)	(kW)	Utility	($'000s)	($'000s)		Rate Impact		($'000s)	$/GJ		$/kWh		$/GJ	$/GJ	$/kWh	$/kW/a	$/GJ	$/kWh	$/kW/a
Label	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT
Source Sheet or Calculation	Program	Program	B+C	Program	Program	E+F	Program	D+G+H	D/I	G/I	H/I	Program	Program	MxN	Program	Program	Program	D/Y	OxAJ	Q x N x AL	M x N x AN	M x N x AO	N x (QxAP + RxAQ)	PV(AL,P,-O)	PV(AK,P,-Q*N)	PV(AK,P,-R)	T/D	H>0, (V+W)<0	H<0, (V+W)>0, X	AD/AC	T/(V+D)	(T+U)/I	(T+U)-I	Input	Program	Input	Input	Input	PV(AM,P,-InputD25)	Input	PV(AM,P,-InputD28)	PV(AM,P,-InputD29)	Input	Input	Input
2011																																													
Geoexchange - Secondary																																													
Geoexchange - Secondary	0	30	30	0	0	0	524	554	5%	0%	95%	6,223	100%	6,223	20	(419)	-	0	696	(527)	652	98	(363)	65,165	(4,389)	-	23.2	524	387	0.7	1.0	0.3	(385)	7.15%	111.84	7%	1.26	7.2%	104.71	15.79	0.87	0.00	9.999	0.083	-

Row	A	B	C	D	E	F	G	H	I	J	K	L
1	**UTILITY**		**Fortis BC**									
2												
3												
4			**Year**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
5			Units									
6		**NATURAL GAS**										
7		Incremental Cost of Gas (nominal)	$ Per GJ	$5.50	$6.17	$6.81	$7.35	$7.87	$8.26	$8.56	$8.78	$8.99
8	1		*Year*	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
9		carbon tax	$ per GJ	*0.75*	*1.00*	*1.25*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*
10		Distribution adder	$ per GJ	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*
11		Total incremental cost of gas including carbon		*6.41*	*7.32*	*8.21*	*9.01*	*9.52*	*9.92*	*10.22*	*10.43*	*10.64*
12	2	GDP Deflator		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
13	3	Incremental Cost of Gas (Real)		$6.41	$7.32	$8.21	$9.01	$9.52	$9.92	$10.22	$10.43	$10.64
14	4	Net Present Value -2010			$12.36	$19.03	$25.87	$32.61	$39.16	$45.47	$51.47	$57.19
15	5	Net Present Value -2011				$13.99	$21.31	$28.54	$35.56	$42.31	$48.75	$54.87
16	6	Net Present Value -2012					$15.51	$23.25	$30.78	$38.01	$44.91	$51.47
17												
18												
19		**ELECTRICITY**										
20		Incremental Cost of Elec	$ Per kWh	$0.12								
21		Incremental Cost of E Capacity	$ Per kW/a	$170.00								
22												
23												
24												
25	**RETAIL**											
26				Rate	Customers		789,928	Total Customers in BC		80,000	Total Residential and Commercial Customers on VI	
27		Residential Retail			*000's*							
28		**TGI**	$ Per MJ	$0.0100	640		712,304	Total Residential Customers in BC				
29		**TGVI**	$ Per MJ	$0.0143	72							
30		**Electricity**	$ Per MJ	$0.0230								
31		**Electricity**	$ per kWh	$0.0827	1,511		1,511,435	Total BCH Residential Customers in BC				89%
32		**Electricity**	$ per kW per year									
33		Commercial Retail										
34		**TGI**	$ Per MJ	$0.0094	78		77,624	Total Commercial Customers in BC				
35		**TGVI**	$ Per MJ	$0.0169	8							
36		**Electricity**	$ Per MJ	$0.0214								
37		**Electricity**	$ per kWh	$0.0769	190		189,764	Total Light Industrial and Commercial Customers in BC				
38		**Electricity**	$ per kW per year	$52.0000	15							
39												
40	**TAX**											
41			**Year**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
42	1		*Year*		*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*
43	2	Carbon	$ Per tonne		$20.00	$25.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00
44	3	Carbon	$ Per GJ		$0.9976	$1.2470	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964
45	4	GDP Deflator			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
46	5	Carbon (Real)			$1.00	$1.25	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50
47	6	Net Present Value -2010				$2.02	$3.23	$4.37	$5.43	$6.42	$7.34	$8.20
48	7	Net Present Value -2011					$2.47	$3.68	$4.82	$5.88	$6.87	$7.79
49	8	Net Present Value -2012						$2.70	$3.92	$5.05	$6.11	$7.10
50												
51		**Discount Rate (real)[1]**										
52		**TERASEN GAS**										
53		**Rate of Inflation**	1.90%									
54		**TGI**	7.15%									
55		**TGVI**	7.15%									
56		**BC HYDRO**										
57		**Rate of Inflation**	2.00%									
58		**BC Hydro**	7.15%									
59		**Customer**	7.15%									
60		*Footnote 1: Source LR 070531*										
61												
62												

Row	M	N	O	P	Q	R	S	T	U	V	W	X
4	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**
7	$9.19	$9.40	$9.60	$9.81	$10.03	$10.25	$10.47	$10.70	$10.93	$11.17	$11.42	$11.67
8	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*
9	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*
10	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*
11	*10.85*	*11.05*	*11.26*	*11.47*	*11.68*	*11.90*	*12.13*	*12.35*	*12.59*	*12.83*	*13.07*	*13.32*
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
13	$10.85	$11.05	$11.26	$11.47	$11.68	$11.90	$12.13	$12.35	$12.59	$12.83	$13.07	$13.32
14	$62.63	$67.80	$72.71	$77.39	$81.83	$86.05	$90.07	$93.89	$97.52	$100.98	$104.26	$107.39
15	$60.70	$66.24	$71.51	$76.51	$81.27	$85.80	$90.10	$94.20	$98.09	$101.79	$105.31	$108.66
16	$57.71	$63.65	$69.29	$74.66	$79.76	$84.61	$89.22	$93.61	$97.78	$101.74	$105.51	$109.10
41	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**
42	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*
43	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00
44	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964
45	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
46	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50
47	$9.00	$9.75	$10.45	$11.11	$11.72	$12.29	$12.82	$13.31	$13.78	$14.21	$14.61	$14.99
48	$8.65	$9.45	$10.20	$10.90	$11.56	$12.17	$12.74	$13.27	$13.76	$14.23	$14.66	$15.06
49	$8.02	$8.88	$9.69	$10.44	$11.14	$11.79	$12.40	$12.97	$13.50	$14.00	$14.46	$14.89

Row	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ
4	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**	
7	$11.92	$12.19	$12.45	$12.73	$13.01	$13.29	$13.58	$13.88	$14.19	$14.50	$14.82	$15.14
8	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*	*31*	
9	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	
10	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*		
11	*13.58*	*13.84*	*14.11*	*14.38*	*14.66*	*14.95*	*15.24*	*15.54*	*15.84*	*16.15*	*16.31*	
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
13	$13.58	$13.84	$14.11	$14.38	$14.66	$14.95	$15.24	$15.54	$15.84	$16.15	$16.31	
14	$110.36	$113.19	$115.88	$118.43	$120.87	$123.18	$125.39	$127.49	$129.48	$131.38	$133.17	
15	$111.84	$114.87	$117.75	$120.49	$123.10	$125.59	$127.95	$130.19	$132.33	$134.37	$136.28	
16	$112.51	$115.76	$118.85	$121.79	$124.58	$127.24	$129.77	$132.18	$134.47	$136.65	$138.70	
41	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	
42	*20*	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*	
43	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	
44	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	
45	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
46	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	
47	$15.34	$15.67	$15.97	$16.26	$16.52	$16.77	$17.00	$17.22	$17.42	$17.61	$17.79	
48	$15.44	$15.79	$16.12	$16.42	$16.71	$16.97	$17.22	$17.45	$17.67	$17.87	$18.06	
49	$15.29	$15.67	$16.02	$16.35	$16.65	$16.94	$17.21	$17.45	$17.69	$17.90	$18.10	

Fortis BC

only enter in boxes marked in blue

Measure Data for Geoexchange - Secondary

PER MEASURE			Utility Incentive to the participant	partner incentive
Incremental Cost	$ 524,221			
Total Incentive	$ -			
Participant	**$ 524,221**			

Annual Impact Per Measure

Energy Savings per installation	6223.0	GJ		Average Annnual Energy Savings per Measure
Free Rider Rate / Net-to-Gross	0%	1.00		Net-to-Gross
Alternate Energy Impact	-1509	GJ	-419,167	kWh
Alternate Capacity Impact		kW/a		
Measure Lifetime	20	Years	Estimated lifespan of measure	

ANNUAL ACTIVITY	2010 NPV	Total	2010	2011	2012	Explanatory Notes
Number of Installations	1	1	0	1		Estimated Participatation
Impact						
Gross Energy Savings (GJ)	5,808	6,223	0	6,223	0	Extension of Unit Savings x No. of Upgrades
Net Energy Savings (GJ)	5,808	6,223	0	6,223	0	Gross Energy Savings less Free Riders
Alternate Energy Impact (Increase) (kWh)	(391,196)	(419,167)	0	(419,167)	0	Other Utility Billed energy impact
Alternate Capacity Impact (Increase) (kW/a)	$0.00	-				Other Utility Billed capacity impact

Benefit Cost Summary

	2010 NPV	*$ Total*	2010	2011	2012	
Avoided Revenue Requirements						
PV $ per GJ			$107.39	$111.84	$115.76	
Energy Purchases	$ 695,989	$ 695,989	$ -	$ 695,989	$ -	
Utility Program Costs						
DSM Incentives		$ -	$ -	$ -	$ -	
Administration		$ 30,000	$ -	$ 30,000		
Subtotal	$ 27,998	$ 30,000	$ -	$ 30,000	$ -	
Partner Program Costs						
DSM Incentives		$ -	$ -	$ -	$ -	
Administration		$ -	$ -	$ -	$ -	
Subtotal	$ -	$ -	$ -	$ -	$ -	
Participants' Net Costs						
Incremental Cost		$ 524,221	$ -	$ 524,221	$ -	
Subtotal	$ 489,240	$ 524,221	$ -	$ 524,221	$ -	
Alternate Savings - Net						
Energy (Purchases)		$ (526,723)	$ -	$ (526,723)	$ -	$1.257 PV $ per kWh
Capacity (Purchases)		$ -	$ -	$ -	$ -	PV$ per kW/a
Subtotal	$ (526,723)	$ (526,723)	$ -	$ (526,723)	$ -	
Total Resource Net Benefit (Cost)	$ (347,972)		$ -	$ (384,955)	$ -	Avoided Revenue Requirement less Utility less Partners less Participant Costs plus Alternate Savings
Utility Levelized Cost per GJ (Lifetime)	**$ 8.5**		**$ -**	**$ 8.5**	**$ -**	Informational (for comparison with supply options)

FORTIS BC

New Initiatives Furnace Scrap It, SCT Calculation	PROGRAM															ALTERNATE		NET PRESENT VALUE									BENEFIT/COST							PARAMETERS										
	COSTS ($000)											SAVINGS (GJ)			LIFE	Impact		Levelized Cost	Utility Benefits (Costs)		Participant Benefits (Costs)			Program Net Savings			Natural Gas	Participant							UTILITY				PARTICIPANT						
FEI	Utility			Partners											Years	Energy	Capacity	($/GJ)	Program	Alternate	Program	Carbon Tax	Alternate	Natural Gas	Alternate Energy	Alternate Capacity		Total Costs	Total Benefits	Benefit/Cost	Natural Gas		Benefits	Natural Gas Utility Discount Rate	Natural Gas Supply	Alternate Discount Rate	Alternate Supply	Discount Rate	Natural Gas NPV	Carbon Tax NPV	Alternate Energy NPV	Alternate Capacity NPV	Natural Gas Tariff	Energy Tariff	Capacity Tariff
	Incentives	Administration	Total	Incentives	Administration	Total	Participant	Total	% Utility	% Partner	% Participant	Gross	Net-to-Gross	Net		MWh	kW		($'000s)	($'000s)	($'000s)	($'000s)	($'000s)	(GJ)	(MWh)	(kW)	Utility	($'000s)	($'000s)		Rate Impact	Societal Cost	($'000s)		$/GJ		$/kWh		$/GJ	$/GJ	$/kWh	$/kW/a	$/GJ	$/kWh	$/kW/a
Label	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT
Source Sheet or Calculation	Program	Program	B+C	Program	Program	E+F	Program	D+G+H	D/I	G/I	H/I	Program	Program	MwN	Program	Program	Program	D/Y	OxAJ	Q x N x AL	M x N x AN	M x N x AO	N x (QxAP + RxAQ)	PV(AI,P,-O)	PV(AK,P,-Q*N)	PV(AK,P,-R)	T/D	H=0, (V+W)=0	H=0, (V+W)>0, X	AD/AC	T/(V+D)	(T+U)/I	(T+U)-I	Input	Program	Input	Input	Input	PV(AM,P,-InputD25)	Input	PV(AM,P,-InputD28)	PV(AM,P,-InputD29)	Input	Input	Input
2011																																													
Scrap It																																													
Scrap It	0	0	0	0	0	0	4	4	4%	0%	96%	9	100%	9	18	1	-	1	2	2	1	0	1	119	13	-	15.3	4	2	0.7	1.8	1.2	1	3.00%	221.16	3%	1.65	3.0%	137.52	20.71	1.14	0.00	9.999	0.083	-

	A	B	C	D	E	F	G	H	I	J	K	L
1	UTILITY		FORTIS BC									
2												
3												
4			Year	2010	2011	2012	2013	2014	2015	2016	2017	2018
5			Units									
6		NATURAL GAS										
7		Incremental Cost of Gas (nominal)	$ Per GJ	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28
8	1		*Year*	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
9		carbon tax	$ per GJ	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
10		Distribution adder	$ per GJ	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*
11		Total incremental cost of gas including carbon		*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*
12	2	GDP Deflator		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
13	3	Incremental Cost of Gas (Real)		$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44
14	4	Net Present Value -2010			$29.54	$43.67	$57.39	$70.71	$83.64	$96.20	$108.38	$120.22
15	5	Net Present Value -2011				$29.54	$43.67	$57.39	$70.71	$83.64	$96.20	$108.38
16	6	Net Present Value -2012					$29.54	$43.67	$57.39	$70.71	$83.64	$96.20
17												
18												
19		ELECTRICITY										
20		Incremental Cost of Elec	$ Per kWh	$0.12								
21		Incremental Cost of E Capacity	$ Per kW/a	$170.00								
22												
23												
24												
25	RETAIL											
26				Rate	Customers		789,928	Total Customers in BC		80,000	Total Residential and Commercial Customers on VI	
27		Residential Retail			000's							
28		**TGI**	$ Per MJ	$0.0100	640		712,304	Total Residential Customers in BC				
29		**TGVI**	$ Per MJ	$0.0143	72							
30		**Electricity**	$ Per MJ	$0.0230								
31		**Electricity**	$ per kWh	$0.0827	1,511		1,511,435	Total BCH Residential Customers in BC				89%
32		**Electricity**	$ per kW per year									
33		Commercial Retail										
34		**TGI**	$ Per MJ	$0.0094	78		77,624	Total Commercial Customers in BC				
35		**TGVI**	$ Per MJ	$0.0169	8							
36		**Electricity**	$ Per MJ	$0.0214								
37		**Electricity**	$ per kWh	$0.0769	190		189,764	Total Light Industrial and Commercial Customers in BC				
38		**Electricity**	$ per kW per year	$52.0000	15							
39												
40	TAX											
41			Year	2009	2010	2011	2012	2013	2014	2015	2016	2017
42	1		*Year*		*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*
43	2	Carbon	$ Per tonne		$20.00	$25.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00
44	3	Carbon	$ Per GJ		$0.9976	$1.2470	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964
45	4	GDP Deflator			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
46	5	Carbon (Real)			$1.00	$1.25	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50
47	6	Net Present Value -2010				$2.14	$3.51	$4.84	$6.13	$7.39	$8.60	$9.78
48	7	Net Present Value -2011					$2.62	$3.99	$5.32	$6.61	$7.86	$9.08
49	8	Net Present Value -2012						$2.86	$4.23	$5.56	$6.85	$8.11
50												
51		**Discount Rate (real)**[1]										
52		**TERASEN GAS**										
53		**Rate of Inflation**	1.90%									
54		**TGI**	3.00%									
55		**TGVI**	3.00%									
56		**BC HYDRO**										
57		**Rate of Inflation**	2.00%									
58		**BC Hydro**	3.00%									
59		**Customer**	3.00%									
60		*Footnote 1: Source LR 070531*										
61												
62				**SHEET LABELS**								
63	**New Construction**											
64		Scrap It		**BASEBOARD**								
65		0		**HEATPUMP**								
66												
67												

	M	N	O	P	Q	R	S	T	U	V	W	X	Y
4	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
7	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28
8	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*21*
9	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
10	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*
11	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
13	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44
14	$131.71	$142.86	$153.69	$164.20	$174.41	$184.32	$193.94	$203.28	$212.35	$221.16	$229.71	$238.01	$246.07
15	$120.22	$131.71	$142.86	$153.69	$164.20	$174.41	$184.32	$193.94	$203.28	$212.35	$221.16	$229.71	$238.01
16	$108.38	$120.22	$131.71	$142.86	$153.69	$164.20	$174.41	$184.32	$193.94	$203.28	$212.35	$221.16	$229.71
41	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
42	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*
43	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00
44	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964
45	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
46	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50
47	$10.93	$12.05	$13.13	$14.18	$15.19	$16.18	$17.14	$18.08	$18.98	$19.86	$20.71	$21.54	$22.35
48	$10.26	$11.41	$12.52	$13.60	$14.65	$15.67	$16.66	$17.62	$18.55	$19.46	$20.34	$21.19	$22.02
49	$9.32	$10.50	$11.65	$12.76	$13.85	$14.90	$15.91	$16.90	$17.86	$18.80	$19.70	$20.58	$21.43

	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ
4	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	
7	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.43
8	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*	*31*	
9	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	
10	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*		
11	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.28*	
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
13	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.28	
14	$253.89	$261.48	$268.86	$276.02	$282.97	$289.72	$296.27	$302.63	$308.81	$314.74	
15	$246.07	$253.89	$261.48	$268.86	$276.02	$282.97	$289.72	$296.27	$302.63	$308.74	
16	$238.01	$246.07	$253.89	$261.48	$268.86	$276.02	$282.97	$289.72	$296.27	$302.56	
41	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	
42	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*	
43	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	
44	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	
45	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
46	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	
47	$23.13	$23.89	$24.62	$25.34	$26.03	$26.71	$27.36	$27.99	$28.61	$29.21	
48	$22.82	$23.61	$24.36	$25.10	$25.81	$26.51	$27.18	$27.84	$28.47	$29.09	
49	$22.26	$23.07	$23.85	$24.61	$25.34	$26.06	$26.75	$27.42	$28.08	$28.71	

FORTIS BC

only enter in boxes marked in blue

Measure Data for Scrap It

PER MEASURE			Utility Incentive to the participant	partner incentive
Incremental Cost	$ 3,708			
Total Incentive				$ -
Participant	$ 3,708			

Annual Impact Per Measure

Energy Savings per installation	8.6	GJ		Average Annnual Energy Savings per Measure
Free Rider Rate / Net-to-Gross	0%	1.00		Net-to-Gross
Alternate Energy Impact	4	GJ	976	kWh
Alternate Capacity Impact		kW/a		
Measure Lifetime	18	Years	Estimated lifespan of measure	

ANNUAL ACTIVITY	2009 NPV	Total	2010	2011	2012	Explanatory Notes
Number of Installations						
	1	1	0	1		Estimated Participatation
Impact						
Gross Energy Savings (GJ)	8	9	0	9	0	Extension of Unit Savings x No. of Upgrades
Net Energy Savings (GJ)	8	9	0	9	0	Gross Energy Savings less Free Riders
Alternate Energy Impact (Increase) (kWh)	920	976	0	976	0	Other Utility Billed energy impact
Alternate Capacity Impact (Increase) (kW/a)	$0.00	-				Other Utility Billed capacity impact

Benefit Cost Summary

	2009 NPV	*$ Total*	2010	2011	2012	
Avoided Revenue Requirements						
PV $ per GJ			$221.16	$221.16	$221.16	
Energy Purchases	$ 1,907	$ 1,907	$ -	$ 1,907	$ -	
Utility Program Costs						
DSM Incentives		$ -	$ -	$ -	$ -	
Administration		$ 162	$ -	$ 162		
Subtotal	$ 153	$ 162	$ -	$ 162	$ -	
Partner Program Costs						
DSM Incentives		$ -	$ -	$ -	$ -	
Administration		$ -	$ -	$ -	$ -	
Subtotal	$ -	$ -	$ -	$ -	$ -	
Participants' Net Costs						
Incremental Cost		$ 3,708	$ -	$ 3,708	$ -	
Subtotal	$ 3,495	$ 3,708	$ -	$ 3,708	$ -	
Alternate Savings - Net						
Energy (Purchases)		$ 1,611	$ -	$ 1,611	$ -	$1.650 PV $ per kWh
Capacity (Purchases)		$ -	$ -	$ -	$ -	PV$ per kW/a
Subtotal	$ 1,611	$ 1,611	$ -	$ 1,611	$ -	
Total Resource Net Benefit (Cost)	$ (129)		$ -	$ (352)	$ -	Avoided Revenue Requirement less Utility less Partners less Participant Costs plus Alternate Savings
Utility Levelized Cost per GJ (Lifetime)	**$ 32.6**		**$ -**	**$ 32.6**	**$ -**	Informational (for comparison with supply options)

FORTIS BC

New Initiatives Solar Air, SCT Calculation	PROGRAM															ALTERNATE		NET PRESENT VALUE									BENEFIT/COST							PARAMETERS										
	COSTS ($000)											SAVINGS (GJ)			LIFE	Impact		Levelized Cost	Utility Benefits (Costs)		Participant Benefits (Costs)			Program Net Savings			Natural Gas	Participant							UTILITY				PARTICIPANT						
FEI	Utility			Partners											Years	Energy	Capacity	($/GJ)	Program	Alternate	Program	Carbon Tax	Alternate	Natural Gas	Alternate Energy	Alternate Capacity	Utility	Total Costs	Total Benefits	Benefit/Cost	Natural Gas Rate Impact	Societal Cost	Benefits ($'000s)	Natural Gas Utility Discount Rate	Natural Gas Supply $/GJ	Alternate Discount Rate	Alternate Supply $/kWh	Discount Rate	Natural Gas NPV $/GJ	Carbon Tax NPV $/GJ	Alternate Energy NPV $/kWh	Alternate Capacity NPV $/kW/a	Natural Gas Tariff $/GJ	Energy Tariff $/kWh	Capacity Tariff $/kW/a
	Incentives	Administration	Total	Incentives	Administration	Total	Participant	Total	% Utility	% Partner	% Participant	Gross	Net-to-Gross	Net		MWh	kW		($'000s)	($'000s)	($'000s)	($'000s)	($'000s)	(GJ)	(MWh)	(kW)		($'000s)	($'000s)				($'000s)												
Label	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT
Source Sheet or Calculation	Program	Program	B+C	Program	Program	E+F	Program	D+G+H	D/I	G/I	H/I	Program	Program	MxN	Program	Program	Program	D/Y	OxAJ	Q x N x AL	M x N x AN	M x N x AO	N x (QxAP + RxAQ)	PV(AI,P,-O)	PV(AK,P,-Q*N)	PV(AK,P,-R)	T/D	H=0, (V+W)>0	H=0, (V+W)>0, X	AD/AC	T/(V+D)	(T+U)/I	(T+U)-I	Input	Program	Input	Input	Input	PV(AM,P,-InputD25)	Input	PV(AM,P,-InputD28)	PV(AM,P,-InputD29)	Input	Input	Input
2011																																													
Solar Air																																													
Solar Air	0	5	5	0	0	0	39	45	12%	0%	88%	48	100%	48	25	0	-	6	17	N/A	8	1	N/A	832	0	-	3.3	39	10	0.2	1.3	0.4	(28)	3.00%	276.02	3%	2.09	3.0%	174.11	26.03	1.44	0.00	9.999	0.083	-

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ
1	UTILITY		FORTIS BC																																	
2																																				
3																																				
4			Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	
5			Units																																	
6		NATURAL GAS																																		
7		Incremental Cost of Gas (nominal)	$ Per GJ	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.43
8	1		*Year*	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*	*31*	
9		carbon tax	$ per GJ	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	
10		Distribution adder	$ per GJ	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*		
11		Total incremental cost of gas including carbon		*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.28*	
12	2	GDP Deflator		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
13	3	Incremental Cost of Gas (Real)		$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.28	
14	4	Net Present Value -2010			$29.54	$43.67	$57.39	$70.71	$83.64	$96.20	$108.38	$120.22	$131.71	$142.86	$153.69	$164.20	$174.41	$184.32	$193.94	$203.28	$212.35	$221.16	$229.71	$238.01	$246.07	$253.89	$261.48	$268.86	$276.02	$282.97	$289.72	$296.27	$302.63	$308.81	$314.74	
15	5	Net Present Value -2011				$29.54	$43.67	$57.39	$70.71	$83.64	$96.20	$108.38	$120.22	$131.71	$142.86	$153.69	$164.20	$174.41	$184.32	$193.94	$203.28	$212.35	$221.16	$229.71	$238.01	$246.07	$253.89	$261.48	$268.86	$276.02	$282.97	$289.72	$296.27	$302.63	$308.74	
16	6	Net Present Value -2012					$29.54	$43.67	$57.39	$70.71	$83.64	$96.20	$108.38	$120.22	$131.71	$142.86	$153.69	$164.20	$174.41	$184.32	$193.94	$203.28	$212.35	$221.16	$229.71	$238.01	$246.07	$253.89	$261.48	$268.86	$276.02	$282.97	$289.72	$296.27	$302.56	

	A	B	C	D	E	F	G	H	I	J	K	L
17												
18												
19		**ELECTRICITY**										
20		Incremental Cost of Elec	$ Per kWh	$0.12								
21		Incremental Cost of E Capacity	$ Per kW/a	$170.00								
22												
23												
24												
25	**RETAIL**											
26				Rate	Customers		789,928	Total Customers in BC		80,000	Total Residential and Commercial Customers on VI	
27		Residential Retail			*000's*							
28		**TGI**	$ Per MJ	$0.0100	640		712,304	Total Residential Customers in BC				
29		**TGVI**	$ Per MJ	$0.0143	72							
30		**Electricity**	$ Per MJ	$0.0230								
31		**Electricity**	$ per kWh	$0.0827	1,511		1,511,435	Total BCH Residential Customers in BC				89%
32		**Electricity**	$ per kW per year									
33		Commercial Retail										
34		**TGI**	$ Per MJ	$0.0094	78		77,624	Total Commercial Customers in BC				
35		**TGVI**	$ Per MJ	$0.0169	8							
36		**Electricity**	$ Per MJ	$0.0214								
37		**Electricity**	$ per kWh	$0.0769	190		189,764	Total Light Industrial and Commercial Customers in BC				
38		**Electricity**	$ per kW per year	$52.0000	15							
39												

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ
40	**TAX**																																			
41			**Year**	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	
42	1		*Year*		*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*	
43	2	Carbon	$ Per tonne		$20.00	$25.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	
44	3	Carbon	$ Per GJ		$0.9976	$1.2470	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	
45	4	GDP Deflator			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
46	5	Carbon (Real)			$1.00	$1.25	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	
47	6	Net Present Value -2010				$2.14	$3.51	$4.84	$6.13	$7.39	$8.60	$9.78	$10.93	$12.05	$13.13	$14.18	$15.19	$16.18	$17.14	$18.08	$18.98	$19.86	$20.71	$21.54	$22.35	$23.13	$23.89	$24.62	$25.34	$26.03	$26.71	$27.36	$27.99	$28.61	$29.21	
48	7	Net Present Value -2011					$2.62	$3.99	$5.32	$6.61	$7.86	$9.08	$10.26	$11.41	$12.52	$13.60	$14.65	$15.67	$16.66	$17.62	$18.55	$19.46	$20.34	$21.19	$22.02	$22.82	$23.61	$24.36	$25.10	$25.81	$26.51	$27.18	$27.84	$28.47	$29.09	
49	8	Net Present Value -2012						$2.86	$4.23	$5.56	$6.85	$8.11	$9.32	$10.50	$11.65	$12.76	$13.85	$14.90	$15.91	$16.90	$17.86	$18.80	$19.70	$20.58	$21.43	$22.26	$23.07	$23.85	$24.61	$25.34	$26.06	$26.75	$27.42	$28.08	$28.71	

	A	B	C	D
50				
51		**Discount Rate (real)[1]**		
52		**TERASEN GAS**		
53		**Rate of Inflation**	1.90%	
54		**TGI**	3.00%	
55		**TGVI**	3.00%	
56		**BC HYDRO**		
57		**Rate of Inflation**	2.00%	
58		**BC Hydro**	3.00%	
59		**Customer**	3.00%	
60		*Footnote 1: Source LR 070531*		
61				
62				**SHEET LABELS**
63	**New Construction**			
64		Solar Air		**BASEBOARD**
65		0		**HEATPUMP**
66				
67				

FORTIS BC

only enter in boxes marked in blue

Measure Data for Solar Air

PER MEASURE			Utility Incentive to the participant	partner incentive
Incremental Cost	$ 39,400			
Total Incentive				$ -
Participant	$ 39,400			

Annual Impact Per Measure

Energy Savings per installation	47.8	GJ		Average Annnual Energy Savings per Measure
Free Rider Rate / Net-to-Gross	0%	1.00		Net-to-Gross
Alternate Energy Impact		GJ	0	kWh
Alternate Capacity Impact		kW/a		
Measure Lifetime	25	Years	Estimated lifespan of measure	

ANNUAL ACTIVITY	2009 NPV	Total	2010	2011	2012	Explanatory Notes
Number of Installations	1	1	0	1		Estimated Participatation
Impact						
Gross Energy Savings (GJ)	45	48	0	48	0	Extension of Unit Savings x No. of Upgrades
Net Energy Savings (GJ)	45	48	0	48	0	Gross Energy Savings less Free Riders
Alternate Energy Impact (Increase) (kWh)	0	0	0	0	0	Other Utility Billed energy impact
Alternate Capacity Impact (Increase) (kW/a)	$0.00	-				Other Utility Billed capacity impact

Benefit Cost Summary

	2009 NPV	*$ Total*	2010	2011	2012	
Avoided Revenue Requirements						
PV $ per GJ			$276.02	$276.02	$276.02	
Energy Purchases	$ 13,185	$ 13,185	$ -	$ 13,185	$ -	
Utility Program Costs						
DSM Incentives		$ -	$ -	$ -	$ -	
Administration		$ 5,250	$ -	$ 5,250		
Subtotal	$ 4,949	$ 5,250	$ -	$ 5,250	$ -	
Partner Program Costs						
DSM Incentives		$ -	$ -	$ -	$ -	
Administration		$ -	$ -	$ -	$ -	
Subtotal	$ -	$ -	$ -	$ -	$ -	
Participants' Net Costs						
Incremental Cost		$ 39,400	$ -	$ 39,400	$ -	
Subtotal	$ 37,138	$ 39,400	$ -	$ 39,400	$ -	
Alternate Savings - Net						
Energy (Purchases)		$ -	$ -	$ -	$ -	$2.090 PV $ per kWh
Capacity (Purchases)		$ -	$ -	$ -	$ -	PV$ per kW/a
Subtotal	$ -	$ -	$ -	$ -	$ -	
Total Resource Net Benefit (Cost)	$ (28,902)		$ -	$ (31,465)	$ -	Avoided Revenue Requirement less Utility less Partners less Participant Costs plus Alternate Savings
Utility Levelized Cost per GJ (Lifetime)	**$ 53.7**		**$ -**	**$ 53.7**	**$ -**	Informational (for comparison with supply options)

FORTIS BC

New Initiatives Solar Commercial, SCT Calculation	PROGRAM															ALTERNATE		NET PRESENT VALUE									BENEFIT/COST							PARAMETERS										
	COSTS ($000)											SAVINGS (GJ)			LIFE	Impact		Levelized Cost	Utility Benefits (Costs)		Participant Benefits (Costs)			Program Net Savings			Natural Gas	Participant							UTILITY				PARTICIPANT						
FEI	Utility			Partners											Years	Energy	Capacity	($/GJ)	Program	Alternate	Program	Carbon Tax	Alternate	Natural Gas	Alternate Energy	Alternate Capacity	Utility	Total Costs	Total Benefits	Benefit/Cost	Natural Gas Rate Impact	Societal Cost	Benefits ($'000s)	Natural Gas Utility Discount Rate	Natural Gas Supply $/GJ	Alternate Discount Rate	Alternate Supply $/kWh	Discount Rate	Natural Gas NPV $/GJ	Carbon Tax NPV $/GJ	Alternate Energy NPV $/kWh	Alternate Capacity NPV $/kW/a	Natural Gas Tariff $/GJ	Energy Tariff $/kWh	Capacity Tariff $/kW/a
	Incentives	Administration	Total	Incentives	Administration	Total	Participant	Total	% Utility	% Partner	% Participant	Gross	Net-to-Gross	Net		MWh	kW		($'000s)	($'000s)	($'000s)	($'000s)	($'000s)	(GJ)	(MWh)	(kW)		($'000s)	($'000s)				($'000s)												
Label	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT
Source Sheet or Calculation	Program	Program	B+C	Program	Program	E+F	Program	D+G+H	D/I	G/I	H/I	Program	Program	MwN	Program	Program	Program	D/Y	OxAJ	Q x N x AL	M x N x AN	M x N x AO	N x (QxAP + RxAQ)	PV(AI,P,-O)	PV(AK,P,-Q*N)	PV(AK,P,-R)	T/D	H=0, (V+W)=0	H=0, (V+W)>0, X	AD/AC	T/(V+D)	(T+U)/I	(T+U)-I	Input	Program	Input	Input	Input	PV(AM,P,-InputD25)	Input	PV(AM,P,-InputD28)	PV(AM,P,-InputD29)	Input	Input	Input
2011																																													
Solar Commercial																																													
Solar Com	0	4	4	0	0	0	55	59	6%	0%	94%	76	100%	76	25	0	-	3	27	N/A	13	2	N/A	1,331	0	-	7.3	55	15	0.3	1.6	0.5	(31)	3.00%	276.02	3%	2.09	3.0%	174.11	26.03	1.44	0.00	9.999	0.083	-

	A	B	C	D	E	F	G	H	I	J	K	L
1	UTILITY		FORTIS BC									
2												
3												
4			Year	2010	2011	2012	2013	2014	2015	2016	2017	2018
5			Units									
6		NATURAL GAS										
7		Incremental Cost of Gas (nominal)	$ Per GJ	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28
8	1		*Year*	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
9		carbon tax	$ per GJ	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
10		Distribution adder	$ per GJ	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*
11		Total incremental cost of gas including carbon		*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*
12	2	GDP Deflator		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
13	3	Incremental Cost of Gas (Real)		$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44
14	4	Net Present Value -2010			$29.54	$43.67	$57.39	$70.71	$83.64	$96.20	$108.38	$120.22
15	5	Net Present Value -2011				$29.54	$43.67	$57.39	$70.71	$83.64	$96.20	$108.38
16	6	Net Present Value -2012					$29.54	$43.67	$57.39	$70.71	$83.64	$96.20
17												
18												
19		**ELECTRICITY**										
20		Incremental Cost of Elec	$ Per kWh	$0.12								
21		Incremental Cost of E Capacity	$ Per kW/a	$170.00								
22												
23												
24												
25	RETAIL											
26				Rate	Customers		789,928	Total Customers in BC		80,000	Total Residential and Commercial Customers on VI	
27		Residential Retail			*000's*							
28		**TGI**	$ Per MJ	$0.0100	640		712,304	Total Residential Customers in BC				
29		**TGVI**	$ Per MJ	$0.0143	72							
30		**Electricity**	$ Per MJ	$0.0230								
31		**Electricity**	$ per kWh	$0.0827	1,511		1,511,435	Total BCH Residential Customers in BC				89%
32		**Electricity**	$ per kW per year									
33		Commercial Retail										
34		**TGI**	$ Per MJ	$0.0094	78		77,624	Total Commercial Customers in BC				
35		**TGVI**	$ Per MJ	$0.0169	8							
36		**Electricity**	$ Per MJ	$0.0214								
37		**Electricity**	$ per kWh	$0.0769	190		189,764	Total Light Industrial and Commercial Customers in BC				
38		**Electricity**	$ per kW per year	$52.0000	15							
39												
40	TAX											
41			Year	2009	2010	2011	2012	2013	2014	2015	2016	2017
42	1		*Year*		*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*
43	2	Carbon	$ Per tonne		$20.00	$25.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00
44	3	Carbon	$ Per GJ		$0.9976	$1.2470	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964
45	4	GDP Deflator			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
46	5	Carbon (Real)			$1.00	$1.25	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50
47	6	Net Present Value -2010				$2.14	$3.51	$4.84	$6.13	$7.39	$8.60	$9.78
48	7	Net Present Value -2011					$2.62	$3.99	$5.32	$6.61	$7.86	$9.08
49	8	Net Present Value -2012						$2.86	$4.23	$5.56	$6.85	$8.11
50												
51		**Discount Rate (real)[1]**										
52		**TERASEN GAS**										
53		**Rate of Inflation**	1.90%									
54		**TGI**	3.00%									
55		**TGVI**	3.00%									
56		**BC HYDRO**										
57		**Rate of Inflation**	2.00%									
58		**BC Hydro**	3.00%									
59		**Customer**	3.00%									
60		*Footnote 1: Source LR 070531*										
61												
62				**SHEET LABELS**								
63	**New Construction**											
64		Solar Com		**BASEBOARD**								
65		0		**HEATPUMP**								
66												
67												

	M	N	O	P	Q	R	S	T	U	V	W	X
4	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
7	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28
8	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*
9	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
10	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*
11	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
13	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44
14	$131.71	$142.86	$153.69	$164.20	$174.41	$184.32	$193.94	$203.28	$212.35	$221.16	$229.71	$238.01
15	$120.22	$131.71	$142.86	$153.69	$164.20	$174.41	$184.32	$193.94	$203.28	$212.35	$221.16	$229.71
16	$108.38	$120.22	$131.71	$142.86	$153.69	$164.20	$174.41	$184.32	$193.94	$203.28	$212.35	$221.16
41	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
42	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*
43	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00
44	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964
45	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
46	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50
47	$10.93	$12.05	$13.13	$14.18	$15.19	$16.18	$17.14	$18.08	$18.98	$19.86	$20.71	$21.54
48	$10.26	$11.41	$12.52	$13.60	$14.65	$15.67	$16.66	$17.62	$18.55	$19.46	$20.34	$21.19
49	$9.32	$10.50	$11.65	$12.76	$13.85	$14.90	$15.91	$16.90	$17.86	$18.80	$19.70	$20.58

	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ
4	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	
7	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.43
8	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*	*31*	
9	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	
10	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*		
11	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.28*	
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
13	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.28	
14	$246.07	$253.89	$261.48	$268.86	$276.02	$282.97	$289.72	$296.27	$302.63	$308.81	$314.74	
15	$238.01	$246.07	$253.89	$261.48	$268.86	$276.02	$282.97	$289.72	$296.27	$302.63	$308.74	
16	$229.71	$238.01	$246.07	$253.89	$261.48	$268.86	$276.02	$282.97	$289.72	$296.27	$302.56	
41	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	
42	*20*	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*	
43	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	
44	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	
45	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
46	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	
47	$22.35	$23.13	$23.89	$24.62	$25.34	$26.03	$26.71	$27.36	$27.99	$28.61	$29.21	
48	$22.02	$22.82	$23.61	$24.36	$25.10	$25.81	$26.51	$27.18	$27.84	$28.47	$29.09	
49	$21.43	$22.26	$23.07	$23.85	$24.61	$25.34	$26.06	$26.75	$27.42	$28.08	$28.71	

FORTIS BC

only enter in boxes marked in blue

Measure Data for Solar Com

PER MEASURE			Utility Incentive to the participant	partner incentive
Incremental Cost	$ 54,772			
Total Incentive				$ -
Participant	$ 54,772			

Annual Impact Per Measure

Energy Savings per installation	76.4	GJ		Average Annnual Energy Savings per Measure
Free Rider Rate / Net-to-Gross	-	1.00		Net-to-Gross
Alternate Energy Impact		GJ	0	kWh
Alternate Capacity Impact		kW/a		
Measure Lifetime	25	Years	Estimated lifespan of measure	

ANNUAL ACTIVITY	2009 NPV	Total	2010	2011	2012	Explanatory Notes
Number of Installations	1	1	0	1		Estimated Participatation
Impact						
Gross Energy Savings (GJ)	72	76	0	76	0	Extension of Unit Savings x No. of Upgrades
Net Energy Savings (GJ)	72	76	0	76	0	Gross Energy Savings less Free Riders
Alternate Energy Impact (Increase) (kWh)	0	0	0	0	0	Other Utility Billed energy impact
Alternate Capacity Impact (Increase) (kW/a)	$0.00	-				Other Utility Billed capacity impact

Benefit Cost Summary

	2009 NPV	*$ Total*	2010	2011	2012	
Avoided Revenue Requirements						
PV $ per GJ			$276.02	$276.02	$276.02	
Energy Purchases	$ 21,094	$ 21,094	$ -	$ 21,094	$ -	
Utility Program Costs						
DSM Incentives		$ -	$ -	$ -	$ -	
Administration		$ 3,750	$ -	$3,750.00		
Subtotal	$ 3,535	$ 3,750	$ -	$ 3,750	$ -	
Partner Program Costs						
DSM Incentives		$ -	$ -	$ -	$ -	
Administration		$ -	$ -	$ -	$ -	
Subtotal	$ -	$ -	$ -	$ -	$ -	
Participants' Net Costs						
Incremental Cost		$ 54,772	$ -	$ 54,772	$ -	
Subtotal	$ 51,628	$ 54,772	$ -	$ 54,772	$ -	
Alternate Savings - Net						
Energy (Purchases)		$ -	$ -	$ -	$ -	$2.090 PV $ per kWh
Capacity (Purchases)		$ -	$ -	$ -	$ -	PV$ per kW/a
Subtotal	$ -	$ -	$ -	$ -	$ -	
Total Resource Net Benefit (Cost)	$ (34,068)		$ -	$ (37,428)	$ -	Avoided Revenue Requirement less Utility less Partners less Participant Costs plus Alternate Savings
Utility Levelized Cost per GJ (Lifetime)	**$ 44.0**		**$ -**	**$ 44.0**	**$ -**	Informational (for comparison with supply options)

FORTIS BC

New Initiatives Solar Residential Hot Water Pilot, SCT Calculation	PROGRAM															ALTERNATE		NET PRESENT VALUE									BENEFIT/COST							PARAMETERS										
	COSTS ($000)											SAVINGS (GJ)			LIFE	Impact		Levelized Cost	Utility Benefits (Costs)		Participant Benefits (Costs)			Program Net Savings				Participant						UTILITY				PARTICIPANT						
FEI	Utility			Partners																																									
	Incentives	Administration	Total	Incentives	Administration	Total	Participant	Total	% Utility	% Partner	% Participant	Gross	Net-to-Gross	Net	Years	Energy	Capacity	($/GJ)	Program	Alternate	Program	Carbon Tax	Alternate	Natural Gas	Alternate Energy	Alternate Capacity	Natural Gas	Total Costs	Total Benefits	Benefit/Cost	Natural Gas	Societal Cost	Benefits	Natural Gas Utility Discount Rate	Natural Gas Supply	Alternate Discount Rate	Alternate Supply	Discount Rate	Natural Gas NPV	Carbon Tax NPV	Alternate Energy NPV	Alternate Capacity NPV	Natural Gas Tariff	Energy Tariff	Capacity Tariff
																MWh	kW		($'000s)	($'000s)	($'000s)	($'000s)	($'000s)	(GJ)	(MWh)	(kW)	Utility	($'000s)	($'000s)		Rate Impact		($'000s)		$/GJ		$/kWh		$/GJ	$/kWh	$/kW/a	$/GJ	$/kWh	$/kW/a
Label	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT
Source Sheet or Calculation	Program	Program	B+C	Program	Program	E+F	Program	D+G+H	D/I	G/I	H/I	Program	Program	MxN	Program	Program	Program	D/Y	OxAJ	Q x N x AL	M x N x AN	M x N x AO	N x (QxAP + RxAQ)	PV(AI,P,-O)	PV(AK,P,-Q*N)	PV(AK,P,-R)	T/D	H=0, (V+W)=0	H=0, (V+W)>0, X	AD/AC	T/(V+D)	(T+U)/I	(T+U)-I	Input	Program	Input	Input	Input	PV(AM,P,-InputD25)	Input	PV(AM,P,-InputD28)	PV(AM,P,-InputD29)	Input	Input	Input
2011																																													
Solar Residential Hot Water Pilot Program																																													
Solar Residential Hot Water Pilot Program	0	1	1	0	0	0	8	8	8%	0%	92%	12	100%	12	25	0	-	3	4	N/A	2	0	N/A	209	0	-	6.9	8	2	0.3	1.6	0.5	(4)	3.00%	276.02	3%	2.09	3.0%	174.11	26.03	1.44	0.00	9.999	0.083	-

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ
1	**UTILITY**		**FORTIS BC**
2
3
4			**Year**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**	
5			Units
6		**NATURAL GAS**
7		Incremental Cost of Gas (nominal)	$ Per GJ	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.43
8	1		*Year*	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*	*31*	
9		carbon tax	$ per GJ	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	
10		Distribution adder	$ per GJ	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*		
11		Total incremental cost of gas including carbon		*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.28*	
12	2	GDP Deflator		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
13	3	Incremental Cost of Gas (Real)		$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.28	
14	4	Net Present Value -2010			$29.54	$43.67	$57.39	$70.71	$83.64	$96.20	$108.38	$120.22	$131.71	$142.86	$153.69	$164.20	$174.41	$184.32	$193.94	$203.28	$212.35	$221.16	$229.71	$238.01	$246.07	$253.89	$261.48	$268.86	$276.02	$282.97	$289.72	$296.27	$302.63	$308.81	$314.74	
15	5	Net Present Value -2011				$29.54	$43.67	$57.39	$70.71	$83.64	$96.20	$108.38	$120.22	$131.71	$142.86	$153.69	$164.20	$174.41	$184.32	$193.94	$203.28	$212.35	$221.16	$229.71	$238.01	$246.07	$253.89	$261.48	$268.86	$276.02	$282.97	$289.72	$296.27	$302.63	$308.74	
16	6	Net Present Value -2012					$29.54	$43.67	$57.39	$70.71	$83.64	$96.20	$108.38	$120.22	$131.71	$142.86	$153.69	$164.20	$174.41	$184.32	$193.94	$203.28	$212.35	$221.16	$229.71	$238.01	$246.07	$253.89	$261.48	$268.86	$276.02	$282.97	$289.72	$296.27	$302.56	
17
18
19		**ELECTRICITY**
20		Incremental Cost of Elec	$ Per kWh	$0.12
21		Incremental Cost of E Capacity	$ Per kW/a	$170.00
22
23
24
25	**RETAIL**
26				Rate	Customers		789,928	Total Customers in BC		80,000	Total Residential and Commercial Customers on VI
27		Residential Retail			*000's*
28		**TGI**	$ Per MJ	$0.0100	640		712,304	Total Residential Customers in BC
29		**TGVI**	$ Per MJ	$0.0143	72
30		**Electricity**	$ Per MJ	$0.0230
31		**Electricity**	$ per kWh	$0.0827	1,511		1,511,435	Total BCH Residential Customers in BC				89%
32		**Electricity**	$ per kW per year
33		Commercial Retail
34		**TGI**	$ Per MJ	$0.0094	78		77,624	Total Commercial Customers in BC
35		**TGVI**	$ Per MJ	$0.0169	8
36		**Electricity**	$ Per MJ	$0.0214
37		**Electricity**	$ per kWh	$0.0769	190		189,764	Total Light Industrial and Commercial Customers in BC
38		**Electricity**	$ per kW per year	$52.0000	15
39
40	**TAX**
41			**Year**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	
42	1		*Year*		*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*	
43	2	Carbon	$ Per tonne		$20.00	$25.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	
44	3	Carbon	$ Per GJ		$0.9976	$1.2470	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	
45	4	GDP Deflator			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
46	5	Carbon (Real)			$1.00	$1.25	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	
47	6	Net Present Value -2010				$2.14	$3.51	$4.84	$6.13	$7.39	$8.60	$9.78	$10.93	$12.05	$13.13	$14.18	$15.19	$16.18	$17.14	$18.08	$18.98	$19.86	$20.71	$21.54	$22.35	$23.13	$23.89	$24.62	$25.34	$26.03	$26.71	$27.36	$27.99	$28.61	$29.21	
48	7	Net Present Value -2011					$2.62	$3.99	$5.32	$6.61	$7.86	$9.08	$10.26	$11.41	$12.52	$13.60	$14.65	$15.67	$16.66	$17.62	$18.55	$19.46	$20.34	$21.19	$22.02	$22.82	$23.61	$24.36	$25.10	$25.81	$26.51	$27.18	$27.84	$28.47	$29.09	
49	8	Net Present Value -2012						$2.86	$4.23	$5.56	$6.85	$8.11	$9.32	$10.50	$11.65	$12.76	$13.85	$14.90	$15.91	$16.90	$17.86	$18.80	$19.70	$20.58	$21.43	$22.26	$23.07	$23.85	$24.61	$25.34	$26.06	$26.75	$27.42	$28.08	$28.71	
50
51		**Discount Rate (real)**[1]
52		**TERASEN GAS**
53		**Rate of Inflation**	1.90%
54		**TGI**	3.00%
55		**TGVI**	3.00%
56		**BC HYDRO**
57		**Rate of Inflation**	2.00%
58		**BC Hydro**	3.00%
59		**Customer**	3.00%
60		*Footnote 1: Source LR 070531*
61
62				**SHEET LABELS**
63	**New Construction**
64		Solar Residential Hot Water Pilot Program		**BASEBOARD**
65		0		**HEATPUMP**

FORTIS BC

only enter in boxes marked in blue

Measure Data for Res Solar

PER MEASURE			Utility Incentive to the participant	partner incentive
Incremental Cost	$ 7,500			
Total Incentive				$ -
Participant	$ 7,500			

Annual Impact Per Measure

Energy Savings per installation	12.0	GJ		Average Annnual Energy Savings per Measure
Free Rider Rate / Net-to-Gross	0%	1.00		Net-to-Gross
Alternate Energy Impact		GJ	0	kWh
Alternate Capacity Impact		kW/a		
Measure Lifetime	25	Years	Estimated lifespan of measure	

ANNUAL ACTIVITY	2009 NPV	Total	2010	2011	2012	Explanatory Notes
Number of Installations						
	1	1	0	1		Estimated Participatation
Impact						
Gross Energy Savings (GJ)	11	12	0	12	0	Extension of Unit Savings x No. of Upgrades
Net Energy Savings (GJ)	11	12	0	12	0	Gross Energy Savings less Free Riders
Alternate Energy Impact (Increase) (kWh)	0	0	0	0	0	Other Utility Billed energy impact
Alternate Capacity Impact (Increase) (kW/a)	$0.00	-				Other Utility Billed capacity impact

Benefit Cost Summary

	2009 NPV	*$ Total*	2010	2011	2012	
Avoided Revenue Requirements						
PV $ per GJ			$276.02	$276.02	$276.02	
Energy Purchases	$ 3,312	$ 3,312	$ -	$ 3,312	$ -	
Utility Program Costs						
DSM Incentives		$ -	$ -	$ -	$ -	
Administration		$ 625	$ -	$ 625		
Subtotal	$ 589	$ 625	$ -	$ 625	$ -	
Partner Program Costs						
DSM Incentives		$ -	$ -	$ -	$ -	
Administration		$ -	$ -	$ -	$ -	
Subtotal	$ -	$ -	$ -	$ -	$ -	
Participants' Net Costs						
Incremental Cost		$ 7,500	$ -	$ 7,500	$ -	
Subtotal	$ 7,069	$ 7,500	$ -	$ 7,500	$ -	
Alternate Savings - Net						
Energy (Purchases)		$ -	$ -	$ -	$ -	$2.090 PV $ per kWh
Capacity (Purchases)		$ -	$ -	$ -	$ -	PV$ per kW/a
Subtotal	$ -	$ -	$ -	$ -	$ -	
Total Resource Net Benefit (Cost)	$ (4,346)		$ -	$ (4,813)	$ -	Avoided Revenue Requirement less Utility less Partners less Participant Costs plus Alternate Savings
Utility Levelized Cost per GJ (Lifetime)	**$ 38.9**		**$ -**	**$ 38.9**	**$ -**	Informational (for comparison with supply options)

FORTIS BC

New Initiatives TES Geoexchange Schools Average, SCT Calculation	PROGRAM															ALTERNATE		NET PRESENT VALUE									BENEFIT/COST							PARAMETERS										
	COSTS ($000)											SAVINGS (GJ)			LIFE	Impact		Levelized Cost	Utility Benefits (Costs)		Participant Benefits (Costs)			Program Net Savings			Natural Gas	Participant			Natural Gas		Benefits	UTILITY				PARTICIPANT							
FEI	Utility			Partners											Years	Energy	Capacity	($/GJ)	Program	Alternate	Program	Carbon Tax	Alternate	Natural Gas	Alternate Energy	Alternate Capacity	Utility	Total Costs	Total Benefits	Benefit/Cost	Rate Impact	Societal Cost	($'000s)	Natural Gas Utility Discount Rate	Natural Gas Supply $/GJ	Alternate Discount Rate	Alternate Supply $/kWh	Discount Rate	Natural Gas NPV $/GJ	Carbon Tax NPV $/GJ	Alternate Energy NPV $/kWh	Alternate Capacity NPV $/kW/a	Natural Gas Tariff $/GJ	Energy Tariff $/kWh	Capacity Tariff $/kW/a
	Incentives	Administration	Total	Incentives	Administration	Total	Participant	Total	% Utility	% Partner	% Participant	Gross	Net-to-Gross	Net		MWh	kW		($'000s)	($'000s)	($'000s)	($'000s)	($'000s)	(GJ)	(MWh)	(kW)		($'000s)	($'000s)																
Label	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT
Source Sheet or Calculation	Program	Program	B+C	Program	Program	E+F	Program	D+G+H	D/I	G/I	H/I	Program	Program	MxN	Program	Program	Program	D/Y	OxAJ	Q x N x AL	M x N x AN	M x N x AO	N x (QxAP + RxAQ)	PV(AI,P,-O)	PV(AK,P,-Q*N)	PV(AK,P,-R)	T/D	H>0, (V+W)>0	H<0, (V+W)>0, X	AD/AC	T/(V+D)	(T+U)/I	(T+U)-I	Input	Program	Input	Input	Input	PV(AM,P,-InputD25)	Input	PV(AM,P,-InputD28)	PV(AM,P,-InputD29)	Input	Input	Input
2011																																													
Geoexchange Schools Average																																													
Geoexchange Schools Average	0	30	30	0	0	0	310	340	9%	0%	91%	3,330	100%	3,330	20	(260)	-	1	1,030	(603)	495	74	(319)	49,543	(3,862)	-	34.3	310	250	0.8	2.0	1.3	88	3.00%	238.01	3%	1.79	3.0%	148.76	22.35	1.23	0.00	9.999	0.083	-

	A	B	C	D	E	F	G	H
1	UTILITY		FORTIS BC					
2								
3								
4			Year	2010	2011	2012	2013	2014
5			Units					
6		NATURAL GAS						
7		Incremental Cost of Gas (nominal)	$ Per GJ	$15.28	$15.28	$15.28	$15.28	$15.28
8	1		*Year*	*0*	*1*	*2*	*3*	*4*
9		carbon tax	$ per GJ	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
10		Distribution adder	$ per GJ	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*
11		Total incremental cost of gas including carbon		*15.44*	*15.44*	*15.44*	*15.44*	*15.44*
12	2	GDP Deflator		1.00	1.00	1.00	1.00	1.00
13	3	Incremental Cost of Gas (Real)		$15.44	$15.44	$15.44	$15.44	$15.44
14	4	Net Present Value -2010			$29.54	$43.67	$57.39	$70.71
15	5	Net Present Value -2011				$29.54	$43.67	$57.39
16	6	Net Present Value -2012					$29.54	$43.67
17								
18								
19		ELECTRICITY						
20		Incremental Cost of Elec	$ Per kWh	$0.12				
21		Incremental Cost of E Capacity	$ Per kW/a	$170.00				
22								
23								
24								
25	RETAIL							
26				Rate	Customers		789,928	Total Customers in BC
27		Residential Retail			*000's*			
28		TGI	$ Per MJ	$0.0100	640		712,304	Total Residential Customers in BC
29		TGVI	$ Per MJ	$0.0143	72			
30		Electricity	$ Per MJ	$0.0230				
31		Electricity	$ per kWh	$0.0827	1,511		1,511,435	Total BCH Residential Customers in BC
32		Electricity	$ per kW per year					
33		Commercial Retail						
34		TGI	$ Per MJ	$0.0094	78		77,624	Total Commercial Customers in BC
35		TGVI	$ Per MJ	$0.0169	8			
36		Electricity	$ Per MJ	$0.0214				
37		Electricity	$ per kWh	$0.0769	190		189,764	Total Light Industrial and Commercial Customers in BC
38		Electricity	$ per kW per year	$52.0000	15			
39								
40	TAX							
41			Year	2009	2010	2011	2012	2013
42	1		*Year*		*0*	*1*	*2*	*3*
43	2	Carbon	$ Per tonne		$20.00	$25.00	$30.00	$30.00
44	3	Carbon	$ Per GJ		$0.9976	$1.2470	$1.4964	$1.4964
45	4	GDP Deflator			1.00	1.00	1.00	1.00
46	5	Carbon (Real)			$1.00	$1.25	$1.50	$1.50
47	6	Net Present Value -2010				$2.14	$3.51	$4.84
48	7	Net Present Value -2011					$2.62	$3.99
49	8	Net Present Value -2012						$2.86
50								
51		Discount Rate (real)[1]						
52		TERASEN GAS						
53		Rate of Inflation	1.90%					
54		TGI	3.00%					
55		TGVI	3.00%					
56		BC HYDRO						
57		Rate of Inflation	2.00%					
58		BC Hydro	3.00%					
59		Customer	3.00%					
60		*Footnote 1: Source LR 070531*						
61								
62				SHEET LABELS				
63	New Construction							
64		Geoexchange Schools Average		BASEBOARD				
65		0		HEATPUMP				

	I	J	K	L	M	N	O	P	Q	R	S	T
4	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
7	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28
8	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*
9	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
10	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*
11	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
13	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44
14	$83.64	$96.20	$108.38	$120.22	$131.71	$142.86	$153.69	$164.20	$174.41	$184.32	$193.94	$203.28
15	$70.71	$83.64	$96.20	$108.38	$120.22	$131.71	$142.86	$153.69	$164.20	$174.41	$184.32	$193.94
16	$57.39	$70.71	$83.64	$96.20	$108.38	$120.22	$131.71	$142.86	$153.69	$164.20	$174.41	$184.32
26		80,000	Total Residential and Commercial Customers on VI									
31				89%								
41	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
42	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*
43	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00
44	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964
45	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
46	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50
47	$6.13	$7.39	$8.60	$9.78	$10.93	$12.05	$13.13	$14.18	$15.19	$16.18	$17.14	$18.08
48	$5.32	$6.61	$7.86	$9.08	$10.26	$11.41	$12.52	$13.60	$14.65	$15.67	$16.66	$17.62
49	$4.23	$5.56	$6.85	$8.11	$9.32	$10.50	$11.65	$12.76	$13.85	$14.90	$15.91	$16.90

	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ
4	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	
7	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.43
8	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*	*31*	
9	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	
10	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*		
11	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.28*	
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
13	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.28	
14	$212.35	$221.16	$229.71	$238.01	$246.07	$253.89	$261.48	$268.86	$276.02	$282.97	$289.72	$296.27	$302.63	$308.81	$314.74	
15	$203.28	$212.35	$221.16	$229.71	$238.01	$246.07	$253.89	$261.48	$268.86	$276.02	$282.97	$289.72	$296.27	$302.63	$308.74	
16	$193.94	$203.28	$212.35	$221.16	$229.71	$238.01	$246.07	$253.89	$261.48	$268.86	$276.02	$282.97	$289.72	$296.27	$302.56	
41	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	
42	*16*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*	
43	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	
44	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	
45	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
46	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	
47	$18.98	$19.86	$20.71	$21.54	$22.35	$23.13	$23.89	$24.62	$25.34	$26.03	$26.71	$27.36	$27.99	$28.61	$29.21	
48	$18.55	$19.46	$20.34	$21.19	$22.02	$22.82	$23.61	$24.36	$25.10	$25.81	$26.51	$27.18	$27.84	$28.47	$29.09	
49	$17.86	$18.80	$19.70	$20.58	$21.43	$22.26	$23.07	$23.85	$24.61	$25.34	$26.06	$26.75	$27.42	$28.08	$28.71	

FORTIS BC

only enter in boxes marked in blue

Measure Data for Geoexchange Schools Average

PER MEASURE			Utility Incentive to the participant	partner incentive
Incremental Cost	$ 309,667			
Total Incentive				$ -
Participant	$ 309,667			

Annual Impact Per Measure

Energy Savings per installation	3330.1	GJ		Average Annnual Energy Savings per Measure
Free Rider Rate / Net-to-Gross	0%	1.00		Net-to-Gross
Alternate Energy Impact	-935	GJ	-259,611	kWh
Alternate Capacity Impact		kW/a		
Measure Lifetime	20	Years	Estimated lifespan of measure	

ANNUAL ACTIVITY	2009 NPV	Total	2010	2011	2012	Explanatory Notes
Number of Installations						
	1	1	0	1		Estimated Participatation
Impact						
Gross Energy Savings (GJ)	3,139	3,330	0	3,330	0	Extension of Unit Savings x No. of Upgrades
Net Energy Savings (GJ)	3,139	3,330	0	3,330	0	Gross Energy Savings less Free Riders
Alternate Energy Impact (Increase) (kWh)	(244,708)	(259,611)	0	(259,611)	0	Other Utility Billed energy impact
Alternate Capacity Impact (Increase) (kW/a)	$0.00	-				Other Utility Billed capacity impact

Benefit Cost Summary

	2009 NPV	*$ Total*	2010	2011	2012	
Avoided Revenue Requirements						
PV $ per GJ			$238.01	$238.01	$238.01	
Energy Purchases	$ 792,590	$ 792,590	$ -	$ 792,590	$ -	
Utility Program Costs						
DSM Incentives		$ -	$ -	$ -	$ -	
Administration		$ 30,000	$ -	$ 30,000		
Subtotal	$ 28,278	$ 30,000	$ -	$ 30,000	$ -	
Partner Program Costs						
DSM Incentives		$ -	$ -	$ -	$ -	
Administration		$ -	$ -	$ -	$ -	
Subtotal	$ -	$ -	$ -	$ -	$ -	
Participants' Net Costs						
Incremental Cost		$ 309,667	$ -	$ 309,667	$ -	
Subtotal	$ 291,891	$ 309,667	$ -	$ 309,667	$ -	
Alternate Savings - Net						
Energy (Purchases)		$ (463,483)	$ -	$ (463,483)	$ -	$1.785 PV $ per kWh
Capacity (Purchases)		$ -	$ -	$ -	$ -	PV$ per kW/a
Subtotal	$ (463,483)	$ (463,483)	$ -	$ (463,483)	$ -	
Total Resource Net Benefit (Cost)	$ 8,939		$ -	$ (10,560)	$ -	Avoided Revenue Requirement less Utility less Partners less Participant Costs plus Alternate Savings
Utility Levelized Cost per GJ (Lifetime)	$ 6.9		$ -	$ 6.9	$ -	Informational (for comparison with supply options)

FORTIS BC

New Initiatives TES Geoexchange Elementary Schools, SCT Calculation	PROGRAM															ALTERNATE		NET PRESENT VALUE									BENEFIT/COST							PARAMETERS										
	COSTS ($000)											SAVINGS (GJ)			LIFE	Impact		Levelized Cost	Utility Benefits (Costs)		Participant Benefits (Costs)			Program Net Savings				Participant						UTILITY				PARTICIPANT						
FEI	Utility			Partners																																									
	Incentives	Administration	Total	Incentives	Administration	Total	Participant	Total	% Utility	% Partner	% Participant	Gross	Net-to-Gross	Net	Years	Energy	Capacity	($/GJ)	Program	Alternate	Program	Carbon Tax	Alternate	Natural Gas	Alternate Energy	Alternate Capacity	Natural Gas	Total Costs	Total Benefits	Benefit/Cost	Natural Gas	Societal Cost	Benefits	Natural Gas Utility Discount Rate	Natural Gas Supply	Alternate Discount Rate	Alternate Supply	Discount Rate	Natural Gas NPV	Carbon Tax NPV	Alternate Energy NPV	Alternate Capacity NPV	Natural Gas Tariff	Energy Tariff	Capacity Tariff
																MWh	kW		($'000s)	($'000s)	($'000s)	($'000s)	($'000s)	(GJ)	(MWh)	(kW)	Utility	($'000s)	($'000s)		Rate Impact		($'000s)		$/GJ		$/kWh		$/GJ	$/GJ	$/kWh	$/kW/a	$/GJ	$/kWh	$/kW/a
Label	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT
Source Sheet or Calculation	Program	Program	B+C	Program	Program	E+F	Program	D+G+H	D/I	G/I	H/I	Program	Program	MxN	Program	Program	Program	D/Y	OxAJ	Q x N x AL	M x N x AN	M x N x AO	N x (QxAP + RxAQ)	PV(AI,P,-O)	PV(AK,P,-Q*N)	PV(AK,P,-R)	T/D	H=0, (V+W)>0	H=0, (V+W)>0, X	AD/AC	T/(V+D)	(T+U)/I	(T+U)-I	Input	Program	Input	Input	Input	PV(AM,P,-InputD25)	Input	PV(AM,P,-InputD28)	PV(AM,P,-InputD29)	Input	Input	Input
2011																																													
Geoexchange - Elementary																																													
Geoexchange - Elementary	0	30	30	0	0	0	167	197	15%	0%	85%	1,011	100%	1,011	20	(153)	-	2	313	(356)	150	23	(189)	15,041	(2,281)	-	10.4	167	(16)	(0.1)	1.7	(0.2)	(240)	3.00%	238.01	3%	1.79	3.0%	148.76	22.35	1.23	0.00	9.999	0.083	-

Row	A	B	C	D	E	F	G	H	I	J	K	L	M
1	**UTILITY**		**FORTIS BC**										
4			**Year**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
5			Units										
6		**NATURAL GAS**											
7		Incremental Cost of Gas (nominal)	$ Per GJ	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28
8	1		*Year*	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
9		carbon tax	$ per GJ	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
10		Distribution adder	$ per GJ	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*
11		Total incremental cost of gas including carbon		*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*
12	2	GDP Deflator		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
13	3	Incremental Cost of Gas (Real)		$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44
14	4	Net Present Value -2010			$29.54	$43.67	$57.39	$70.71	$83.64	$96.20	$108.38	$120.22	$131.71
15	5	Net Present Value -2011				$29.54	$43.67	$57.39	$70.71	$83.64	$96.20	$108.38	$120.22
16	6	Net Present Value -2012					$29.54	$43.67	$57.39	$70.71	$83.64	$96.20	$108.38
19		**ELECTRICITY**											
20		Incremental Cost of Elec	$ Per kWh	$0.12									
21		Incremental Cost of E Capacity	$ Per kW/a	$170.00									
25	**RETAIL**												
26				Rate	Customers		789,928	Total Customers in BC		80,000	Total Residential and Commercial Customers on VI		
27		Residential Retail			*000's*								
28		**TGI**	$ Per MJ	$0.0100	640		712,304	Total Residential Customers in BC					
29		**TGVI**	$ Per MJ	$0.0143	72								
30		**Electricity**	$ Per MJ	$0.0230									
31		**Electricity**	$ per kWh	$0.0827	1,511		1,511,435	Total BCH Residential Customers in BC				89%	
32		**Electricity**	$ per kW per year										
33		Commercial Retail											
34		**TGI**	$ Per MJ	$0.0094	78		77,624	Total Commercial Customers in BC					
35		**TGVI**	$ Per MJ	$0.0169	8								
36		**Electricity**	$ Per MJ	$0.0214									
37		**Electricity**	$ per kWh	$0.0769	190		189,764	Total Light Industrial and Commercial Customers in BC					
38		**Electricity**	$ per kW per year	$52.0000	15								
40	**TAX**												
41			**Year**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
42	1		*Year*		*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
43	2	Carbon	$ Per tonne		$20.00	$25.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00
44	3	Carbon	$ Per GJ		$0.9976	$1.2470	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964
45	4	GDP Deflator			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
46	5	Carbon (Real)			$1.00	$1.25	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50
47	6	Net Present Value -2010				$2.14	$3.51	$4.84	$6.13	$7.39	$8.60	$9.78	$10.93
48	7	Net Present Value -2011					$2.62	$3.99	$5.32	$6.61	$7.86	$9.08	$10.26
49	8	Net Present Value -2012						$2.86	$4.23	$5.56	$6.85	$8.11	$9.32
51		**Discount Rate (real)**[1]											
52		**TERASEN GAS**											
53		**Rate of Inflation**	1.90%										
54		**TGI**	3.00%										
55		**TGVI**	3.00%										
56		**BC HYDRO**											
57		**Rate of Inflation**	2.00%										
58		**BC Hydro**	3.00%										
59		**Customer**	3.00%										
60		*Footnote 1: Source LR 070531*											
62				**SHEET LABELS**									
63	**New Construction**												
64		Geoexchange - Elementary		**BASEBOARD**									
65		0		**HEATPUMP**									

Row	N	O	P	Q	R	S	T	U	V	W	X	Y
4	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**
7	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28
8	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*21*
9	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
10	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*
11	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
13	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44
14	$142.86	$153.69	$164.20	$174.41	$184.32	$193.94	$203.28	$212.35	$221.16	$229.71	$238.01	$246.07
15	$131.71	$142.86	$153.69	$164.20	$174.41	$184.32	$193.94	$203.28	$212.35	$221.16	$229.71	$238.01
16	$120.22	$131.71	$142.86	$153.69	$164.20	$174.41	$184.32	$193.94	$203.28	$212.35	$221.16	$229.71
41	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**
42	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*
43	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00
44	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964
45	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
46	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50
47	$12.05	$13.13	$14.18	$15.19	$16.18	$17.14	$18.08	$18.98	$19.86	$20.71	$21.54	$22.35
48	$11.41	$12.52	$13.60	$14.65	$15.67	$16.66	$17.62	$18.55	$19.46	$20.34	$21.19	$22.02
49	$10.50	$11.65	$12.76	$13.85	$14.90	$15.91	$16.90	$17.86	$18.80	$19.70	$20.58	$21.43

Row	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ
4	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**	
7	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.43
8	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*	*31*	
9	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	
10	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*		
11	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.28*	
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
13	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.28	
14	$253.89	$261.48	$268.86	$276.02	$282.97	$289.72	$296.27	$302.63	$308.81	$314.74	
15	$246.07	$253.89	$261.48	$268.86	$276.02	$282.97	$289.72	$296.27	$302.63	$308.74	
16	$238.01	$246.07	$253.89	$261.48	$268.86	$276.02	$282.97	$289.72	$296.27	$302.56	
41	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	
42	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*	
43	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	
44	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	
45	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
46	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	
47	$23.13	$23.89	$24.62	$25.34	$26.03	$26.71	$27.36	$27.99	$28.61	$29.21	
48	$22.82	$23.61	$24.36	$25.10	$25.81	$26.51	$27.18	$27.84	$28.47	$29.09	
49	$22.26	$23.07	$23.85	$24.61	$25.34	$26.06	$26.75	$27.42	$28.08	$28.71	

FORTIS BC

only enter in boxes marked in blue

Measure Data for Geoexchange - Elementary

PER MEASURE			Utility Incentive to the participant	partner incentive
Incremental Cost	$ 166,631			
Total Incentive				$ -
Participant	$ 166,631			

Annual Impact Per Measure

Energy Savings per installation	1011.0	GJ		Average Annnual Energy Savings per Measure
Free Rider Rate / Net-to-Gross	0%	1.00		Net-to-Gross
Alternate Energy Impact	-552	GJ	-153,333	kWh
Alternate Capacity Impact		kW/a		
Measure Lifetime	20	Years	Estimated lifespan of measure	

ANNUAL ACTIVITY	2009 NPV	Total	2010	2011	2012	Explanatory Notes
Number of Installations						
	1	1	0	1		Estimated Participatation
Impact						
Gross Energy Savings (GJ)	953	1,011	0	1,011	0	Extension of Unit Savings x No. of Upgrades
Net Energy Savings (GJ)	953	1,011	0	1,011	0	Gross Energy Savings less Free Riders
Alternate Energy Impact (Increase) (kWh)	(144,531)	(153,333)	0	(153,333)	0	Other Utility Billed energy impact
Alternate Capacity Impact (Increase) (kW/a)	$0.00	-				Other Utility Billed capacity impact

Benefit Cost Summary

	2009 NPV	*$ Total*	2010	2011	2012	
Avoided Revenue Requirements						
PV $ per GJ			$238.01	$238.01	$238.01	
Energy Purchases	$ 240,626	$ 240,626	$ -	$ 240,626	$ -	
Utility Program Costs						
DSM Incentives		$ -	$ -	$ -	$ -	
Administration		$ 30,000	$ -	$ 30,000		
Subtotal	$ 28,278	$ 30,000	$ -	$ 30,000	$ -	
Partner Program Costs						
DSM Incentives		$ -	$ -	$ -	$ -	
Administration		$ -	$ -	$ -	$ -	
Subtotal	$ -	$ -	$ -	$ -	$ -	
Participants' Net Costs						
Incremental Cost		$ 166,631	$ -	$ 166,631	$ -	
Subtotal	$ 157,066	$ 166,631	$ -	$ 166,631	$ -	
Alternate Savings - Net						
Energy (Purchases)		$ (273,746)	$ -	$ (273,746)	$ -	$1.785 PV $ per kWh
Capacity (Purchases)		$ -	$ -	$ -	$ -	PV$ per kW/a
Subtotal	$ (273,746)	$ (273,746)	$ -	$ (273,746)	$ -	
Total Resource Net Benefit (Cost)	$ (218,463)		$ -	$ (229,750)	$ -	Avoided Revenue Requirement less Utility less Partners less Participant Costs plus Alternate Savings
Utility Levelized Cost per GJ (Lifetime)	**$ 13.1**		**$ -**	**$ 13.1**	**$ -**	Informational (for comparison with supply options)

FORTIS BC

New Initiatives TES Geoexchange Secondary Schools, SCT Calculation	PROGRAM															ALTERNATE		NET PRESENT VALUE									BENEFIT/COST							PARAMETERS										
	COSTS ($000)											SAVINGS (GJ)			LIFE	Impact		Levelized Cost	Utility Benefits (Costs)		Participant Benefits (Costs)			Program Net Savings			Natural Gas	Participant					Benefits	UTILITY				PARTICIPANT						
FEI	Utility			Partners												Energy	Capacity	($/GJ)	Program	Alternate	Program	Carbon Tax	Alternate	Natural Gas	Alternate Energy	Alternate Capacity		Total Costs	Total Benefits	Benefit/Cost	Natural Gas			Natural Gas Utility Discount Rate	Natural Gas Supply	Alternate Discount Rate	Alternate Supply	Discount Rate	Natural Gas NPV	Carbon Tax NPV	Alternate Energy NPV	Alternate Capacity NPV	Natural Gas Tariff	Energy Tariff	Capacity Tariff
	Incentives	Administration	Total	Incentives	Administration	Total	Participant	Total	% Utility	% Partner	% Participant	Gross	Net-to-Gross	Net	Years	MWh	kW	($/GJ)	($'000s)	($'000s)	($'000s)	($'000s)	($'000s)	(GJ)	(MWh)	(kW)	Utility	($'000s)	($'000s)		Rate Impact	Societal Cost	($'000s)		$/GJ		$/kWh		$/GJ	$/kWh	$/kW/a	$/GJ	$/kWh	$/kW/a
Label	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT
Source Sheet or Calculation	Program	Program	B+C	Program	Program	E+F	Program	D+G+H	D/I	G/I	H/I	Program	Program	MxN	Program	Program	Program	D/Y	OxAJ	Q x N x AL	M x N x AN	M x N x AO	N x (QxAP + RxAQ)	PV(AI,P,-O)	PV(AK,P,-Q*N)	PV(AK,P,-R)	T/D	H>0, (V+W)>0	H<0, (V+W)>0, X	AD/AC	T/(V+D)	(T+U)/I	(T+U)-I	Input	Program	Input	Input	Input	PV(AM,P,-InputD25)	Input	PV(AM,P,-InputD28)	PV(AM,P,-InputD29)	Input	Input	Input
2011																																													
Geoexchange - Secondary																																													
Geoexchange - Secondary	0	30	30	0	0	0	524	554	5%	0%	95%	6,223	100%	6,223	20	(419)	-	0	1,925	(973)	926	139	(516)	92,583	(6,236)	-	64.2	524	549	1.0	2.0	1.7	398	3.00%	238.01	3%	1.79	3.0%	148.76	22.35	1.23	0.00	9.999	0.083	-

Row	A	B	C	D	E	F	G	H	I	J	K	L	M
1	UTILITY		FORTIS BC										
4			Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
5			Units										
6		NATURAL GAS											
7		Incremental Cost of Gas (nominal)	$ Per GJ	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28
8	1		*Year*	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
9		carbon tax	$ per GJ	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
10		Distribution adder	$ per GJ	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*
11		Total incremental cost of gas including carbon		*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*
12	2	GDP Deflator		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
13	3	Incremental Cost of Gas (Real)		$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44
14	4	Net Present Value -2010			$29.54	$43.67	$57.39	$70.71	$83.64	$96.20	$108.38	$120.22	$131.71
15	5	Net Present Value -2011				$29.54	$43.67	$57.39	$70.71	$83.64	$96.20	$108.38	$120.22
16	6	Net Present Value -2012					$29.54	$43.67	$57.39	$70.71	$83.64	$96.20	$108.38
19		ELECTRICITY											
20		Incremental Cost of Elec	$ Per kWh	$0.12									
21		Incremental Cost of E Capacity	$ Per kW/a	$170.00									

Row	N	O	P	Q	R	S	T	U	V	W	X	Y
4	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
7	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28
8	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*21*
9	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
10	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*
11	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
13	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44
14	$142.86	$153.69	$164.20	$174.41	$184.32	$193.94	$203.28	$212.35	$221.16	$229.71	$238.01	$246.07
15	$131.71	$142.86	$153.69	$164.20	$174.41	$184.32	$193.94	$203.28	$212.35	$221.16	$229.71	$238.01
16	$120.22	$131.71	$142.86	$153.69	$164.20	$174.41	$184.32	$193.94	$203.28	$212.35	$221.16	$229.71

Row	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ
4	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	
7	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.28	$15.43
8	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*	*31*	
9	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	
10	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*		
11	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.44*	*15.28*	
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
13	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.44	$15.28	
14	$253.89	$261.48	$268.86	$276.02	$282.97	$289.72	$296.27	$302.63	$308.81	$314.74	
15	$246.07	$253.89	$261.48	$268.86	$276.02	$282.97	$289.72	$296.27	$302.63	$308.74	
16	$238.01	$246.07	$253.89	$261.48	$268.86	$276.02	$282.97	$289.72	$296.27	$302.56	

Row	A	B	C	D	E	F	G	H	I	J	K	L
25	RETAIL											
26				Rate	Customers		789,928	Total Customers in BC		80,000	Total Residential and Commercial Customers on VI	
27		Residential Retail			*000's*							
28		**TGI**	$ Per MJ	$0.0100	640		712,304	Total Residential Customers in BC				
29		**TGVI**	$ Per MJ	$0.0143	72							
30		**Electricity**	$ Per MJ	$0.0230								
31		**Electricity**	$ per kWh	$0.0827	1,511		1,511,435	Total BCH Residential Customers in BC				89%
32		**Electricity**	$ per kW per year									
33		Commercial Retail										
34		**TGI**	$ Per MJ	$0.0094	78		77,624	Total Commercial Customers in BC				
35		**TGVI**	$ Per MJ	$0.0169	8							
36		**Electricity**	$ Per MJ	$0.0214								
37		**Electricity**	$ per kWh	$0.0769	190		189,764	Total Light Industrial and Commercial Customers in BC				
38		**Electricity**	$ per kW per year	$52.0000	15							

Row	A	B	C	D	E	F	G	H	I	J	K	L	M
40	TAX												
41			Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
42	1		*Year*		*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
43	2	Carbon	$ Per tonne		$20.00	$25.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00
44	3	Carbon	$ Per GJ		$0.9976	$1.2470	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964
45	4	GDP Deflator			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
46	5	Carbon (Real)			$1.00	$1.25	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50
47	6	Net Present Value -2010				$2.14	$3.51	$4.84	$6.13	$7.39	$8.60	$9.78	$10.93
48	7	Net Present Value -2011					$2.62	$3.99	$5.32	$6.61	$7.86	$9.08	$10.26
49	8	Net Present Value -2012						$2.86	$4.23	$5.56	$6.85	$8.11	$9.32

Row	N	O	P	Q	R	S	T	U	V	W	X	Y
41	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
42	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*
43	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00
44	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964
45	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
46	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50
47	$12.05	$13.13	$14.18	$15.19	$16.18	$17.14	$18.08	$18.98	$19.86	$20.71	$21.54	$22.35
48	$11.41	$12.52	$13.60	$14.65	$15.67	$16.66	$17.62	$18.55	$19.46	$20.34	$21.19	$22.02
49	$10.50	$11.65	$12.76	$13.85	$14.90	$15.91	$16.90	$17.86	$18.80	$19.70	$20.58	$21.43

Row	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI
41	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
42	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*
43	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00
44	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964
45	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
46	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50
47	$23.13	$23.89	$24.62	$25.34	$26.03	$26.71	$27.36	$27.99	$28.61	$29.21
48	$22.82	$23.61	$24.36	$25.10	$25.81	$26.51	$27.18	$27.84	$28.47	$29.09
49	$22.26	$23.07	$23.85	$24.61	$25.34	$26.06	$26.75	$27.42	$28.08	$28.71

Row	A	B	C	D
51		**Discount Rate (real)[1]**		
52		**TERASEN GAS**		
53		**Rate of Inflation**	1.90%	
54		**TGI**	3.00%	
55		**TGVI**	3.00%	
56		**BC HYDRO**		
57		**Rate of Inflation**	2.00%	
58		**BC Hydro**	3.00%	
59		**Customer**	3.00%	
60		*Footnote 1: Source LR 070531*		
62				**SHEET LABELS**
63	**New Construction**			
64		Geoexchange - Secondary		**BASEBOARD**
65		0		**HEATPUMP**

FORTIS BC

only enter in boxes marked in blue

Measure Data for Geoexchange - Secondary

PER MEASURE			Utility Incentive to the participant	partner incentive
Incremental Cost	$ 524,221			
Total Incentive				$ -
Participant	$ 524,221			

Annual Impact Per Measure

Energy Savings per installation	6223.0	GJ		Average Annnual Energy Savings per Measure
Free Rider Rate / Net-to-Gross	0%	1.00		Net-to-Gross
Alternate Energy Impact	-1509	GJ	-419,167	kWh
Alternate Capacity Impact		kW/a		
Measure Lifetime	20	Years	Estimated lifespan of measure	

ANNUAL ACTIVITY	2009 NPV	Total	2010	2011	2012	Explanatory Notes
Number of Installations	1	1	0	1		Estimated Participatation
Impact						
Gross Energy Savings (GJ)	5,866	6,223	0	6,223	0	Extension of Unit Savings x No. of Upgrades
Net Energy Savings (GJ)	5,866	6,223	0	6,223	0	Gross Energy Savings less Free Riders
Alternate Energy Impact (Increase) (kWh)	(395,105)	(419,167)	0	(419,167)	0	Other Utility Billed energy impact
Alternate Capacity Impact (Increase) (kW/a)	$0.00	-				Other Utility Billed capacity impact

Benefit Cost Summary

	2009 NPV	*$ Total*	2010	2011	2012	
Avoided Revenue Requirements						
PV $ per GJ			$238.01	$238.01	$238.01	
Energy Purchases	$ 1,481,124	$ 1,481,124	$ -	$ 1,481,124	$ -	
Utility Program Costs						
DSM Incentives		$ -	$ -	$ -	$ -	
Administration		$ 30,000	$ -	$ 30,000		
Subtotal	$ 28,278	$ 30,000	$ -	$ 30,000	$ -	
Partner Program Costs						
DSM Incentives		$ -	$ -	$ -	$ -	
Administration		$ -	$ -	$ -	$ -	
Subtotal	$ -	$ -	$ -	$ -	$ -	
Participants' Net Costs						
Incremental Cost		$ 524,221	$ -	$ 524,221	$ -	
Subtotal	$ 494,129	$ 524,221	$ -	$ 524,221	$ -	
Alternate Savings - Net						
Energy (Purchases)		$ (748,337)	$ -	$ (748,337)	$ -	$1.785 PV $ per kWh
Capacity (Purchases)		$ -	$ -	$ -	$ -	PV$ per kW/a
Subtotal	$ (748,337)	$ (748,337)	$ -	$ (748,337)	$ -	
Total Resource Net Benefit (Cost)	$ 210,380		$ -	$ 178,566	$ -	Avoided Revenue Requirement less Utility less Partners less Participant Costs plus Alternate Savings
Utility Levelized Cost per GJ (Lifetime)	**$ 6.0**		**$ -**	**$ 6.0**	**$ -**	Informational (for comparison with supply options)

Program	**Thermal Energy Services for Schools**		
Project Type	**Elementary**	**Secondary**	**Typical Project**
Efficient Technology Description	Geoexchange systems and high-efficiency boiler upgrades		
Baseline Technology Description	Existing heating system		
Measure Life	20	20	20
Incremental Cost - Total	$166,631	$524,221	$309,667
Assumed Penetration			
Energy Savings per Installation (GJ)	1,011.00	6,223.00	3,095.50
Alternative Energy Impact (kWh)	(552.00)	(1,509.00)	(934.60)
Free Rider Rate			
Administration Costs	$30,000	$30,000	$30,000

Program	**Solar - Residential**
Efficient Technology Description	Solar DWH system. The primary components of a solar water heating system are a solar collector, a heat transfer fluid and a well-insulated storage tank. Due to Canada's colder climate and the higher likelihood of freezing, active closed-loop systems are generally used. These systems use a pump to circulate a non-freezing heat transfer fluid through the collectors and then through a heat exchanger so that the thermal energy can be transferred to the water.
Baseline Technology Description	No solar hot water heating system
Measure Life	25
Incremental Cost	$7,500
Assumed Penetration	400
Energy Savings per Installation (GJ)	12.00
Alternative Energy Impact (kWh)	$0
Free Rider Rate	-
Administration Costs	$625

Program	Solar Air
Efficient Technology Description	Solar walls, consisting of cladding placed on a southern exposure of a building to preheat ventilation air.
Baseline Technology Description	1500 CFM of supply air is heated by a natural gas source at 80% thermal efficiency (78% seasonal).
Measure Life	25
Incremental Cost	$39,400
Assumed Penetration	12
Energy Savings per Installation (GJ)	47.77
Alternative Energy Impact (kWh)	-
Free Rider Rate	0%
Administration Costs	$5,250

Program	Solar - Commercial
Efficient Technology Description	Solar direct water heating systems for commercial applications such as schools, universities, apartments and hospital. The primary components of the installed system are a solar collector, a heat transfer fluid, and an insulated storage tank. Due to the climate, active closed-loop systems are installed for a typical project. The systems use a pump to circulate non-freezing heat-transfer fluid through the collectors and then through a heat exchanger in order to transfer the thermal energy to the water.
Baseline Technology Description	Existing gas hot water heater or gas boiler.
Measure Life	25
Incremental Cost	$54,772
Assumed Penetration	50
Energy Savings per Installation (GJ)	76.42
Alternative Energy Impact (kWh)	-
Free Rider Rate	0%
Administration Costs	$3,750

Program	Furnace Scrap-It
Efficient Technology Description	96% AFUE Furnace
Baseline Technology Description	77% AFUE Furnace
Measure Life	18
Incremental Cost	$3,708
Assumed Penetration	8,500
Energy Savings per Installation (GJ) (leveliz	8.62
Alternative Energy Impact (kWh)	976.00
Free Rider Rate	0%
Administration Costs (per participant)	$162

INDEX

Tab Name	Measure Description	Average B/C Ratio
HEATING: SHELL MEASURES		
Attic Insulation	Improving the attic insulation in an average home by RSI-3.5 (R-20), through the addition of cellulose insulation	0.88
Wall Insulation	Improving the wall insulation in an average home by RSI-1.76 (R-10) to RSI-4.2 (R-24)	0.88
Slab Insulation	The addition of slab (basement floor) insulation in homes with unfinished basements. It is assumed that 2" polystyrene rigid foam insulation (RSI-1.76 (R-10)) is being added.	0.10
Basement Insulation	In average homes with basements, improving the foundation wall insulation by RSI-2.12 (R-12)	0.92
Crawl Space Insul.	In homes with crawlspaces, the addition of crawlspace insulation to bring the thermal resistance values up to RSI-2.1 (R-12)	0.33
Air Sealing	A comprehensive air sealing job, which results in an air tightness (ACH @ 50 Pa) improvement of 30%	0.46
Homeowner Air Sealing	A homeowner air sealing job, which results in an air tightness (ACH @ 50 Pa) improvement of 15-20%	0.85
Sealing & Insul. - Old Homes	Improve both the attic insulation and the air tightness (ACH@50 Pa) in an old home. It is assumed that the air tightness is improved by 30% and that RSI-3.52 (R-20) of attic insulation is added.	0.57
ESTAR Windows	In existing homes, replacing 50% of windows with ENERGY STAR windows from Zone C (double-glazed, argon fill, low-e coating, insulating spacer, vinyl frame, hinged). In hew homes, replacing 100% of windows.	0.23
Super Windows	In existing homes, replacing 50% of windows with super high-performance windows (triple-glazed, krypton fill, low-e and insulating coatings, insulating spacer, fiberglass frame, hinged). In new homes, replacing all of the windows with super high-performance windows.	0.56
HEATING: SHELL MEASURES (NEW HOMES)		
High-Perf. New Homes	A high-performance new home (EGH rating of 80 assumed). This option no longer applies as EGH of 80 is now the minimum.	0.00
Net Zero Ready Homes	A net-zero energy ready home (EGH rating of 86 assumed)	0.28
HEATING: EQUIPMENT		
Condensing Gas Furnaces	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 96%	0.28
Early Retire Gas Furnaces	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 90%	0.32
Condensing Gas Boilers	A condensing natural gas boiler (92% AFUE assumed)	0.24
Gas Fireplaces	A high efficiency natural gas fireplace (80% assumed)	3.67
Prog. Thermostats	Programmable thermostat installed on central forced-air natural gas furnace and electric space cooling system	6.35
Solar Make-Up Air	A 10 m2 solar pre-heated make-up air system, located on the south side of a home	0.17
HRVs	A high-efficiency heat recovery ventilator (HRV) (sensible efficiency of approximately 85%), in a home with central heating and cooling	0.31
Air Heat Pumps	A gas-fired air-source heat pump. This option is not valid because these units are not available in residential sizes.	0.00
Ground Heat Pumps	A gas-fired ground-source heat pump. This option is not valid because these units are not available in residential sizes.	0.00
Heating & DHW	An integrated heating and DHW system, with a condensing furnace (AFUE of 94), a condensing natural gas water heater (EF of 0.80 assumed), and an HRV with an efficiency similar to that in the base case (72%).	0.17
Heating & DHW (Hydronic)	An integrated heating and DHW system, with a condensing boiler (AFUE 92.7), a condensing natural gas water heater (EF of .85) and an HRV with an efficiency similar to that in the base case (72%).	0.33
WATER HEATING		
Condensing Gas DHW	A condensing natural gas water heater (EF of 0.80 assumed)	0.30
Tankless Gas DHW	A tankless natural gas hot water heater (EF of 0.82 assumed)	0.42
Solar DHW	Solar DHW systems use the energy of the sun to heat water. The primary components of a solar water heating system are a solar collector, a heat transfer fluid and a well-insulated storage tank. Due to Canada's colder climate and the higher likelihood of	0.24
DHW Tank Insulation	An insulating blanket installed on a hot water storage tank to reduce standby losses	0.98
DHW Pipe Insulation	Installing pipe insulation on the first meter of piping leading out of a hot water storage tank	18.33
DHW Heat Traps	Installing an external "S-type" pre-bent copper pipe heat trap on an gas-fired storage hot water heater. This option no longer applies because most new hot water heaters include an integrated heat trap.	0.00
Showerheads	An ultra low-flow showerhead with a 1.25 GPM (4.75) flow rate	10.35
Faucet Aerators	A 1.5 GPM (5.7 LPM) faucet aerator installed on the kitchen faucet	5.42
Wastewater Heat Recovery	A 60" wastewater heat recovery system	0.49
DHW Recirculation	A home with a DHW recirculation system installed on the point-of-use farthest away from the hot water tank	0.63
APPLIANCES		
ESTAR Dishwashers	An ENERGY STAR® certified, standard-sized new dishwasher	0.34
ESTAR Clothes Washers	An ENERGY STAR® certified, 3.2 cu. ft. (90.6 L) front loading clothes washer	1.00
Gas Clothes Dryers	A gas clothes dryer with a moisture sensor. This option is no longer valid because almost all new gas dryers have moisture sensors.	0.00
OTHER		
Pool Covers	Installing a pool cover to reduce the heat loss from a heated pool	0.86
Heat Pump Pool Heaters	A heat pump pool heater. This option is not valid in this study because it is a fuel-switching measure.	4.91
Efficient Pool Heaters	A high efficiency gas-fired pool heater (92.5% efficiency assumed)	0.07
Solar Pool Heaters	A solar pool heater with an unglazed collector	1.25
Micro-CHP	Installing a microturbine system in an average home, offsetting both the electric consumption from the grid and the amount of space and water heating that must be provided by a boiler. Note that this technology is not currently available in Canada.	0.35

Measure Name	Basis (Full/ Incremental)	Weighted Average	
		B/C Ratio	Measure TRC ($)
DHW Pipe Insulation	Full	18.33	$12
Ultra Low-Flow Showerheads	Full	10.35	$122
Programmable Thermostats (Central Heating and Cooling)	Full	6.35	$267
Faucet Aerators	Full	5.42	$66
Solar Pool Heaters	Full	1.25	$851
DHW Tank Insulation	Full	0.98	-$1
Attic Insulation	Full	0.88	-$78
Insulating Pool Covers	Full	0.86	-$169
Homeowner Air Sealing/Weather Stripping/Caulking	Full	0.85	-$51
DHW Recirculation Systems (e.g. Metlund D'MAND®)	Full	0.63	-$206
Air Leakage Sealing and Insulation (Old Homes)	Full	0.57	-$1,375
Wastewater Heat Recovery Systems	Full	0.49	-$399
Professional Air Sealing/Weather Stripping/Caulking	Full	0.46	-$1,086
Crawl Space Insulation	Full	0.33	-$538
Net-Zero Ready Energy Homes	Full	0.28	-$9,260
Active Solar Water Heating Systems	Full	0.24	-$5,326
Solar Pre-Heated Make-Up Air Systems (e.g., SolarWall®)	Full	0.17	-$1,073
High Efficiency Gas Fireplaces	Incr.	3.67	$400
High-Efficiency (ENERGY STAR®) Clothes Washers	Incr.	1.00	-$1
Basement (Foundation) Insulation	Incr.	0.92	-$95
Wall Insulation	Incr.	0.88	-$228
Super High-Performance Windows	Incr.	0.56	-$1,266
Point-of-Use (Tankless) Water Heaters (Gas)	Incr.	0.42	-$1,154
Micro-Combined Heat and Power (CHP)	Incr.	0.35	-$5,163
High-Efficiency (ENERGY STAR®) Dishwashers	Incr.	0.34	-$69
Integrated Heating and DHW (Hydronic Heating)	Incr.	0.33	-$4,034
Early Retirement of Existing Gas Furnaces	Incr.	0.32	-$1,260
High Efficiency Heat Recovery Ventilators (HRVs)	Incr.	0.31	-$412
Condensing Gas Water Heaters	Incr.	0.30	-$936
High Efficiency Condensing Gas Furnaces	Incr.	0.28	-$1,062
Condensing Gas Boilers	Incr.	0.24	-$2,432
Zoned-Up Windows: (ENERGY STAR®) Rating for a Colder Zone	Incr.	0.23	-$1,377
Integrated Heating and DHW (Forced Air Heating)	Incr.	0.17	-$5,142
Slab Insulation (Unfinished Basements)	Incr.	0.10	-$1,069
High-Efficiency Gas-Fired Pool Heaters	Incr.	0.07	-$2,696

Back to Index

Tab Name	Measure Name (Full)	General Measure Description	Baseline Description	Upgrade Description	
Attic Insulation	Attic Insulation	Insulation levels can be increased in attics by blowing insulation into the attic spaces to fill and cover the space within the roof frame. One technique is to make sure loose-fill or batt insulation fills the attic floor joists fully and then add an additional layer of unfaced fibreglass batt insulation across the joists. To reduce cost, it is also possible to blow in cellulose insulation on top of the existing insulation instead.	A home with average insulation in the attic	Improving the attic insulation in an average home by RSI-3.5 (R-20), through the addition of cellulose insulation	Cool
Wall Insulation	Wall Insulation	It can be challenging to retrofit wall insulation in existing homes since the inside surfaces of the exterior walls are already finished. It is sometimes possible to add insulation to a wall by blowing insulating materials into the wall cavity, if sufficient space exists. Alternatively, if the siding is old and due for replacement, rigid foam insulation can be added before the new siding is installed. In this situation, it would also be quite cost-effective to install a more effective vapour and air barrier (e.g., Dupont Tyvek®) to reduce the amount of air leakage through the walls.	A home with average wall insulation	Improving the wall insulation in an average home by RSI-1.76 (R-10) to RSI-4.2 (R-24)	Cool
Slab Insulation	Slab Insulation (Unfinished Basements)	Insulation can be added both under and on top of basement slab floors. However, in existing homes, only the latter is practical. It is assumed that additional insulation is added to the slab floor while the basement is being finished. This can be done by purchasing insulated subfloor panels or laying down extruded polystyrene rigid foam insulation.	Homes with unfinished basements	The addition of slab (basement floor) insulation in homes with unfinished basements. It is assumed that 2" polystyrene rigid foam insulation (RSI-1.76 (R-10)) is being added.	Cool
Basement Insulation	Basement (Foundation) Insulation	In many homes, the basement is often under-insulated or even left uninsulated. Increasing the insulation level in basements can be achieved in a number of ways, including constructing a new insulated frame wall, moving the existing frame wall to increase the insulation level, adding extra insulation to the existing frame wall, adding rigid board insulation to the exterior of the foundation, or using a combination of interior and exterior rigid board insulation. As a lower cost alternative, it is also possible to use polyurethane foam	A home with average insulation in the basement (foundation) walls	In average homes with basements, improving the foundation wall insulation by RSI-2.12 (R-12)	Cool
Crawl Space Insul.	Crawl Space Insulation	Insulation levels remain below code in many homes that include crawlspaces as part of the basement design. If the floor is exposed, it would first be necessary to install a vapour barrier (e.g., 6 mil (600 gauge/0.15 mm) polyurethane barrier). Polyurethane foam could then be applied to the ceiling of the crawlspace (or the outer walls if there are pipes running below the floor). In addition to increasing the insulation of the crawlspace, this would help to eliminate any air leaks. Co-benefits of improved crawlspace insulation include improved thermal comfort, fewer drafts, and less condensation.	Minimal crawlspace insulation in homes with crawlspaces	In homes with crawlspaces, the addition of crawlspace insulation to bring the thermal resistance values up to RSI-2.1 (R-12)	Cool
Air Sealing	Professional Air Sealing/Weather Stripping/Caulking	Air leakage sealing of building envelopes includes completion of a blower door test to quantify leakage levels and to identify the location of air leaks. Generally, major leakage occurs at window-to-wall interfaces, around doors (especially patio doors), through electrical and plumbing penetrations and at the top of foundation walls. Installation of sealant and gaskets are generally accepted methods for reducing air leakage in buildings. Other sources of air leaks include pot lights, wall-to-floor interfaces (i.e., top and bottom of baseboards) and bathroom and kitchen exhaust piping.	No action taken	A comprehensive air sealing job, which results in an air tightness (ACH @ 50 Pa) improvement of 30%	Cool
Homeowner Air Sealing	Homeowner Air Sealing/Weather Stripping/Caulking	Homeowner air leakage sealing does not include a blower door test to quantify leakage levels and to identify the location of air leaks. Homeowners are likely to identify leakage primarily in more visible areas of the envelope, for example, the major leakage at window-to-wall interfaces, around doors (especially patio doors), through electrical and plumbing penetrations and perhaps at the top of foundation walls. Installation of weather stripping, sealant and gaskets are the most likely methods to be used. Less visible sources of air leaks such as pot lights, wall-to-floor interfaces (i.e., top and bottom of baseboards), bathroom and kitchen exhaust piping, and leaks from the top of walls into the attic are less likely to be addressed by the homeowner	No action taken	A homeowner air sealing job, which results in an air tightness (ACH @ 50 Pa) improvement of 15-20%	Cool
Sealing & Insul. - Old Homes	Air Leakage Sealing and Insulation (Old Homes)	This measure is targeted at homes that are at least 30 years old, since many of these homes haven't had any work done to improve insulation and air-sealing deficiencies and it is generally most cost-effective to upgrade the insulation and the air sealing at the same time. This includes wall, attic, foundation, and crawlspace retrofits of older homes but, for the purposes of this analysis, it is assumed that a retrofit is being conducted on the attic. The air-sealing portion of the work could be accomplished by segmenting the attic. In each segment, the existing insulation could be moved to one side and polyurethane foam could be sprayed in (serves as an air sealant in addition to its insulating properties). It may also be necessary to install or refurbish top plates to prevent airflow into the attic through exterior wall cavities. Other considerations that would increase the cost of the air-sealing portion of the work and may be present in some homes include sealing pot lights and kitchen or bathroom exhaust piping. When completed, these measures would dramatically improve the air tightness of an older home. The attic insulation could subsequently be cost-effectively improved with cellulose insulation.	An older home with average air tightness and attic insulation (for that particular vintage)	Improve both the attic insulation and the air tightness (ACH@50 Pa) in an old home. It is assumed that the air tightness is improved by 30% and that RSI-3.52 (R-20) of attic insulation is added.	Cool
Zone Up Windows	Zoned-Up Windows: (ENERGY STAR®) Rating for a Colder Zone	High-performance windows incorporate a number of additional energy-saving features, including low-E (soft coating), insulating spacers, argon fill and low conductivity frames (which can be sliders, hinged or picture). These windows are certified based on their energy rating (ER), which is based on their tested energy performance, rather than on their specific combination of features. In this case, however, the Energy Star windows for a colder zone are specified instead of the Energy Star windows for the zone where the house is located - for example, Zone C Energy Star windows would be chosen for a house in Zone A. High-performance windows also provide occupant co-benefits, such as reduced interior noise, reduced air leakage, greater thermal comfort, and fewer condensation problems.	ENERGY STAR windows for Zone A (double glazed, argon fill, low-e coating, insulating spacer, vinyl frame, hinged)	In existing homes, replacing 50% of windows with ENERGY STAR windows from Zone C (double-glazed, argon fill, low-e coating, insulating spacer, vinyl frame, hinged). In hew homes, replacing 100% of windows.	Not cool
Super Windows	Super High-Performance Windows	In addition to low-E coating, argon fill and insulating spacers, super-high performance windows incorporate features such as triple glazing, transparent insulating films, and fibreglass frames.	Standard windows (double glazed, air fill, no coating, metal spacer, vinyl frame, slider with sash)	In existing homes, replacing 50% of windows with super high-performance windows (triple-glazed, krypton fill, low-e and insulating coatings, insulating spacer, fiberglass frame, hinged). In new homes, replacing all of the windows with super high-performance windows.	Cool
High-Perf. New Homes	High-Performance Homes (EGH 80/R2000/ENERGY STAR®)	There are several certification schemes for energy-efficient new homes that incorporate integrated design and multiple envelope measures. An EnerGuide for Houses (EGH) rating is a standard measure of a home's energy performance, calculated by a professional EGH advisor. The rating is based on information on the construction of the home and the results of a blower door test performed once the house has been built. The R2000 standard is one method of achieving an EGH 80 rating. However, R2000 homes are required to achieve an air tightness level of 1.5 ACH@50Pa, install a heat recovery ventilator (HRV), and meet other environmental requirements. This substantially increases the cost of the measure. The ENERGY STAR® for New Homes program has similar requirements and also requires that homes be rated EGH 80. Since these three high performance home standards all result in essentially the same energy performance, the costs assumed for the measure are those of the least expensive of the three. EGH 80 is the lowest cost, since it allows the builder the most flexibitility for achieving the energy performance.	An average new home (EGH rating of 76 assumed)	A high-performance new home (EGH rating of 80 assumed). This option no longer applies as EGH of 80 is now the minimum.	Cool
Net Zero Ready Homes	Net-Zero Ready Energy Homes	Net-zero energy homes (NZEH) produce at least as much energy as they consume. This is accomplished by incorporating on-site power generation, such as solar PV panels or small wind turbines, to offset electrical loads. However, the energy consumption of a NZEH is significantly lower, due to the addition of a wide array of energy efficiency features. Measures that are typically considered include increased insulation, super high-performance windows, ENERGY STAR® appliances, solar thermal space and/or water heating, heat pumps, and passive solar designs. This measure is designed to produce a highly efficient house that is ready to be turned into a NZEH with the addition of on-site renewable energy generation.	An average new home (Minimum EGH rating of 80 required)	A net-zero energy ready home (EGH rating of 86 assumed)	Cool
Condensing Gas Furnaces	High Efficiency Condensing Gas Furnaces	Federal legislation now requires that all residential furnaces meet the minimum performance standard of 90% AFUE . However, higher efficiency condensing furnaces are available. These furnaces include more advanced heat exchanger designs that extract more heat from the flue gases before they are exhausted.	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 90%	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 96%	Cool
Early Retire Gas Furnaces	Early Retirement of Existing Gas Furnaces	Federal legislation now requires that all residential furnaces meet the minimum performance standard of 90% AFUE . However, consumers with less efficient furnaces that still work may wait years before replacing them. Early retirement of existing furnaces that are still functional is an option. Energy savings only last until the old furnace would have been replaced, because after that the energy consumption of the base case and upgrade is the same. The consumer has the added peace of mind of having a new furnace that is less likely to break down in winter	Keep existing 77% efficient furnace until failure, assumed to be in 9 years; then replace with the same furnace as the upgrade	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 90%	Cool
Condensing Gas Boilers	Condensing Gas Boilers	High-efficiency condensing boilers feature advanced heat exchanger designs that extract more heat from the flue gases before they are exhausted. So much heat is extracted that the flue gases condense and must be discharged as a condensate rather than a gas. In retrofit applications where condensing boilers are replacing non-condensing units, it may be necessary to modify the radiating system. Otherwise, the units may not actually condense the flue gas and realize their full efficiency potential.	A non-condensing mid-efficiency natural gas boiler (82% AFUE assumed)	A condensing natural gas boiler (92% AFUE assumed)	Cool
Gas Fireplaces	High Efficiency Gas Fireplaces	All vented gas fireplaces sold in Canada must now be tested for their energy efficiency using the Canadian Standards Association CSA-P.4.1-02 standard if they are shipped across provincial lines. The energy-efficiency rating of the fireplace is printed on the EnerGuide label. EnerGuide does not set a minimum efficiency level, so savings are possible by using the EnerGuide label to choose the more efficient unit.	An average efficiency natural gas fireplace (60% assumed)	A high efficiency natural gas fireplace (80% assumed)	Cool
Prog. Thermostats	Programmable Thermostats (Central Heating and Cooling)	Digital programmable thermostats provide improved temperature setting accuracy and allow occupants to preset temperatures for various time periods. A 4ºC temperature setback is often assumed during night and unoccupied periods. However, utility studies have indicated that a lower average setback value should be used to reflect the fact that the thermostat's setback capabilities do not completely reflect how they are used. For example, some home occupants reliably set back manual thermostats while others do not use the setback features on their electronic thermostats.	Non-programmable thermostat installed on central forced-air natural gas furnace and electric space cooling system	Programmable thermostat installed on central forced-air natural gas furnace and electric space cooling system	Cool
Solar Make-Up Air	Solar Pre-Heated Make-Up Air Systems (e.g., SolarWall®)	Solar preheated ventilation systems preheat incoming ventilation air and reduce heat loss through the portion of the building shell covered by them. They consist of perforated steel or aluminum absorber sheets that are mounted vertically on a building's exterior surface and are ideally mounted on southerly facing walls, plus or minus 20 degrees. The dark coloured metal sheets that make up the system are mounted a small distance away from the building's surface, creating an air cavity. A negative pressure is created within the cavity by ventilation fans and air is drawn through small holes in the metal panels. On sunny winter days, these systems can raise incoming air temperatures by 25°C to 35°C. In summer months, ventilation air can be drawn directly from the outside through a bypass damper, while heated air is rejected through vents at the top of the air cavity. These systems are generally used in commercial and industrial applications but they have seen some limited residential use.	Homes with ducting and heat recovery ventilators (HRVs)	A 10 m2 solar pre-heated make-up air system, located on the south side of a home	Cool
HRVs	High Efficiency Heat Recovery Ventilators (HRVs)	Heat recovery ventilators (HRVs) are heat exchangers that are integrated into the centralized ventilation and exhaust systems of many newer homes. In the winter, they allow for incoming fresh air to be heated by outgoing stale air. Conversely, in homes with central air conditioning systems, they allow incoming fresh air to be cooled by outgoing stale air in the summer. High efficiency HRVs incorporate more effective heat exchangers. Some models also include desiccant wheels so that latent heat (i.e. humidity) can be transferred between the two air streams	A standard-efficiency (sensible efficiency of approximately 70%) heat recovery ventilator (HRV), in a home with central heating and cooling	A high-efficiency heat recovery ventilator (HRV) (sensible efficiency of approximately 85%), in a home with central heating and cooling	Cool
Air Heat Pumps	Gas-Fired Air-Source Heat Pumps	Early gas-fired heat pumps, such as the York Triathlon, were unsuccessful due to their bulky size and poor quality design. A new generation of gas absorption heat pumps (GAHPs) is currently available through Robur, an Italian manufacturer. These systems can either be ground-source or air-source (i.e., the heat sink may be either an underground fluid loop or an above ground heat exchanger coil). Air-source systems are substantially less expensive since they don't require drilling to install underground fluid loops. However, they can also be much less efficient than ground-source versions since their efficiency is a function of outside air temperature. Commercial-sized GAHP systems have been available in Canada since mid-2007 but residential-sized systems are rare in North America. It is hoped that residential-sized units will become more available in Canada within the study period, but the current manufacturers do not have specific plans at this time. It is estimated that air-source systems can operate at temperatures as low as -29°C and have annual efficiencies of 105% in cold winter locations. In more moderate winter climates, an efficiency of up to 129% is advertised. Unlike electric heat pump systems, GAHPs do not require any auxiliary heating equipment. In addition, the lack of a mechanical compressor extends their lifetime and allows air-source systems to withstand	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 90%	A gas-fired air-source heat pump. This option is not valid because these units are not available in residential sizes.	Cool

Ground Heat Pumps	Gas-Fired Ground-Source Heat Pumps	Early gas-fired heat pumps, such as the York Triathlon, were unsuccessful due to their bulky size and poor quality design. A new generation of gas absorption heat pumps (GAHPs) is currently available through Robur, an Italian manufacturer. These systems can either be ground-source or air-source (i.e., the heat sink may be either an underground fluid loop or an above ground heat exchanger coil). Air-source systems are substantially less expensive since they don't require drilling to install underground fluid loops. However, they can also be much less efficient than ground-source versions since their efficiency is a function of outside air temperature. Commercial-sized GAHP systems have been available in Canada since mid-2007 but residential-sized systems are not currently available outside of Europe. It is hoped that residential-sized units will become more available in Canada within the study period, but the current manufacturers do not have specific plans at this time. Ground-source GAHPs have efficiencies (COPs) ranging from 120% to 130% Unlike electric heat pump systems, GAHPs do not require any auxiliary heating equipment. In addition, the lack of a mechanical compressor extends their lifetime.	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 90%	A gas-fired ground-source heat pump. This option is not valid because these units are not available in residential sizes.	Cool
Heating & DHW	Integrated Heating and DHW (Forced Air Heating)	Integrated mechanical systems combine the most efficient technologies for residential space heating and domestic water heating into one package. For example, the Matrix system by NTI NY Thermal incorporates a condensing furnace, condensing boiler, condensing water heater and HRV all in one unit. Primary benefits of the integrated units include compact construction, lower cost of installation (only one set of gas, water and circulation connections are required), and lower installation and maintenance costs (once the technology is mature). Since the minimum performance standards for furnaces was brought up to 90% efficiency at the end of 2009, the base case system is a 90% efficient forced-air furnace and a standard efficiency natural gas tank-style water heater. With this baseline, the integrated system would offer little in the way of space heating savings, but it does still offer DHW savings because the integrated system would heat domestic water with	A 90% AFUE efficient forced-air condensing furnace, a standard efficiency natural gas tank-style water heater (EF of 0.62 or 0.64 assumed) and a standard efficiency HRV	An integrated heating and DHW system, with a condensing furnace (AFUE of 94), a condensing natural gas water heater (EF of 0.80 assumed), and an HRV with an efficiency similar to that in the base case (72%).	Cool
Heating & DHW (Hydronic)	Integrated Heating and DHW (Hydronic Heating)	Integrated mechanical systems combine the most efficient technologies for residential space heating and domestic water heating into one package. For example, the Matrix system by NTI NY Thermal incorporates a condensing furnace, condensing boiler, condensing water heater and HRV all in one unit. Primary benefits of the integrated units include compact construction, lower cost of installation (only one set of gas, water and circulation connections are required), and lower installation and maintenance costs (once the technology is mature). Water heating in the base case is assumed to be provided by a standard efficiency natural gas tank-style water heater (EF of 0.62 or 0.64), while space heating is provided by a non-condensing boiler, assumed to have an AFUE of 82% . The HRV in the base case is assumed to be of similar efficiency to the HRV in the	A non-condensing boiler with an AFUE of 82% and a standard efficiency natural gas tank-style water heater (EF of 0.62 or 0.64). An HRV of similar efficiency to the integrated unit (72%) is assumed.	An integrated heating and DHW system, with a condensing boiler (AFUE 92.7), a condensing natural gas water heater (EF of .85) and an HRV with an efficiency similar to that in the base case (72%).	Cool
Condensing Gas DHW	Condensing Gas Water Heaters	Condensing water heaters feature advanced heat exchanger designs that extract more heat from the flue gases before they are exhausted. So much heat is extracted that the flue gases condense and must be discharged as a condensate rather than a gas. As a result, the efficiency of these types of water heaters is significantly higher than standard water heaters.	A conventional storage natural gas hot water heater (EF of 0.62 or 0.64 assumed)	A condensing natural gas water heater (EF of 0.80 assumed)	Cool
Tankless Gas DHW	Point-of-Use (Tankless) Water Heaters (Gas)	Tankless water heaters heat water on demand, eliminating hot water storage. The absence of hot water storage reduces standby heat losses. The efficiency of tankless water heaters is generally improved by the addition of features such as modulating controls, electric spark ignitions and direct venting. The applicability of tankless gas-fired DHW systems is somewhat limited by venting constraints; the burner is significantly larger than for a standard water heater, so a larger vent is required. Some houses cannot accommodate the larger flue because of requirements for clearance from other structures, windows, etc.	A conventional storage natural gas hot water heater (EF of 0.60 assumed)	A tankless natural gas hot water heater (EF of 0.82 assumed)	Cool
Solar DHW	Active Solar Water Heating Systems	Solar DHW systems use the energy of the sun to heat water. The primary components of a solar water heating system are a solar collector, a heat transfer fluid and a well-insulated storage tank. Due to Canada's colder climate and the higher likelihood of freezing, active closed-loop systems are generally used. These systems use a pump to circulate a non-freezing heat transfer fluid through the collectors and then through a heat exchanger so that the thermal energy can be transferred to the water. Solar DHW are not generally sized to supply all of the annual requirement for water heating in the home, because if the system is sized for cloudy winter periods it will have enormous excess capacity during sunny summer periods, and will cost far too much to install. The system analyzed here meets approximately 2/3 of the annual requirements.	No solar water heating system installed	Solar DHW systems use the energy of the sun to heat water. The primary components of a solar water heating system are a solar collector, a heat transfer fluid and a well-insulated storage tank. Due to Canada's colder climate and the higher likelihood of	Cool
DHW Tank Insulation	DHW Tank Insulation	Pre-cut tank jackets/blankets (DHW tank insulation) are readily available and can be installed on hot water storage tanks to reduce standby heat losses. Caution is required to install blankets on gas water heaters, to avoid blocking the flue, the air intake to the burner, or the drain at the bottom. The thermostat should also remain uncovered.	No additional tank insulation installed on a conventional hot water storage tank	An insulating blanket installed on a hot water storage tank to reduce standby losses	Cool
DHW Pipe Insulation	DHW Pipe Insulation	Hot water pipe insulation reduces the distribution losses for DHW. In general, only the first one or two metres of pipe nearest the DHW tank are accessible enough to insulate. However, since the dominant loss is from the pipe transferring heat out of the tank and then losing it to the basement, the first meter of pipe is the most important and only worthwhile section of pipe to insulate. Insulating this section of piping affects both the delivery of hot water and the losses from the tank. Delivery temperature is slightly increased during a hot water draw, and the water in the piping does not lose its stored heat as quickly between draws	No insulation installed on the piping leading out of a hot water storage tank	Installing pipe insulation on the first meter of piping leading out of a hot water storage tank	Cool
DHW Heat Traps	DHW Heat Traps	This measure involves the installation of external "S-type" pre-bent copper pipe heat traps on both of the outlets ofwater heaters. This measure is only being considered during the installation of new tanks since it can be prohibitively expensive to bring in a plumber otherwise.	No heat trap installed on a new electric storage hot water heater	Installing an external "S-type" pre-bent copper pipe heat trap on an gas-fired storage hot water heater. This option no longer applies because most new hot water heaters include an integrated heat trap.	Cool
Showerheads	Ultra Low-Flow Showerheads	Ultra low-flow showerheads have aerators and flow restrictors to reduce water use. At 4.75 LPM (1.25 GPM), their flow rates are substantially lower than traditional low-flow fixtures, whose flow rates range between 7.6 LPM and 9.5 LPM (2.0-2.5 GPM).	A low-flow showerhead with a 2.0 GPM (7.6 LPM) flow rate (conservative estimate)	An ultra low-flow showerhead with a 1.25 GPM (4.75) flow rate	Cool
Faucet Aerators	Faucet Aerators	Aerators can easily be attached to most faucets to restrict the flow rate of water flowing from them. This can result in savings to both water consumption and DHW energy.	No faucet aerator installed on the kitchen faucet	A 1.5 GPM (5.7 LPM) faucet aerator installed on the kitchen faucet	Cool
Wastewater Heat Recovery	Wastewater Heat Recovery Systems	Residential wastewater heat recovery systems transfer the waste heat from drains to preheat make-up water. These systems work well only for DHW uses in which the hot water use and the draining of wastewater are simultaneous. Thus, in homes, application to anything other than showers is difficult. Heat recovery systems incorporate shell-and-tube heat exchangers that typically have efficiencies in the range of 40% to 55%, depending on factors such as design, material, overall length, and fluid flow rate.	No wastewater heat recovery system installed	A 60" wastewater heat recovery system	Cool
DHW Recirculation	DHW Recirculation Systems (e.g. Metlund D'MAND®)	When turning on the hot water tap, it often takes a long time before hot water begins to flow. DHW recirculation systems can be used to pump hot water to a faucet at the demand of a user, getting hot water to the fixture four to five times quicker than traditional systems. Water that is in the hot water lines is pumped back to the water heater either through the cold water lines or through a dedicated line. This pumping continues until the temperature of the hot water at the point of use reaches a specified value. In retrofit situations, this pumping system is generally installed at the faucet that is furthest away from the water heater and the system is enabled by remote activation from the other points of use. Along with improved convenience and water savings (since water isn't flushed down the drain), energy savings are achieved since the water that is pumped back to the water heater is generally warmer than city water. In addition, since the pump gets water to the fixture more quickly, there is an overall reduction of hot water use.	A home with no DHW recirculation system	A home with a DHW recirculation system installed on the point-of-use farthest away from the hot water tank	Cool
ESTAR Dishwashers	High-Efficiency (ENERGY STAR®) Dishwashers	ENERGY STAR® dishwashers save energy by using improved technology for the primary wash cycle and by using less hot water to clean. Features include more effective washing action, energy-efficient motors, and sensors that determine the length of the wash cycle and the temperature of the water necessary to clean the dishes. In addition, some advanced dishwashers can sense and adjust for the amount of soil on dishes, using only as much water as necessary. These savings affect both the energy used for heating the water and the mechanical energy of the dishwasher	A standard-sized new dishwasher	An ENERGY STAR® certified, standard-sized new dishwasher	Cool
ESTAR Clothes Washers	High-Efficiency (ENERGY STAR®) Clothes Washers	In January 2011, the ENERGY STAR® standard for clothes washers will be increased once again. As a result, very few top loading washers will meet ENERGY STAR® requirements. Instead, the overwhelming majority of ENERGY STAR® models will be front loading (horizontal axis) models. Compared to standard models, front loading washing machines use less hot water, less mechanical energy, and result in dryer energy savings due to faster spin cycle speeds	A standard 3.2 cu. ft. (90.6 L) top loading clothes washer	An ENERGY STAR® certified, 3.2 cu. ft. (90.6 L) front loading clothes washer	Cool
Gas Clothes Dryers	High-Efficiency Gas Clothes Dryers	The major distinction with energy-efficient gas clothes dryer models is that they incorporate termination controls to sense dryness and turn off automatically. The most efficient models have moisture sensors in the drum for sensing dryness, while other lower-cost and slightly less efficient models infer dryness by sensing the temperature of the exhaust air. The majority of the retail models currently available employ some type of dryness sensing technology but it is unclear how often these controls are used by homeowners	A gas clothes dryer with a temperature sensor	A gas clothes dryer with a moisture sensor. This option is no longer valid because almost all new gas dryers have moisture sensors.	Cool
Pool Covers	Insulating Pool Covers	Between 30% and 50% of the heat loss from a swimming pool is due to evaporation. In an outdoor pool, this heat loss either adds to the cost of heating the pool or shortens the swimming season. Evaporation also increases the quantity of chemicals that must be added to the pool. A pool cover can reduce evaporation and other heat losses but can also reduce heat gains depending on the design. An insulating vinyl pool cover is assumed for this analysis. Although substantially more expensive than the bubble type covers, insulating vinyl pool covers are much more robust and, thus, have much longer lifetimes. They are also more effective at trapping heat	A pool with no insulating cover	Installing a pool cover to reduce the heat loss from a heated pool	Cool
Heat Pump Pool Heaters	Heat Pump Pool Heaters	Air source heat pumps can be used to replace electric or gas-fired pool heaters. The principal of operation for these types of heat pumps is very similar to refrigerators and air conditioning units, in that they are used to transfer heat from one place to another. This allows them to be significantly more efficient than electric or gas-fired pool heaters, since these types of heaters generate heat rather than transferring it.	A standard efficiency gas-fired pool heater	A heat pump pool heater. This option is not valid in this study because it is a fuel-switching measure.	Cool
Efficient Pool Heaters	High-Efficiency Gas-Fired Pool Heaters	High-efficiency pool heaters incorporate advanced heat exchangers, forced draft combustion systems, pilot-less ignitions and innovations in hydraulics, which results in performance efficiencies that range between 90% and 95%, compared to efficiencies of 80% to 85% for standard models.	A standard efficiency gas-fired pool heater (82.5% efficiency assumed)	A high efficiency gas-fired pool heater (92.5% efficiency assumed)	Cool
Solar Pool Heaters	Solar Pool Heaters	Unlike other types of solar hot water systems, solar pool heaters do not include storage tanks or heat exchangers, and, since they are only used in warmer weather, they generally employ unglazed solar collectors that are composed of a polymer. These collectors are mounted of the roofs of homes or in an unshaded part of the yard. The heat transfer fluid is usually pool water that is pumped directly into the array of collectors and flows within the polymer in a serpentine array in order to pick up heat. Although solar DHW systems do require a pump, its consumption is similar to that used in electric and gas-fired pool heaters. Solar pool heaters can completely offset the energy requirements of conventional pool heaters. And,	A standard efficiency gas-fired pool heater	A solar pool heater with an unglazed collector	Cool
Micro-CHP	Micro-Combined Heat and Power (CHP)	Several types of micro-combustion heat and power (micro CHP) systems are either available or under development. These units all generate electrical power and capture the resulting "waste" heat for space and/or water heating. Reciprocating engine units such as the Honda Freewatt use a well-developed technology and can be scaled to a residential size. Power generate efficiencies range from 20-40% and up to 90% of the waste heat can be captured. Various sizing and control strategies can be used: for example, the amount of heat can be maximized or the amount of electricity can be maximized. This example assumes a unit such as the Honda Freewatt hydronic system, which has a 1.2 kW maximum electrical output and a 3.5 kW thermal output. Heat load following control is assumed to avoid fuel-switching, however power load following control is usually more economically attractive for applications involving seasonally varying loads. A back-up boiler is included in the Honda Freewatt package. Net-metering is	Condensing gas-fired boiler (92% AFUE)	Installing a microturbine system in an average home, offsetting both the electric consumption from the grid and the amount of space and water heating that must be provided by a boiler. Note that this technology is not currently available in Canada.	Cool

MISCELLANEOUS INPUTS

Back to Index

Measure Sheet Title: TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Number of Sub-Sectors (1 to 15): 8

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Average
Sub-Sector Names:	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	9	10	11	12	13	14	15	Weighted Avg.

FUEL MIX

Space Heating

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	9	10	11	12	13	14	15	Weighted Avg.	References/Notes
Electricity	5.2%	5.2%	5.2%	5.4%	5.4%	5.4%	5.2%	5.2%								5.2%	
Natural Gas	94.5%	94.5%	94.5%	94.5%	94.5%	94.5%	94.5%	94.5%								94.5%	
Oil																0.0%	Not used
Wood																0.0%	Not used
Total	**99.7%**	**99.7%**	**99.7%**	**99.9%**	**99.9%**	**99.9%**	**99.7%**	**99.7%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**99.8%**	

DHW

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	9	10	11	12	13	14	15	Weighted Avg.	References/Notes
Electricity	7.0%	7.0%	7.0%	7.5%	7.5%	7.5%	7.1%	7.1%								7.1%	
Natural Gas	92.3%	92.3%	92.3%	91.7%	91.7%	91.7%	92.3%	92.3%								92.2%	
Oil																0.0%	Not used
Total	**99.3%**	**99.3%**	**99.3%**	**99.2%**	**99.2%**	**99.2%**	**99.4%**	**99.4%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**99.3%**	

Cooking

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	9	10	11	12	13	14	15	Weighted Avg.	References/Notes
Electricity	76.4%	76.4%	76.4%	82.5%	82.5%	82.5%	77.0%	77.0%								77.5%	
Natural Gas	23.6%	23.6%	23.6%	17.5%	17.5%	17.5%	23.0%	23.0%								22.5%	
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**100.0%**	

Clothes Dryers

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	9	10	11	12	13	14	15	Weighted Avg.	References/Notes
Electricity	94.4%	94.4%	94.4%	96.5%	96.5%	96.5%	94.6%	94.6%								94.8%	
Natural Gas	5.6%	5.6%	5.6%	3.5%	3.5%	3.5%	5.4%	5.4%								5.2%	
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**100.0%**	

Pools and Spas

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	9	10	11	12	13	14	15	Weighted Avg.	References/Notes
Electricity	49.8%	49.8%	49.8%	49.8%	49.8%	49.8%	49.8%	49.8%								49.8%	
Natural Gas	44.7%	44.7%	44.7%	44.7%	44.7%	44.7%	44.7%	44.7%								44.7%	
Total	**94.5%**	**94.5%**	**94.5%**	**94.5%**	**94.5%**	**94.5%**	**94.5%**	**94.5%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**94.5%**	

HEATING PENALTY/ COOLING BENEFITS

Mix of Heating Fuels (for heating penalty and cooling benefits calculations)

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	9	10	11	12	13	14	15	Weighted Avg.	References/Notes
Electricity	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%								0.0%	Not used
Natural Gas	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%								0.0%	Not used
Oil	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%								0.0%	Not used
Wood	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%								0.0%	Not used
Total	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	

Average Heating System Efficiency by Fuel

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	9	10	11	12	13	14	15	Weighted Avg.	References/Notes
Electricity	110.0%	110.0%	110.0%	110.0%	110.0%	110.0%	100.0%	100.0%								109.8%	Not used
Natural Gas	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%								85.0%	Not used
Oil	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%								75.0%	Not used

Average Cooling System Efficiency by Fuel

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	9	10	11	12	13	14	15	Weighted Avg.	References/Notes
Electricity	300.0%	300.0%	300.0%	300.0%	300.0%	300.0%	300.0%	300.0%								300.0%	Not used

HOUSING STOCK

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	9	10	11	12	13	14	15	Weighted Avg.	References/Notes
Occupancy Rates	3.1	3.1	3.1	2.4	2.4	2.4	1.9	1.9								3.0	Stats Canada, values for Vancouver
Distribution of Housing Types	39.7%	48.5%	72.4%	1.4%	8.4%	25.7%	1.9%	1.9%								N/A	

ECONOMIC PARAMETERS

Back to Index

Customer Resource Costs

Electric Energy ($/kWh)	$0.083
Electric Demand ($/kW)	
Natural Gas ($/MJ)	$0.010
Oil ($/L)	
Water ($/1000L)	

Sources:

Electricity: Residential retail cost of electricity and demand taken from the spreadsheet "20100111_Planning Tool with Partners_TGVI_Res.xlsx" provided by Terasen

Gas: TGI rate taken from the spreadsheet "20100111_Planning Tool with Partners_TGVI_Res.xlsx" provided by Terasen

Oil: Cost not used

Water: Cost not used

GHG Adder Inputs

	Electricity (kWh)	Natural Gas (m^3)	Fuel Oil (L)	Water (1000L)	
			Not used	Not used	
GHG Cost, 2010 ($/tonne CO_2e)					Not used--GHG costs already in avoided cost
GHG Cost, 2011 ($/tonne CO_2e)					Not used--GHG costs already in avoided cost
GHG Cost, 2012+ ($/tonne CO_2e)					Not used--GHG costs already in avoided cost
Emissions Coefficient (tonnes CO_2e/unit)	0.0000	0			Not used--GHG costs already in avoided cost
GHG Adder, 2010 ($/unit)	0.0000	0	0.0000	0.0000	Not used--GHG costs already in avoided cost
GHG Adder, 2011 ($/unit)	0.0000	0	0.0000	0.0000	Not used--GHG costs already in avoided cost
GHG Adder, 2012+ ($/unit)	0.0000	0	0.0000	0.0000	Not used--GHG costs already in avoided cost

- Electricity emissions factors based on BC emission factors presented on http://www.ec.gc.ca/ges-ghg/default.asp?lang=En&n=EAF0E96A-1#section11, from Environment Canada; *National Inventory Report (1990-2008): Greenhouse Gas Sources and Sinks in Canada* , May 2008.

- Natural gas emissions factors based on BC emission factors presented on http://www.ec.gc.ca/ges-ghg/default.asp?lang=En&n=AC2B7641-1 from Environment Canada; *National Inventory Report (1990-2008): Greenhouse Gas Sources and Sinks in Canada* , May 2008.

Other Economic Parameters

Discount Rate	7.38%

AVOIDED COSTS (2009)

Back to Index

GHG Adder	No	**Note:** GHG adders already added to avoided costs
Inflation Factor	N/A	**Note:** Not currently being used
Discount Rate	7.38%	

YEAR	ELECTRICITY (ENERGY) ☑				ELECTRICITY (DEMAND) ☐				NATURAL GAS ☑				FUEL OIL ☐		WATER ☐	
	Baseload		Peak		Baseload		Peak		Baseload		Weather Sensitive		Rates	NPV	Rates	NPV
	Rates	NPV	Rates	NPV	Rates	NPV	Rates	NPV	Rates	NPV	Rates	NPV				
1	0.1284	0.1284	0.1584	0.1584	0.0000	0.0000	0.0000	0.0000	0.0065	0.0065	0.3407	0.3407	0.00000	0.00000	0.00000	0.00000
2	0.1284	0.2480	0.1584	0.3059	0.0000	0.0000	0.0000	0.0000	0.0070	0.0130	0.3251	0.6434	0.00000	0.00000	0.00000	0.00000
3	0.1284	0.3593	0.1584	0.4433	0.0000	0.0000	0.0000	0.0000	0.0080	0.0200	0.3324	0.9317	0.00000	0.00000	0.00000	0.00000
4	0.1284	0.4630	0.1584	0.5712	0.0000	0.0000	0.0000	0.0000	0.0090	0.0272	0.3265	1.1954	0.00000	0.00000	0.00000	0.00000
5	0.1284	0.5596	0.1584	0.6904	0.0000	0.0000	0.0000	0.0000	0.0096	0.0344	0.3408	1.4517	0.00000	0.00000	0.00000	0.00000
6	0.1284	0.6496	0.1584	0.8013	0.0000	0.0000	0.0000	0.0000	0.0101	0.0415	0.3535	1.6993	0.00000	0.00000	0.00000	0.00000
7	0.1284	0.7333	0.1584	0.9046	0.0000	0.0000	0.0000	0.0000	0.0105	0.0483	0.3599	1.9341	0.00000	0.00000	0.00000	0.00000
8	0.1284	0.8113	0.1584	1.0009	0.0000	0.0000	0.0000	0.0000	0.0108	0.0548	0.3557	2.1501	0.00000	0.00000	0.00000	0.00000
9	0.1284	0.8840	0.1584	1.0905	0.0000	0.0000	0.0000	0.0000	0.0110	0.0611	0.3626	2.3553	0.00000	0.00000	0.00000	0.00000
10	0.1284	0.9516	0.1584	1.1739	0.0000	0.0000	0.0000	0.0000	0.0112	0.0670	0.3697	2.5500	0.00000	0.00000	0.00000	0.00000
11	0.1284	1.0146	0.1584	1.2517	0.0000	0.0000	0.0000	0.0000	0.0114	0.0726	0.3769	2.7349	0.00000	0.00000	0.00000	0.00000
12	0.1284	1.0733	0.1584	1.3240	0.0000	0.0000	0.0000	0.0000	0.0116	0.0779	0.3842	2.9105	0.00000	0.00000	0.00000	0.00000
13	0.1284	1.1279	0.1584	1.3914	0.0000	0.0000	0.0000	0.0000	0.0119	0.0829	0.3917	3.0771	0.00000	0.00000	0.00000	0.00000
14	0.1284	1.1788	0.1584	1.4542	0.0000	0.0000	0.0000	0.0000	0.0121	0.0877	0.3993	3.2354	0.00000	0.00000	0.00000	0.00000
15	0.1284	1.2262	0.1584	1.5127	0.0000	0.0000	0.0000	0.0000	0.0123	0.0923	0.4071	3.3856	0.00000	0.00000	0.00000	0.00000
16	0.1284	1.2703	0.1584	1.5671	0.0000	0.0000	0.0000	0.0000	0.0125	0.0966	0.4150	3.5282	0.00000	0.00000	0.00000	0.00000
17	0.1284	1.3114	0.1584	1.6178	0.0000	0.0000	0.0000	0.0000	0.0128	0.1007	0.4231	3.6636	0.00000	0.00000	0.00000	0.00000
18	0.1284	1.3497	0.1584	1.6650	0.0000	0.0000	0.0000	0.0000	0.0130	0.1045	0.4313	3.7922	0.00000	0.00000	0.00000	0.00000
19	0.1284	1.3853	0.1584	1.7090	0.0000	0.0000	0.0000	0.0000	0.0133	0.1082	0.4397	3.9143	0.00000	0.00000	0.00000	0.00000
20	0.1284	1.4185	0.1584	1.7499	0.0000	0.0000	0.0000	0.0000	0.0135	0.1117	0.4483	4.0302	0.00000	0.00000	0.00000	0.00000
21	0.1284	1.4494	0.1584	1.7881	0.0000	0.0000	0.0000	0.0000	0.0139	0.1151	0.4570	4.1402	0.00000	0.00000	0.00000	0.00000
22	0.1284	1.4782	0.1584	1.8236	0.0000	0.0000	0.0000	0.0000	0.0143	0.1183	0.4659	4.2446	0.00000	0.00000	0.00000	0.00000
23	0.1284	1.5050	0.1584	1.8566	0.0000	0.0000	0.0000	0.0000	0.0146	0.1213	0.4750	4.3438	0.00000	0.00000	0.00000	0.00000
24	0.1284	1.5300	0.1584	1.8874	0.0000	0.0000	0.0000	0.0000	0.0150	0.1242	0.4843	4.4380	0.00000	0.00000	0.00000	0.00000
25	0.1284	1.5532	0.1584	1.9161	0.0000	0.0000	0.0000	0.0000	0.0154	0.1270	0.4937	4.5274	0.00000	0.00000	0.00000	0.00000
26	0.1284	1.5749	0.1584	1.9428	0.0000	0.0000	0.0000	0.0000	0.0157	0.1297	0.5033	4.6122	0.00000	0.00000	0.00000	0.00000
27	0.1284	1.5950	0.1584	1.9677	0.0000	0.0000	0.0000	0.0000	0.0161	0.1322	0.5131	4.6928	0.00000	0.00000	0.00000	0.00000
28	0.1284	1.6138	0.1584	1.9909	0.0000	0.0000	0.0000	0.0000	0.0165	0.1346	0.5231	4.7693	0.00000	0.00000	0.00000	0.00000
29	0.1284	1.6313	0.1584	2.0124	0.0000	0.0000	0.0000	0.0000	0.0168	0.1369	0.5333	4.8419	0.00000	0.00000	0.00000	0.00000
30	0.1284	1.6476	0.1584	2.0325	0.0000	0.0000	0.0000	0.0000	0.0172	0.1391	0.5419	4.9107	0.00000	0.00000	0.00000	0.00000

Measure Information		Applicability										Savings by End Use																				
Measure #	Technology	Climate Zone	Building Type(s)	Exist	Reno	New	Life	Cost	Benefit/Cost Ratio	Economic Screen	Basis	Space heating	Space cooling	Ventilation and Circulation	Domestic hot water (DHW)	Fireplace	Cooking	Dishwasher	Clothes washer	Clothes dryer	Pool & spa heaters	Other gas uses	Other electrical internal loads									
1	Attic Insulation	1	Detached (Pre-1976)	y	y		30.0	$675	1.12	Pass	Full	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2	Attic Insulation	1	Detached (Post-1976)	y	y		30.0	$713	0.74	Fail	Full	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3	Attic Insulation	1	Attached (Pre-1976)	y	y		30.0	$450	0.95	Fail	Full	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4	Attic Insulation	1	Attached (Post-1976)	y	y		30.0	$488	0.60	Fail	Full	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5	Attic Insulation	1	Mobile (Existing)	y	y		30.0	$525	0.66	Fail	Full	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6	Wall Insulation	1	Detached (Pre-1976)	y	y		30.0	$2,000	0.99	Fail	Incr.	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
7	Wall Insulation	1	Detached (Post-1976)	y	y		30.0	$2,000	0.84	Fail	Incr.	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
8	Wall Insulation	1	Attached (Pre-1976)	y	y		30.0	$1,500	0.75	Fail	Incr.	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
9	Wall Insulation	1	Attached (Post-1976)	y	y		30.0	$1,500	0.62	Fail	Incr.	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
10	Wall Insulation	1	Mobile (Existing)	y	y		30.0	$1,500	0.66	Fail	Incr.	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
11	Slab Insulation	1	Detached (Pre-1976)	y	y		30.0	$1,125	0.14	Fail	Incr.	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12	Slab Insulation	1	Detached (Post-1976)	y	y		30.0	$1,275	0.08	Fail	Incr.	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
13	Slab Insulation	1	Attached (Pre-1976)	y	y		30.0	$975	0.09	Fail	Incr.	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
14	Slab Insulation	1	Attached (Post-1976)	y	y		30.0	$1,050	0.06	Fail	Incr.	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
15	Basement Insulation	1	Detached (Pre-1976)	y	y		30.0	$1,400	1.04	Pass	Incr.	12%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
16	Basement Insulation	1	Detached (Post-1976)	y	y		30.0	$1,500	0.89	Fail	Incr.	13%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
17	Basement Insulation	1	Attached (Pre-1976)	y	y		30.0	$900	0.76	Fail	Incr.	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
18	Basement Insulation	1	Attached (Post-1976)	y	y		30.0	$1,000	0.60	Fail	Incr.	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
19	Crawl Space Insul.	1	Detached (Pre-1976)	y	y		30.0	$800	0.38	Fail	Full	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
20	Crawl Space Insul.	1	Detached (Post-1976)	y	y		30.0	$800	0.32	Fail	Full	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21	Crawl Space Insul.	1	Attached (Pre-1976)	y	y		30.0	$800	0.21	Fail	Full	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22	Crawl Space Insul.	1	Attached (Post-1976)	y	y		30.0	$800	0.18	Fail	Full	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23	Air Sealing	1	Detached (Pre-1976)	y	y		25.0	$1,800	0.58	Fail	Full	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
24	Air Sealing	1	Detached (Post-1976)	y	y		25.0	$1,800	0.42	Fail	Full	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
25	Air Sealing	1	Attached (Pre-1976)	y	y		25.0	$1,800	0.33	Fail	Full	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
26	Air Sealing	1	Attached (Post-1976)	y	y		25.0	$1,800	0.24	Fail	Full	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
27	Air Sealing	1	Mobile (Existing)	y	y		25.0	$1,800	0.26	Fail	Full	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
28	Homeowner Air Sealing	1	Detached (Pre-1976)	y	y		10.0	$200	1.06	Pass	Full	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
29	Homeowner Air Sealing	1	Detached (Post-1976)	y	y		10.0	$200	0.78	Fail	Full	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
30	Homeowner Air Sealing	1	Attached (Pre-1976)	y	y		10.0	$200	0.60	Fail	Full	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
31	Homeowner Air Sealing	1	Attached (Post-1976)	y	y		10.0	$200	0.43	Fail	Full	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
32	Homeowner Air Sealing	1	Mobile (Existing)	y	y		10.0	$200	0.48	Fail	Full	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
33	Sealing & Insul. - Old Homes	1	Detached (Pre-1976)	y	y		25.0	$3,000	0.58	Fail	Full	17%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
34	Sealing & Insul. - Old Homes	1	Attached (Pre-1976)	y	y		25.0	$2,500	0.39	Fail	Full	17%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
35	Zone Up Windows	1	Detached (Pre-1976)	y	y		25.0	$1,000	0.28	Fail	Incr.	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
36	Zone Up Windows	1	Detached (Post-1976)	y	y		25.0	$1,200	0.28	Fail	Incr.	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
37	Zone Up Windows	1	Detached (New)			y	25.0	$2,600	0.21	Fail	Incr.	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
38	Zone Up Windows	1	Attached (Pre-1976)	y	y		25.0	$800	0.20	Fail	Incr.	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
39	Zone Up Windows	1	Attached (Post-1976)	y	y		25.0	$960	0.19	Fail	Incr.	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
40	Zone Up Windows	1	Attached (New)			y	25.0	$2,080	0.15	Fail	Incr.	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
41	Zone Up Windows	1	Mobile (Existing)	y	y		25.0	$720	0.24	Fail	Incr.	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
42	Zone Up Windows	1	Mobile (New)			y	25.0	$1,600	0.20	Fail	Incr.	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
43	Super Windows	1	Detached (Pre-1976)	y	y		25.0	$1,500	0.68	Fail	Incr.	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
44	Super Windows	1	Detached (Post-1976)	y	y		25.0	$1,800	0.71	Fail	Incr.	13%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
45	Super Windows	1	Detached (New)			y	25.0	$3,900	0.49	Fail	Incr.	19%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
46	Super Windows	1	Attached (Pre-1976)	y	y		25.0	$1,200	0.48	Fail	Incr.	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
47	Super Windows	1	Attached (Post-1976)	y	y		25.0	$1,440	0.49	Fail	Incr.	13%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
48	Super Windows	1	Attached (New)			y	25.0	$3,120	0.34	Fail	Incr.	19%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
49	Super Windows	1	Mobile (Existing)	y	y		25.0	$1,080	0.56	Fail	Incr.	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
50	Super Windows	1	Mobile (New)			y	25.0	$2,400	0.46	Fail	Incr.	19%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
51	High-Perf. New Homes	1	Detached (New)			y	30.0	$6,000	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
52	High-Perf. New Homes	1	Attached (New)			y	30.0	$4,800	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
53	High-Perf. New Homes	1	Mobile (New)			y	30.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
54	Net Zero Ready Homes	1	Detached (New)			y	30.0	$14,000	0.28	Fail	Full	30%	0%	0%	30%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
55	Net Zero Ready Homes	1	Attached (New)			y	30.0	$9,800	0.26	Fail	Full	30%	0%	0%	30%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
56	Net Zero Ready Homes	1	Mobile (New)			y	30.0	$9,800	0.27	Fail	Full	30%	0%	0%	30%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
57	Condensing Gas Furnaces	1	Detached (Pre-1976)	y	y		18.0	$1,477	0.36	Fail	Incr.	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
58	Condensing Gas Furnaces	1	Detached (Post-1976)	y	y		18.0	$1,477	0.29	Fail	Incr.	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
59	Condensing Gas Furnaces	1	Detached (New)			y	18.0	$1,477	0.29	Fail	Incr.	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
60	Condensing Gas Furnaces	1	Attached (Pre-1976)	y	y		18.0	$1,477	0.20	Fail	Incr.	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
61	Condensing Gas Furnaces	1	Attached (Post-1976)	y	y		18.0	$1,477	0.16	Fail	Incr.	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
62	Condensing Gas Furnaces	1	Attached (New)			y	18.0	$1,477	0.16	Fail	Incr.	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
63	Condensing Gas Furnaces	1	Mobile (Existing)	y	y		18.0	$1,477	0.19	Fail	Incr.	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
64	Condensing Gas Furnaces	1	Mobile (New)			y	18.0	$1,477	0.19	Fail	Incr.	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
65	Early Retire Gas Furnaces	1	Detached (Pre-1976)	y	y		9.0	$1,864	0.38	Fail	Incr.	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
66	Early Retire Gas Furnaces	1	Detached (Post-1976)	y	y		9.0	$1,864	0.31	Fail	Incr.	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
67	Early Retire Gas Furnaces	1	Attached (Pre-1976)	y	y		9.0	$1,864	0.22	Fail	Incr.	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
68	Early Retire Gas Furnaces	1	Attached (Post-1976)	y	y		9.0	$1,864	0.17	Fail	Incr.	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
69	Early Retire Gas Furnaces	1	Mobile (Existing)	y	y		9.0	$1,864	0.20	Fail	Incr.	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
70	Condensing Gas Boilers	1	Detached (Pre-1976)	y	y		20.0	$3,200	0.31	Fail	Incr.	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
71	Condensing Gas Boilers	1	Detached (Post-1976)	y	y		20.0	$3,200	0.25	Fail	Incr.	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
72	Condensing Gas Boilers	1	Detached (New)			y	20.0	$3,200	0.25	Fail	Incr.	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
73	Condensing Gas Boilers	1	Attached (Pre-1976)	y	y		20.0	$3,200	0.17	Fail	Incr.	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
74	Condensing Gas Boilers	1	Attached (Post-1976)	y	y		20.0	$3,200	0.14	Fail	Incr.	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
75	Condensing Gas Boilers	1	Attached (New)			y	20.0	$3,200	0.14	Fail	Incr.	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
76	Condensing Gas Boilers	1	Mobile (Existing)	y	y		20.0	$3,200	0.16	Fail	Incr.	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
77	Condensing Gas Boilers	1	Mobile (New)			y	20.0	$3,200	0.16	Fail	Incr.	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
78	Gas Fireplaces	1	Detached (Pre-1976)	y	y		15.0	$150	3.97	Pass	Incr.	0%	0%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
79	Gas Fireplaces	1	Detached (Post-1976)	y	y		15.0	$150	3.97	Pass	Incr.	0%	0%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
80	Gas Fireplaces	1	Detached (New)			y	15.0	$150	3.97	Pass	Incr.	0%	0%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
81	Gas Fireplaces	1	Attached (Pre-1976)	y	y		15.0	$150	2.42	Pass	Incr.	0%	0%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
82	Gas Fireplaces	1	Attached (Post-1976)	y	y		15.0	$150	2.42	Pass	Incr.	0%	0%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
83	Gas Fireplaces	1	Attached (New)			y	15.0	$150	2.42	Pass	Incr.	0%	0%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
84	Gas Fireplaces	1	Mobile (Existing)	y	y		15.0	$150	2.37	Pass	Incr.	0%	0%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
85	Gas Fireplaces	1	Mobile (New)			y	15.0	$150	2.37	Pass	Incr.	0%	0%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
86	Prog. Thermostats	1	Detached (Pre-1976)	y	y		11.0	$50	8.08	Pass	Full	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
87	Prog. Thermostats	1	Detached (Post-1976)	y	y		11.0	$50	6.62	Pass	Full	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
88	Prog. Thermostats	1	Detached (New)			y	11.0	$50	6.60	Pass	Full	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
89	Prog. Thermostats	1	Attached (Pre-1976)	y	y		11.0	$50	4.53	Pass	Full	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
90	Prog. Thermostats	1	Attached (Post-1976)	y	y		11.0	$50	3.73	Pass	Full	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
91	Prog. Thermostats	1	Attached (New)			y	11.0	$50	3.72	Pass	Full	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
92	Prog. Thermostats	1	Mobile (Existing)	y	y		11.0	$50	4.17	Pass	Full	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
93	Prog. Thermostats	1	Mobile (New)			y	11.0	$50	4.16	Pass	Full	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
94	Solar Make-Up Air	1	Detached (Pre-1976)	y	y		40.0	$1,300	0.22	Fail	Full	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
95	Solar Make-Up Air	1	Detached (Post-1976)	y	y		40.0	$1,300	0.18	Fail	Full	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
96	Solar Make-Up Air	1	Detached (New)			y	40.0	$1,300	0.18	Fail	Full	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
97	Solar Make-Up Air	1	Attached (Pre-1976)	y	y		40.0	$1,300	0.12	Fail	Full	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
98	Solar Make-Up Air	1	Attached (Post-1976)	y	y		40.0	$1,300	0.10	Fail	Full	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
99	Solar Make-Up Air	1	Attached (New)			y	40.0	$1,300	0.10	Fail	Full	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
100	Solar Make-Up Air	1	Mobile (Existing)	y	y		40.0	$1,300	0.11	Fail	Full	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
101	Solar Make-Up Air	1	Mobile (New)			y	40.0	$1,300	0.11	Fail	Full	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
102	HRVs	1	Detached (Pre-1976)	y	y		15.0	$600	0.39	Fail	Incr.	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
103	HRVs	1	Detached (Post-1976)	y	y		15.0	$600	0.33	Fail	Incr.	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
104	HRVs	1	Detached (New)			y	15.0	$600	0.33	Fail	Incr.	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
105	HRVs	1	Attached (Pre-1976)	y	y		15.0	$600	0.22	Fail	Incr.	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
106	HRVs	1	Attached (Post-1976)	y	y		15.0	$600	0.18	Fail	Incr.	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
107	HRVs	1	Attached (New)			y	15.0	$600	0.18	Fail	Incr.	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
108	HRVs	1	Mobile (Existing)	y	y		15.0	$600	0.19	Fail	Incr.	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
109	HRVs	1	Mobile (New)			y	15.0	$600	0.19	Fail	Incr.	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
110	Air Heat Pumps	1	Detached (Pre-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
111	Air Heat Pumps	1	Detached (Post-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
112	Air Heat Pumps	1	Detached (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
113	Air Heat Pumps	1	Attached (Pre-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
114	Air Heat Pumps	1	Attached (Post-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
115	Air Heat Pumps	1	Attached (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
116	Air Heat Pumps	1	Mobile (Existing)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
117	Air Heat Pumps	1	Mobile (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
118	Ground Heat Pumps	1	Detached (Pre-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
119	Ground Heat Pumps	1	Detached (Post-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
120	Ground Heat Pumps	1	Detached (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
121	Ground Heat Pumps	1	Attached (Pre-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
122	Ground Heat Pumps	1	Attached (Post-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
123	Ground Heat Pumps	1	Attached (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
124	Ground Heat Pumps	1	Mobile (Existing)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
125	Ground Heat Pumps	1	Mobile (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
126	Heating & DHW	1	Detached (Pre-1976)	y	y		18.0	$8,506	0.11	Fail	Incr.	4%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
127	Heating & DHW	1	Detached (Post-1976)	y	y		18.0	$8,506	0.10	Fail	Incr.	4%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
128	Heating & DHW	1	Detached (New)			y	18.0	$3,506	0.25	Fail	Incr.	4%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
129	Heating & DHW	1	Attached (Pre-1976)	y	y		18.0	$8,506	0.09	Fail	Incr.	4%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
130	Heating & DHW	1	Attached (Post-1976)	y	y		18.0	$8,506	0.08	Fail	Incr.	4%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
131	Heating & DHW	1	Attached (New)			y	18.0	$3,506	0.20	Fail	Incr.	4%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
132	Heating & DHW	1	Mobile (Existing)	y	y		18.0	$8,506	0.08	Fail	Incr.	4%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
133	Heating & DHW	1	Mobile (New)			y	18.0	$3,506	0.19	Fail	Incr.	4%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
134	Heating & DHW (Hydronic)	1	Detached (Pre-1976)	y	y		20.0	$8,000	0.22	Fail	Incr.	12%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
135	Heating & DHW (Hydronic)	1	Detached (Post-1976)	y	y		20.0	$8,000	0.19	Fail	Incr.	12%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
136	Heating & DHW (Hydronic)	1	Detached (New)			y	20.0	$3,000	0.50	Fail	Incr.	12%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
137	Heating & DHW (Hydronic)	1	Attached (Pre-1976)	y	y		20.0	$8,000	0.15	Fail	Incr.	12%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
138	Heating & DHW (Hydronic)	1	Attached (Post-1976)	y	y		20.0	$8,000	0.13	Fail	Incr.	12%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
139	Heating & DHW (Hydronic)	1	Attached (New)			y	20.0	$3,000	0.35	Fail	Incr.	12%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
140	Heating & DHW (Hydronic)	1	Mobile (Existing)	y	y		20.0	$8,000	0.13	Fail	Incr.	12%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
141	Heating & DHW (Hydronic)	1	Mobile (New)			y	20.0	$3,000	0.36	Fail	Incr.	12%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
142	Condensing Gas DHW	1	Detached (Pre-1976)	y	y		13.0	$1,567	0.25	Fail	Incr.	0%	0%	0%	23%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
143	Condensing Gas DHW	1	Detached (Post-1976)	y	y		13.0	$1,567	0.25	Fail	Incr.	0%	0%	0%	23%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
144	Condensing Gas DHW	1	Detached (New)			y	13.0	$1,073	0.37	Fail	Incr.	0%	0%	0%	23%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
145	Condensing Gas DHW	1	Attached (Pre-1976)	y	y		13.0	$1,567	0.22	Fail	Incr.	0%	0%	0%	23%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
146	Condensing Gas DHW	1	Attached (Post-1976)	y	y		13.0	$1,567	0.22	Fail	Incr.	0%	0%	0%	23%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
147	Condensing Gas DHW	1	Attached (New)			y	13.0	$1,073	0.33	Fail	Incr.	0%	0%	0%	23%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
148	Condensing Gas DHW	1	Mobile (Existing)	y	y		13.0	$1,567	0.19	Fail	Incr.	0%	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
149	Condensing Gas DHW	1	Mobile (New)			y	13.0	$1,073	0.28	Fail	Incr.	0%	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
150	Tankless Gas DHW	1	Detached (Pre-1976)	y	y		20.0	$2,274	0.36	Fail	Incr.	0%	0%	0%	35%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
151	Tankless Gas DHW	1	Detached (Post-1976)	y	y		20.0	$2,274	0.36	Fail	Incr.	0%	0%	0%	35%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
152	Tankless Gas DHW	1	Detached (New)			y	20.0	$1,646	0.50	Fail	Incr.	0%	0%	0%	35%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
153	Tankless Gas DHW	1	Attached (Pre-1976)	y	y		20.0	$2,274	0.32	Fail	Incr.	0%	0%	0%	35%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
154	Tankless Gas DHW	1	Attached (Post-1976)	y	y		20.0	$2,274	0.32	Fail	Incr.	0%	0%	0%	35%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
155	Tankless Gas DHW	1	Attached (New)			y	20.0	$1,646	0.45	Fail	Incr.	0%	0%	0%	35%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
156	Tankless Gas DHW	1	Mobile (Existing)	y	y		20.0	$2,274	0.32	Fail	Incr.	0%	0%	0%	35%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
157	Tankless Gas DHW	1	Mobile (New)			y	20.0	$1,646	0.44	Fail	Incr.	0%	0%	0%	35%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
158	Solar DHW	1	Detached (Pre-1976)	y	y		25.0	$7,000	0.24	Fail	Full	0%	0%	0%	63%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
159	Solar DHW	1	Detached (Post-1976)	y	y		25.0	$7,000	0.24	Fail	Full	0%	0%	0%	63%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
160	Solar DHW	1	Detached (New)			y	25.0	$7,000	0.24	Fail	Full	0%	0%	0%	63%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
161	Solar DHW	1	Attached (Pre-1976)	y	y		25.0	$7,000	0.23	Fail	Full	0%	0%	0%	68%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
162	Solar DHW	1	Attached (Post-1976)	y	y		25.0	$7,000	0.23	Fail	Full	0%	0%	0%	68%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
163	Solar DHW	1	Attached (New)			y	25.0	$7,000	0.23	Fail	Full	0%	0%	0%	68%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
164	Solar DHW	1	Mobile (Existing)	y	y		25.0	$7,000	0.24	Fail	Full	0%	0%	0%	73%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%
165	Solar DHW	1	Mobile (New)			y	25.0	$7,000	0.24	Fail	Full	0%	0%	0%	73%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%
166	DHW Tank Insulation	1	Detached (Pre-1976)	y	y		13.0	$35	0.94	Fail	Full	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
167	DHW Tank Insulation	1	Detached (Post-1976)	y	y		13.0	$35	0.94	Fail	Full	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
168	DHW Tank Insulation	1	Detached (New)			y	13.0	$35	0.94	Fail	Full	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
169	DHW Tank Insulation	1	Attached (Pre-1976)	y	y		13.0	$25	1.17	Pass	Full	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
170	DHW Tank Insulation	1	Attached (Post-1976)	y	y		13.0	$25	1.17	Pass	Full	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
171	DHW Tank Insulation	1	Attached (New)			y	13.0	$25	1.17	Pass	Full	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
172	DHW Tank Insulation	1	Mobile (Existing)	y	y		13.0	$25	1.14	Pass	Full	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
173	DHW Tank Insulation	1	Mobile (New)			y	13.0	$25	1.14	Pass	Full	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
174	DHW Pipe Insulation	1	Detached (Pre-1976)	y	y		15.0	$1	18.74	Pass	Full	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
175	DHW Pipe Insulation	1	Detached (Post-1976)	y	y		15.0	$1	18.74	Pass	Full	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
176	DHW Pipe Insulation	1	Detached (New)			y	15.0	$1	18.74	Pass	Full	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
177	DHW Pipe Insulation	1	Attached (Pre-1976)	y	y		15.0	$1	16.68	Pass	Full	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
178	DHW Pipe Insulation	1	Attached (Post-1976)	y	y		15.0	$1	16.68	Pass	Full	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
179	DHW Pipe Insulation	1	Attached (New)			y	15.0	$1	16.68	Pass	Full	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
180	DHW Pipe Insulation	1	Mobile (Existing)	y	y		15.0	$1	16.34	Pass	Full	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
181	DHW Pipe Insulation	1	Mobile (New)			y	15.0	$1	16.34	Pass	Full	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
182	DHW Heat Traps	1	Detached (New)			y	13.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
183	DHW Heat Traps	1	Attached (New)			y	13.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
184	DHW Heat Traps	1	Mobile (New)			y	13.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
185	Showerheads	1	Detached (Pre-1976)	y	y		10.0	$13	10.58	Pass	Full	0%	0%	0%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
186	Showerheads	1	Detached (Post-1976)	y	y		10.0	$13	10.58	Pass	Full	0%	0%	0%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
187	Showerheads	1	Detached (New)			y	10.0	$13	10.58	Pass	Full	0%	0%	0%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
188	Showerheads	1	Attached (Pre-1976)	y	y		10.0	$13	9.42	Pass	Full	0%	0%	0%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
189	Showerheads	1	Attached (Post-1976)	y	y		10.0	$13	9.42	Pass	Full	0%	0%	0%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
190	Showerheads	1	Attached (New)			y	10.0	$13	9.42	Pass	Full	0%	0%	0%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
191	Showerheads	1	Mobile (Existing)	y	y		10.0	$13	9.23	Pass	Full	0%	0%	0%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
192	Showerheads	1	Mobile (New)			y	10.0	$13	9.23	Pass	Full	0%	0%	0%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
193	Faucet Aerators	1	Detached (Pre-1976)	y	y		10.0	$15	5.54	Pass	Full	0%	0%	0%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
194	Faucet Aerators	1	Detached (Post-1976)	y	y		10.0	$15	5.54	Pass	Full	0%	0%	0%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
195	Faucet Aerators	1	Detached (New)			y	10.0	$15	5.54	Pass	Full	0%	0%	0%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
196	Faucet Aerators	1	Attached (Pre-1976)	y	y		10.0	$15	4.93	Pass	Full	0%	0%	0%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
197	Faucet Aerators	1	Attached (Post-1976)	y	y		10.0	$15	4.93	Pass	Full	0%	0%	0%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
198	Faucet Aerators	1	Attached (New)			y	10.0	$15	4.93	Pass	Full	0%	0%	0%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
199	Faucet Aerators	1	Mobile (Existing)	y	y		10.0	$15	4.83	Pass	Full	0%	0%	0%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
200	Faucet Aerators	1	Mobile (New)			y	10.0	$15	4.83	Pass	Full	0%	0%	0%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
201	Wastewater Heat Recovery	1	Detached (Pre-1976)	y	y		30.0	$800	0.50	Fail	Full	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
202	Wastewater Heat Recovery	1	Detached (Post-1976)	y	y		30.0	$800	0.50	Fail	Full	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
203	Wastewater Heat Recovery	1	Detached (New)			y	30.0	$800	0.50	Fail	Full	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
204	Wastewater Heat Recovery	1	Attached (Pre-1976)	y	y		30.0	$731	0.48	Fail	Full	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
205	Wastewater Heat Recovery	1	Attached (Post-1976)	y	y		30.0	$731	0.48	Fail	Full	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
206	Wastewater Heat Recovery	1	Attached (New)			y	30.0	$731	0.48	Fail	Full	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
207	Wastewater Heat Recovery	1	Mobile (Existing)	y	y		30.0	$731	0.47	Fail	Full	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
208	Wastewater Heat Recovery	1	Mobile (New)			y	30.0	$731	0.47	Fail	Full	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
209	DHW Recirculation	1	Detached (Pre-1976)	y	y		18.0	$570	0.62	Fail	Full	0%	0%	0%	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
210	DHW Recirculation	1	Detached (Post-1976)	y	y		18.0	$570	0.62	Fail	Full	0%	0%	0%	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
211	DHW Recirculation	1	Detached (New)			y	18.0	$570	0.62	Fail	Full	0%	0%	0%	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
212	DHW Recirculation	1	Attached (Pre-1976)	y	y		18.0	$470	0.67	Fail	Full	0%	0%	0%	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
213	DHW Recirculation	1	Attached (Post-1976)	y	y		18.0	$470	0.67	Fail	Full	0%	0%	0%	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
214	DHW Recirculation	1	Attached (New)			y	18.0	$470	0.67	Fail	Full	0%	0%	0%	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%

215	DHW Recirculation	1	Mobile (Existing)	y	y		18.0	$470	0.65	Fail	Full	0%	0%	0%	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
216	DHW Recirculation	1	Mobile (New)			y	18.0	$470	0.65	Fail	Full	0%	0%	0%	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
217	ESTAR Dishwashers	1	Detached (Pre-1976)	y	y		11.0	$105	0.36	Fail	Incr.	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
218	ESTAR Dishwashers	1	Detached (Post-1976)	y	y		11.0	$105	0.36	Fail	Incr.	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
219	ESTAR Dishwashers	1	Detached (New)			y	11.0	$105	0.35	Fail	Incr.	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
220	ESTAR Dishwashers	1	Attached (Pre-1976)	y	y		11.0	$105	0.30	Fail	Incr.	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
221	ESTAR Dishwashers	1	Attached (Post-1976)	y	y		11.0	$105	0.30	Fail	Incr.	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
222	ESTAR Dishwashers	1	Attached (New)			y	11.0	$105	0.30	Fail	Incr.	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
223	ESTAR Dishwashers	1	Mobile (Existing)	y	y		11.0	$105	0.30	Fail	Incr.	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
224	ESTAR Dishwashers	1	Mobile (New)			y	11.0	$105	0.30	Fail	Incr.	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
225	ESTAR Clothes Washers	1	Detached (Pre-1976)	y	y		14.0	$300	1.02	Pass	Incr.	0%	0%	0%	7%	0%	0%	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
226	ESTAR Clothes Washers	1	Detached (Post-1976)	y	y		14.0	$300	1.02	Pass	Incr.	0%	0%	0%	7%	0%	0%	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
227	ESTAR Clothes Washers	1	Detached (New)			y	14.0	$300	1.02	Pass	Incr.	0%	0%	0%	7%	0%	0%	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
228	ESTAR Clothes Washers	1	Attached (Pre-1976)	y	y		14.0	$300	0.89	Fail	Incr.	0%	0%	0%	7%	0%	0%	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
229	ESTAR Clothes Washers	1	Attached (Post-1976)	y	y		14.0	$300	0.89	Fail	Incr.	0%	0%	0%	7%	0%	0%	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
230	ESTAR Clothes Washers	1	Attached (New)			y	14.0	$300	0.89	Fail	Incr.	0%	0%	0%	7%	0%	0%	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
231	ESTAR Clothes Washers	1	Mobile (Existing)	y	y		14.0	$300	0.88	Fail	Incr.	0%	0%	0%	7%	0%	0%	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
232	ESTAR Clothes Washers	1	Mobile (New)			y	14.0	$300	0.88	Fail	Incr.	0%	0%	0%	7%	0%	0%	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
233	Gas Clothes Dryers	1	Detached (Pre-1976)	y	y		18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
234	Gas Clothes Dryers	1	Detached (Post-1976)	y	y		18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
235	Gas Clothes Dryers	1	Detached (New)			y	18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
236	Gas Clothes Dryers	1	Attached (Pre-1976)	y	y		18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
237	Gas Clothes Dryers	1	Attached (Post-1976)	y	y		18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
238	Gas Clothes Dryers	1	Attached (New)			y	18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
239	Gas Clothes Dryers	1	Mobile (Existing)	y	y		18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
240	Gas Clothes Dryers	1	Mobile (New)			y	18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
241	Pool Covers	1	Detached (Pre-1976)	y	y		10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	26%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
242	Pool Covers	1	Detached (Post-1976)	y	y		10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	26%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
243	Pool Covers	1	Detached (New)			y	10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	26%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
244	Pool Covers	1	Attached (Pre-1976)	y	y		10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	26%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
245	Pool Covers	1	Attached (Post-1976)	y	y		10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	26%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
246	Pool Covers	1	Attached (New)			y	10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	26%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
247	Pool Covers	1	Mobile (Existing)	y	y		10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	26%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
248	Pool Covers	1	Mobile (New)			y	10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	26%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
249	Heat Pump Pool Heaters	1	Detached (Pre-1976)	y	y		10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
250	Heat Pump Pool Heaters	1	Detached (Post-1976)	y	y		10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
251	Heat Pump Pool Heaters	1	Detached (New)			y	10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
252	Heat Pump Pool Heaters	1	Attached (Pre-1976)	y	y		10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
253	Heat Pump Pool Heaters	1	Attached (Post-1976)	y	y		10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
254	Heat Pump Pool Heaters	1	Attached (New)			y	10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
255	Heat Pump Pool Heaters	1	Mobile (Existing)	y	y		10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
256	Heat Pump Pool Heaters	1	Mobile (New)			y	10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
257	Efficient Pool Heaters	1	Detached (Pre-1976)	y	y		7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
258	Efficient Pool Heaters	1	Detached (Post-1976)	y	y		7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
259	Efficient Pool Heaters	1	Detached (New)			y	7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
260	Efficient Pool Heaters	1	Attached (Pre-1976)	y	y		7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
261	Efficient Pool Heaters	1	Attached (Post-1976)	y	y		7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
262	Efficient Pool Heaters	1	Attached (New)			y	7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
263	Efficient Pool Heaters	1	Mobile (Existing)	y	y		7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
264	Efficient Pool Heaters	1	Mobile (New)			y	7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
265	Solar Pool Heaters	1	Detached (Pre-1976)	y	y		20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
266	Solar Pool Heaters	1	Detached (Post-1976)	y	y		20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
267	Solar Pool Heaters	1	Detached (New)			y	20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
268	Solar Pool Heaters	1	Attached (Pre-1976)	y	y		20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
269	Solar Pool Heaters	1	Attached (Post-1976)	y	y		20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
270	Solar Pool Heaters	1	Attached (New)			y	20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
271	Solar Pool Heaters	1	Mobile (Existing)	y	y		20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
272	Solar Pool Heaters	1	Mobile (New)			y	20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
273	Micro-CHP	1	Detached (Pre-1976)	y	y		20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
274	Micro-CHP	1	Detached (Post-1976)	y	y		20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
275	Micro-CHP	1	Detached (New)			y	20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
276	Micro-CHP	1	Attached (Pre-1976)	y	y		20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
277	Micro-CHP	1	Attached (Post-1976)	y	y		20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
278	Micro-CHP	1	Attached (New)			y	20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
279	Micro-CHP	1	Mobile (Existing)	y	y		20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
280	Micro-CHP	1	Mobile (New)			y	20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Measure Information		Applicability										Savings by End Use																				
Measure #	Technology	Climate Zone	Building Type(s)	Exist	Reno	New	Life	Cost	Benefit/Cost Ratio	Economic Screen	Basis	Space heating	Space cooling	Ventilation and Circulation	Domestic hot water (DHW)	Fireplace	Cooking	Dishwasher	Clothes washer	Clothes dryer	Pool & spa heaters	Other gas uses	Other electrical internal loads									
1	Attic Insulation	1	Detached (Pre-1976)	y	y		30.0	$675	1.12	Pass	Full	0%	3%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2	Attic Insulation	1	Detached (Post-1976)	y	y		30.0	$713	0.74	Fail	Full	0%	2%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3	Attic Insulation	1	Attached (Pre-1976)	y	y		30.0	$450	0.95	Fail	Full	0%	3%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4	Attic Insulation	1	Attached (Post-1976)	y	y		30.0	$488	0.60	Fail	Full	0%	2%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5	Attic Insulation	1	Mobile (Existing)	y	y		30.0	$525	0.66	Fail	Full	0%	2%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6	Wall Insulation	1	Detached (Pre-1976)	y	y		30.0	$2,000	0.99	Fail	Incr.	0%	3%	15%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
7	Wall Insulation	1	Detached (Post-1976)	y	y		30.0	$2,000	0.84	Fail	Incr.	0%	3%	15%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
8	Wall Insulation	1	Attached (Pre-1976)	y	y		30.0	$1,500	0.75	Fail	Incr.	0%	3%	15%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
9	Wall Insulation	1	Attached (Post-1976)	y	y		30.0	$1,500	0.62	Fail	Incr.	0%	3%	15%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
10	Wall Insulation	1	Mobile (Existing)	y	y		30.0	$1,500	0.66	Fail	Incr.	0%	3%	15%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
11	Slab Insulation	1	Detached (Pre-1976)	y	y		30.0	$1,125	0.14	Fail	Incr.	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12	Slab Insulation	1	Detached (Post-1976)	y	y		30.0	$1,275	0.08	Fail	Incr.	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
13	Slab Insulation	1	Attached (Pre-1976)	y	y		30.0	$975	0.09	Fail	Incr.	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
14	Slab Insulation	1	Attached (Post-1976)	y	y		30.0	$1,050	0.06	Fail	Incr.	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
15	Basement Insulation	1	Detached (Pre-1976)	y	y		30.0	$1,400	1.04	Pass	Incr.	0%	0%	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
16	Basement Insulation	1	Detached (Post-1976)	y	y		30.0	$1,500	0.89	Fail	Incr.	0%	0%	12%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
17	Basement Insulation	1	Attached (Pre-1976)	y	y		30.0	$900	0.76	Fail	Incr.	0%	0%	8%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
18	Basement Insulation	1	Attached (Post-1976)	y	y		30.0	$1,000	0.60	Fail	Incr.	0%	0%	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
19	Crawl Space Insul.	1	Detached (Pre-1976)	y	y		30.0	$800	0.38	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
20	Crawl Space Insul.	1	Detached (Post-1976)	y	y		30.0	$800	0.32	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21	Crawl Space Insul.	1	Attached (Pre-1976)	y	y		30.0	$800	0.21	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22	Crawl Space Insul.	1	Attached (Post-1976)	y	y		30.0	$800	0.18	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23	Air Sealing	1	Detached (Pre-1976)	y	y		25.0	$1,800	0.58	Fail	Full	0%	1%	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
24	Air Sealing	1	Detached (Post-1976)	y	y		25.0	$1,800	0.42	Fail	Full	0%	1%	8%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
25	Air Sealing	1	Attached (Pre-1976)	y	y		25.0	$1,800	0.33	Fail	Full	0%	1%	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
26	Air Sealing	1	Attached (Post-1976)	y	y		25.0	$1,800	0.24	Fail	Full	0%	1%	8%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
27	Air Sealing	1	Mobile (Existing)	y	y		25.0	$1,800	0.26	Fail	Full	0%	1%	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
28	Homeowner Air Sealing	1	Detached (Pre-1976)	y	y		10.0	$200	1.06	Pass	Full	0%	0%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
29	Homeowner Air Sealing	1	Detached (Post-1976)	y	y		10.0	$200	0.78	Fail	Full	0%	1%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
30	Homeowner Air Sealing	1	Attached (Pre-1976)	y	y		10.0	$200	0.60	Fail	Full	0%	0%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
31	Homeowner Air Sealing	1	Attached (Post-1976)	y	y		10.0	$200	0.43	Fail	Full	0%	1%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
32	Homeowner Air Sealing	1	Mobile (Existing)	y	y		10.0	$200	0.48	Fail	Full	0%	0%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
33	Sealing & Insul. - Old Homes	1	Detached (Pre-1976)	y	y		25.0	$3,000	0.58	Fail	Full	0%	3%	15%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
34	Sealing & Insul. - Old Homes	1	Attached (Pre-1976)	y	y		25.0	$2,500	0.39	Fail	Full	0%	3%	15%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
35	Zone Up Windows	1	Detached (Pre-1976)	y	y		25.0	$1,000	0.28	Fail	Incr.	0%	1%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
36	Zone Up Windows	1	Detached (Post-1976)	y	y		25.0	$1,200	0.28	Fail	Incr.	0%	1%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
37	Zone Up Windows	1	Detached (New)			y	25.0	$2,600	0.21	Fail	Incr.	0%	2%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
38	Zone Up Windows	1	Attached (Pre-1976)	y	y		25.0	$800	0.20	Fail	Incr.	0%	1%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
39	Zone Up Windows	1	Attached (Post-1976)	y	y		25.0	$960	0.19	Fail	Incr.	0%	1%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
40	Zone Up Windows	1	Attached (New)			y	25.0	$2,080	0.15	Fail	Incr.	0%	2%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
41	Zone Up Windows	1	Mobile (Existing)	y	y		25.0	$720	0.24	Fail	Incr.	0%	1%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
42	Zone Up Windows	1	Mobile (New)			y	25.0	$1,600	0.20	Fail	Incr.	0%	2%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
43	Super Windows	1	Detached (Pre-1976)	y	y		25.0	$1,500	0.68	Fail	Incr.	0%	8%	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
44	Super Windows	1	Detached (Post-1976)	y	y		25.0	$1,800	0.71	Fail	Incr.	0%	10%	13%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
45	Super Windows	1	Detached (New)			y	25.0	$3,900	0.49	Fail	Incr.	0%	17%	19%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
46	Super Windows	1	Attached (Pre-1976)	y	y		25.0	$1,200	0.48	Fail	Incr.	0%	8%	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
47	Super Windows	1	Attached (Post-1976)	y	y		25.0	$1,440	0.49	Fail	Incr.	0%	10%	13%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
48	Super Windows	1	Attached (New)			y	25.0	$3,120	0.34	Fail	Incr.	0%	17%	19%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
49	Super Windows	1	Mobile (Existing)	y	y		25.0	$1,080	0.56	Fail	Incr.	0%	9%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
50	Super Windows	1	Mobile (New)			y	25.0	$2,400	0.46	Fail	Incr.	0%	17%	19%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
51	High-Perf. New Homes	1	Detached (New)			y	30.0	$6,000	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
52	High-Perf. New Homes	1	Attached (New)			y	30.0	$4,800	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
53	High-Perf. New Homes	1	Mobile (New)			y	30.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
54	Net Zero Ready Homes	1	Detached (New)			y	30.0	$14,000	0.28	Fail	Full	0%	0%	30%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
55	Net Zero Ready Homes	1	Attached (New)			y	30.0	$9,800	0.26	Fail	Full	0%	0%	30%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
56	Net Zero Ready Homes	1	Mobile (New)			y	30.0	$9,800	0.27	Fail	Full	0%	0%	30%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
57	Condensing Gas Furnaces	1	Detached (Pre-1976)	y	y		18.0	$1,477	0.36	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
58	Condensing Gas Furnaces	1	Detached (Post-1976)	y	y		18.0	$1,477	0.29	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
59	Condensing Gas Furnaces	1	Detached (New)			y	18.0	$1,477	0.29	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
60	Condensing Gas Furnaces	1	Attached (Pre-1976)	y	y		18.0	$1,477	0.20	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
61	Condensing Gas Furnaces	1	Attached (Post-1976)	y	y		18.0	$1,477	0.16	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
62	Condensing Gas Furnaces	1	Attached (New)			y	18.0	$1,477	0.16	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
63	Condensing Gas Furnaces	1	Mobile (Existing)	y	y		18.0	$1,477	0.19	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
64	Condensing Gas Furnaces	1	Mobile (New)			y	18.0	$1,477	0.19	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
65	Early Retire Gas Furnaces	1	Detached (Pre-1976)	y	y		9.0	$1,864	0.38	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
66	Early Retire Gas Furnaces	1	Detached (Post-1976)	y	y		9.0	$1,864	0.31	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
67	Early Retire Gas Furnaces	1	Attached (Pre-1976)	y	y		9.0	$1,864	0.22	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
68	Early Retire Gas Furnaces	1	Attached (Post-1976)	y	y		9.0	$1,864	0.17	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
69	Early Retire Gas Furnaces	1	Mobile (Existing)	y	y		9.0	$1,864	0.20	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
70	Condensing Gas Boilers	1	Detached (Pre-1976)	y	y		20.0	$3,200	0.31	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
71	Condensing Gas Boilers	1	Detached (Post-1976)	y	y		20.0	$3,200	0.25	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
72	Condensing Gas Boilers	1	Detached (New)			y	20.0	$3,200	0.25	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
73	Condensing Gas Boilers	1	Attached (Pre-1976)	y	y		20.0	$3,200	0.17	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
74	Condensing Gas Boilers	1	Attached (Post-1976)	y	y		20.0	$3,200	0.14	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
75	Condensing Gas Boilers	1	Attached (New)			y	20.0	$3,200	0.14	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
76	Condensing Gas Boilers	1	Mobile (Existing)	y	y		20.0	$3,200	0.16	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
77	Condensing Gas Boilers	1	Mobile (New)			y	20.0	$3,200	0.16	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
78	Gas Fireplaces	1	Detached (Pre-1976)	y	y		15.0	$150	3.97	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
79	Gas Fireplaces	1	Detached (Post-1976)	y	y		15.0	$150	3.97	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
80	Gas Fireplaces	1	Detached (New)			y	15.0	$150	3.97	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
81	Gas Fireplaces	1	Attached (Pre-1976)	y	y		15.0	$150	2.42	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
82	Gas Fireplaces	1	Attached (Post-1976)	y	y		15.0	$150	2.42	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
83	Gas Fireplaces	1	Attached (New)			y	15.0	$150	2.42	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
84	Gas Fireplaces	1	Mobile (Existing)	y	y		15.0	$150	2.37	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
85	Gas Fireplaces	1	Mobile (New)			y	15.0	$150	2.37	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
86	Prog. Thermostats	1	Detached (Pre-1976)	y	y		11.0	$50	8.08	Pass	Full	0%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
87	Prog. Thermostats	1	Detached (Post-1976)	y	y		11.0	$50	6.62	Pass	Full	0%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
88	Prog. Thermostats	1	Detached (New)			y	11.0	$50	6.60	Pass	Full	0%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
89	Prog. Thermostats	1	Attached (Pre-1976)	y	y		11.0	$50	4.53	Pass	Full	0%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
90	Prog. Thermostats	1	Attached (Post-1976)	y	y		11.0	$50	3.73	Pass	Full	0%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
91	Prog. Thermostats	1	Attached (New)			y	11.0	$50	3.72	Pass	Full	0%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
92	Prog. Thermostats	1	Mobile (Existing)	y	y		11.0	$50	4.17	Pass	Full	0%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
93	Prog. Thermostats	1	Mobile (New)			y	11.0	$50	4.16	Pass	Full	0%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
94	Solar Make-Up Air	1	Detached (Pre-1976)	y	y		40.0	$1,300	0.22	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
95	Solar Make-Up Air	1	Detached (Post-1976)	y	y		40.0	$1,300	0.18	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
96	Solar Make-Up Air	1	Detached (New)			y	40.0	$1,300	0.18	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
97	Solar Make-Up Air	1	Attached (Pre-1976)	y	y		40.0	$1,300	0.12	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
98	Solar Make-Up Air	1	Attached (Post-1976)	y	y		40.0	$1,300	0.10	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
99	Solar Make-Up Air	1	Attached (New)			y	40.0	$1,300	0.10	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
100	Solar Make-Up Air	1	Mobile (Existing)	y	y		40.0	$1,300	0.11	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
101	Solar Make-Up Air	1	Mobile (New)			y	40.0	$1,300	0.11	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
102	HRVs	1	Detached (Pre-1976)	y	y		15.0	$600	0.39	Fail	Incr.	0%	3%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
103	HRVs	1	Detached (Post-1976)	y	y		15.0	$600	0.33	Fail	Incr.	0%	3%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
104	HRVs	1	Detached (New)			y	15.0	$600	0.33	Fail	Incr.	0%	3%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
105	HRVs	1	Attached (Pre-1976)	y	y		15.0	$600	0.22	Fail	Incr.	0%	3%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
106	HRVs	1	Attached (Post-1976)	y	y		15.0	$600	0.18	Fail	Incr.	0%	3%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
107	HRVs	1	Attached (New)			y	15.0	$600	0.18	Fail	Incr.	0%	3%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
108	HRVs	1	Mobile (Existing)	y	y		15.0	$600	0.19	Fail	Incr.	0%	3%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
109	HRVs	1	Mobile (New)			y	15.0	$600	0.19	Fail	Incr.	0%	3%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
110	Air Heat Pumps	1	Detached (Pre-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
111	Air Heat Pumps	1	Detached (Post-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
112	Air Heat Pumps	1	Detached (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
113	Air Heat Pumps	1	Attached (Pre-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
114	Air Heat Pumps	1	Attached (Post-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
115	Air Heat Pumps	1	Attached (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
116	Air Heat Pumps	1	Mobile (Existing)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
117	Air Heat Pumps	1	Mobile (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
118	Ground Heat Pumps	1	Detached (Pre-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
119	Ground Heat Pumps	1	Detached (Post-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
120	Ground Heat Pumps	1	Detached (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
121	Ground Heat Pumps	1	Attached (Pre-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
122	Ground Heat Pumps	1	Attached (Post-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
123	Ground Heat Pumps	1	Attached (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
124	Ground Heat Pumps	1	Mobile (Existing)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
125	Ground Heat Pumps	1	Mobile (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
126	Heating & DHW	1	Detached (Pre-1976)	y	y		18.0	$8,506	0.11	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
127	Heating & DHW	1	Detached (Post-1976)	y	y		18.0	$8,506	0.10	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
128	Heating & DHW	1	Detached (New)			y	18.0	$3,506	0.25	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
129	Heating & DHW	1	Attached (Pre-1976)	y	y		18.0	$8,506	0.09	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
130	Heating & DHW	1	Attached (Post-1976)	y	y		18.0	$8,506	0.08	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
131	Heating & DHW	1	Attached (New)			y	18.0	$3,506	0.20	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
132	Heating & DHW	1	Mobile (Existing)	y	y		18.0	$8,506	0.08	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
133	Heating & DHW	1	Mobile (New)			y	18.0	$3,506	0.19	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
134	Heating & DHW (Hydronic)	1	Detached (Pre-1976)	y	y		20.0	$8,000	0.22	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
135	Heating & DHW (Hydronic)	1	Detached (Post-1976)	y	y		20.0	$8,000	0.19	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
136	Heating & DHW (Hydronic)	1	Detached (New)			y	20.0	$3,000	0.50	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
137	Heating & DHW (Hydronic)	1	Attached (Pre-1976)	y	y		20.0	$8,000	0.15	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
138	Heating & DHW (Hydronic)	1	Attached (Post-1976)	y	y		20.0	$8,000	0.13	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
139	Heating & DHW (Hydronic)	1	Attached (New)			y	20.0	$3,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
140	Heating & DHW (Hydronic)	1	Mobile (Existing)	y	y		20.0	$8,000	0.13	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
141	Heating & DHW (Hydronic)	1	Mobile (New)			y	20.0	$3,000	0.36	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
142	Condensing Gas DHW	1	Detached (Pre-1976)	y	y		13.0	$1,567	0.25	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
143	Condensing Gas DHW	1	Detached (Post-1976)	y	y		13.0	$1,567	0.25	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
144	Condensing Gas DHW	1	Detached (New)			y	13.0	$1,073	0.37	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
145	Condensing Gas DHW	1	Attached (Pre-1976)	y	y		13.0	$1,567	0.22	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
146	Condensing Gas DHW	1	Attached (Post-1976)	y	y		13.0	$1,567	0.22	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
147	Condensing Gas DHW	1	Attached (New)			y	13.0	$1,073	0.33	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
148	Condensing Gas DHW	1	Mobile (Existing)	y	y		13.0	$1,567	0.19	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
149	Condensing Gas DHW	1	Mobile (New)			y	13.0	$1,073	0.28	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
150	Tankless Gas DHW	1	Detached (Pre-1976)	y	y		20.0	$2,274	0.36	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
151	Tankless Gas DHW	1	Detached (Post-1976)	y	y		20.0	$2,274	0.36	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
152	Tankless Gas DHW	1	Detached (New)			y	20.0	$1,646	0.50	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
153	Tankless Gas DHW	1	Attached (Pre-1976)	y	y		20.0	$2,274	0.32	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
154	Tankless Gas DHW	1	Attached (Post-1976)	y	y		20.0	$2,274	0.32	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
155	Tankless Gas DHW	1	Attached (New)			y	20.0	$1,646	0.45	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
156	Tankless Gas DHW	1	Mobile (Existing)	y	y		20.0	$2,274	0.32	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
157	Tankless Gas DHW	1	Mobile (New)			y	20.0	$1,646	0.44	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
158	Solar DHW	1	Detached (Pre-1976)	y	y		25.0	$7,000	0.24	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
159	Solar DHW	1	Detached (Post-1976)	y	y		25.0	$7,000	0.24	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
160	Solar DHW	1	Detached (New)			y	25.0	$7,000	0.24	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
161	Solar DHW	1	Attached (Pre-1976)	y	y		25.0	$7,000	0.23	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
162	Solar DHW	1	Attached (Post-1976)	y	y		25.0	$7,000	0.23	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
163	Solar DHW	1	Attached (New)			y	25.0	$7,000	0.23	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
164	Solar DHW	1	Mobile (Existing)	y	y		25.0	$7,000	0.24	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
165	Solar DHW	1	Mobile (New)			y	25.0	$7,000	0.24	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
166	DHW Tank Insulation	1	Detached (Pre-1976)	y	y		13.0	$35	0.94	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
167	DHW Tank Insulation	1	Detached (Post-1976)	y	y		13.0	$35	0.94	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
168	DHW Tank Insulation	1	Detached (New)			y	13.0	$35	0.94	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
169	DHW Tank Insulation	1	Attached (Pre-1976)	y	y		13.0	$25	1.17	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
170	DHW Tank Insulation	1	Attached (Post-1976)	y	y		13.0	$25	1.17	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
171	DHW Tank Insulation	1	Attached (New)			y	13.0	$25	1.17	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
172	DHW Tank Insulation	1	Mobile (Existing)	y	y		13.0	$25	1.14	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
173	DHW Tank Insulation	1	Mobile (New)			y	13.0	$25	1.14	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
174	DHW Pipe Insulation	1	Detached (Pre-1976)	y	y		15.0	$1	18.74	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
175	DHW Pipe Insulation	1	Detached (Post-1976)	y	y		15.0	$1	18.74	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
176	DHW Pipe Insulation	1	Detached (New)			y	15.0	$1	18.74	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
177	DHW Pipe Insulation	1	Attached (Pre-1976)	y	y		15.0	$1	16.68	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
178	DHW Pipe Insulation	1	Attached (Post-1976)	y	y		15.0	$1	16.68	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
179	DHW Pipe Insulation	1	Attached (New)			y	15.0	$1	16.68	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
180	DHW Pipe Insulation	1	Mobile (Existing)	y	y		15.0	$1	16.34	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
181	DHW Pipe Insulation	1	Mobile (New)			y	15.0	$1	16.34	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
182	DHW Heat Traps	1	Detached (New)			y	13.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
183	DHW Heat Traps	1	Attached (New)			y	13.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
184	DHW Heat Traps	1	Mobile (New)			y	13.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
185	Showerheads	1	Detached (Pre-1976)	y	y		10.0	$13	10.58	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
186	Showerheads	1	Detached (Post-1976)	y	y		10.0	$13	10.58	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
187	Showerheads	1	Detached (New)			y	10.0	$13	10.58	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
188	Showerheads	1	Attached (Pre-1976)	y	y		10.0	$13	9.42	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
189	Showerheads	1	Attached (Post-1976)	y	y		10.0	$13	9.42	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
190	Showerheads	1	Attached (New)			y	10.0	$13	9.42	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
191	Showerheads	1	Mobile (Existing)	y	y		10.0	$13	9.23	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
192	Showerheads	1	Mobile (New)			y	10.0	$13	9.23	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
193	Faucet Aerators	1	Detached (Pre-1976)	y	y		10.0	$15	5.54	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
194	Faucet Aerators	1	Detached (Post-1976)	y	y		10.0	$15	5.54	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
195	Faucet Aerators	1	Detached (New)			y	10.0	$15	5.54	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
196	Faucet Aerators	1	Attached (Pre-1976)	y	y		10.0	$15	4.93	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
197	Faucet Aerators	1	Attached (Post-1976)	y	y		10.0	$15	4.93	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
198	Faucet Aerators	1	Attached (New)			y	10.0	$15	4.93	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
199	Faucet Aerators	1	Mobile (Existing)	y	y		10.0	$15	4.83	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
200	Faucet Aerators	1	Mobile (New)			y	10.0	$15	4.83	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
201	Wastewater Heat Recovery	1	Detached (Pre-1976)	y	y		30.0	$800	0.50	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
202	Wastewater Heat Recovery	1	Detached (Post-1976)	y	y		30.0	$800	0.50	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
203	Wastewater Heat Recovery	1	Detached (New)			y	30.0	$800	0.50	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
204	Wastewater Heat Recovery	1	Attached (Pre-1976)	y	y		30.0	$731	0.48	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
205	Wastewater Heat Recovery	1	Attached (Post-1976)	y	y		30.0	$731	0.48	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
206	Wastewater Heat Recovery	1	Attached (New)			y	30.0	$731	0.48	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
207	Wastewater Heat Recovery	1	Mobile (Existing)	y	y		30.0	$731	0.47	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
208	Wastewater Heat Recovery	1	Mobile (New)			y	30.0	$731	0.47	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
209	DHW Recirculation	1	Detached (Pre-1976)	y	y		18.0	$570	0.62	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

210	DHW Recirculation	1	Detached (Post-1976)	y	y		18.0	$570	0.62	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
211	DHW Recirculation	1	Detached (New)			y	18.0	$570	0.62	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
212	DHW Recirculation	1	Attached (Pre-1976)	y	y		18.0	$470	0.67	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
213	DHW Recirculation	1	Attached (Post-1976)	y	y		18.0	$470	0.67	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
214	DHW Recirculation	1	Attached (New)			y	18.0	$470	0.67	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
215	DHW Recirculation	1	Mobile (Existing)	y	y		18.0	$470	0.65	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
216	DHW Recirculation	1	Mobile (New)			y	18.0	$470	0.65	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
217	ESTAR Dishwashers	1	Detached (Pre-1976)	y	y		11.0	$105	0.36	Fail	Incr.	0%	0%	0%	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
218	ESTAR Dishwashers	1	Detached (Post-1976)	y	y		11.0	$105	0.36	Fail	Incr.	0%	0%	0%	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
219	ESTAR Dishwashers	1	Detached (New)			y	11.0	$105	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
220	ESTAR Dishwashers	1	Attached (Pre-1976)	y	y		11.0	$105	0.30	Fail	Incr.	0%	0%	0%	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
221	ESTAR Dishwashers	1	Attached (Post-1976)	y	y		11.0	$105	0.30	Fail	Incr.	0%	0%	0%	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
222	ESTAR Dishwashers	1	Attached (New)			y	11.0	$105	0.30	Fail	Incr.	0%	0%	0%	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
223	ESTAR Dishwashers	1	Mobile (Existing)	y	y		11.0	$105	0.30	Fail	Incr.	0%	0%	0%	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
224	ESTAR Dishwashers	1	Mobile (New)			y	11.0	$105	0.30	Fail	Incr.	0%	0%	0%	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
225	ESTAR Clothes Washers	1	Detached (Pre-1976)	y	y		14.0	$300	1.02	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	37%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
226	ESTAR Clothes Washers	1	Detached (Post-1976)	y	y		14.0	$300	1.02	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	37%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
227	ESTAR Clothes Washers	1	Detached (New)			y	14.0	$300	1.02	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	37%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
228	ESTAR Clothes Washers	1	Attached (Pre-1976)	y	y		14.0	$300	0.89	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	37%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
229	ESTAR Clothes Washers	1	Attached (Post-1976)	y	y		14.0	$300	0.89	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	37%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
230	ESTAR Clothes Washers	1	Attached (New)			y	14.0	$300	0.89	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	37%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
231	ESTAR Clothes Washers	1	Mobile (Existing)	y	y		14.0	$300	0.88	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	37%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
232	ESTAR Clothes Washers	1	Mobile (New)			y	14.0	$300	0.88	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	37%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
233	Gas Clothes Dryers	1	Detached (Pre-1976)	y	y		18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
234	Gas Clothes Dryers	1	Detached (Post-1976)	y	y		18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
235	Gas Clothes Dryers	1	Detached (New)			y	18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
236	Gas Clothes Dryers	1	Attached (Pre-1976)	y	y		18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
237	Gas Clothes Dryers	1	Attached (Post-1976)	y	y		18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
238	Gas Clothes Dryers	1	Attached (New)			y	18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
239	Gas Clothes Dryers	1	Mobile (Existing)	y	y		18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
240	Gas Clothes Dryers	1	Mobile (New)			y	18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
241	Pool Covers	1	Detached (Pre-1976)	y	y		10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
242	Pool Covers	1	Detached (Post-1976)	y	y		10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
243	Pool Covers	1	Detached (New)			y	10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
244	Pool Covers	1	Attached (Pre-1976)	y	y		10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
245	Pool Covers	1	Attached (Post-1976)	y	y		10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
246	Pool Covers	1	Attached (New)			y	10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
247	Pool Covers	1	Mobile (Existing)	y	y		10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
248	Pool Covers	1	Mobile (New)			y	10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
249	Heat Pump Pool Heaters	1	Detached (Pre-1976)	y	y		10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
250	Heat Pump Pool Heaters	1	Detached (Post-1976)	y	y		10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
251	Heat Pump Pool Heaters	1	Detached (New)			y	10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
252	Heat Pump Pool Heaters	1	Attached (Pre-1976)	y	y		10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
253	Heat Pump Pool Heaters	1	Attached (Post-1976)	y	y		10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
254	Heat Pump Pool Heaters	1	Attached (New)			y	10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
255	Heat Pump Pool Heaters	1	Mobile (Existing)	y	y		10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
256	Heat Pump Pool Heaters	1	Mobile (New)			y	10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
257	Efficient Pool Heaters	1	Detached (Pre-1976)	y	y		7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
258	Efficient Pool Heaters	1	Detached (Post-1976)	y	y		7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
259	Efficient Pool Heaters	1	Detached (New)			y	7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
260	Efficient Pool Heaters	1	Attached (Pre-1976)	y	y		7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
261	Efficient Pool Heaters	1	Attached (Post-1976)	y	y		7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
262	Efficient Pool Heaters	1	Attached (New)			y	7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
263	Efficient Pool Heaters	1	Mobile (Existing)	y	y		7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
264	Efficient Pool Heaters	1	Mobile (New)			y	7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
265	Solar Pool Heaters	1	Detached (Pre-1976)	y	y		20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
266	Solar Pool Heaters	1	Detached (Post-1976)	y	y		20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
267	Solar Pool Heaters	1	Detached (New)			y	20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
268	Solar Pool Heaters	1	Attached (Pre-1976)	y	y		20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
269	Solar Pool Heaters	1	Attached (Post-1976)	y	y		20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
270	Solar Pool Heaters	1	Attached (New)			y	20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
271	Solar Pool Heaters	1	Mobile (Existing)	y	y		20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
272	Solar Pool Heaters	1	Mobile (New)			y	20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
273	Micro-CHP	1	Detached (Pre-1976)	y	y		20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
274	Micro-CHP	1	Detached (Post-1976)	y	y		20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
275	Micro-CHP	1	Detached (New)			y	20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
276	Micro-CHP	1	Attached (Pre-1976)	y	y		20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
277	Micro-CHP	1	Attached (Post-1976)	y	y		20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
278	Micro-CHP	1	Attached (New)			y	20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
279	Micro-CHP	1	Mobile (Existing)	y	y		20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
280	Micro-CHP	1	Mobile (New)			y	20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Back to Index

Attic Insulation

		References/Notes
Description:	Insulation levels can be increased in attics by blowing insulation into the attic spaces to fill and cover the space within the roof frame. One technique is to make sure loose-fill or batt insulation fills the attic floor joists fully and then add an additional layer of unfaced fibreglass batt insulation across the joists. To reduce cost, it is also possible to blow in cellulose insulation on top of the existing insulation instead.	
Baseline:	A home with average insulation in the attic	
Upgrade:	Improving the attic insulation in an average home by RSI-3.5 (R-20), through the addition of cellulose insulation	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.648	$1.648		$1.648	$1.648		$1.648	
Electricity ($/kW)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	
Natural Gas ($/MJ)	$0.010	$0.139	$0.139		$0.139	$0.139		$0.139	
Oil ($/L)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	
Water ($/1000L)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	

Sub-sector		Detached ☑ (Pre-1976)	Detached ☑ (Post-1976)	Detached ☐ (New)	Attached ☑ (Pre-1976)	Attached ☑ (Post-1976)	Attached ☐ (New)	Mobile ☑ (Existing)	Mobile ☐ (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	1,152	1,352		700	700		501		1,191	
	Natural Gas (MJ/yr.)	81,113	65,361		45,482	36,932		41,932		68,475	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Upgrade Consumption	Electricity (kWh/yr.)	1,105	1,307		670	677		486		1,149	
	Natural Gas (MJ/yr.)	76,247	62,093		42,753	35,085		39,625		64,719	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%		0%	0%		0%		0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%		0%	0%		0%		0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-		-	-		-		-	
	Electricity, Cooling (kWh/yr.)	-	-		-	-		-		-	
	Electricity, Total (kWh/yr.)	-	-		-	-		-		-	
	Natural Gas (MJ/yr.)	-	-		-	-		-		-	
	Oil (L/yr.)	-	-		-	-		-		-	
Winter Peak Hours-Use Factor		-	-		-	-		-		-	
Resource Savings	Electricity (kWh/yr.)	47	44		29	22		16		43	
	Electricity (kW peak)	-	-		-	-		-		-	
	Natural Gas (MJ/yr.)	4,867	3,268		2,729	1,847		2,306		3,756	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Cost Parameters	Upgrade, Material ($)	$675.00	$712.50		$450.00	$487.50		$525.00		$671.23	Consultations with utilities and contractors have suggested that an average cost of $0.75/ft^2 (material and installation) is reasonable. Average ceiling areas based on ecoENERGY database data for BC and HOT2000 modelling.
	Upgrade, Installation ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	Installation costs included above
	Baseline, Material ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	
	Baseline, Installation ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	
	Total Measure Cost ($)	$675.00	$712.50		$450.00	$487.50		$525.00		$671.23	
	Basis (Full/Incremental)	Full	Full		Full	Full		Full		Full	
Incremental O&M ($/yr.)		$0	$0		$0	$0		$0		$0	
Lifetimes	Upgrade (yrs.)	30	30		30	30		30		30	Approximate lifetime, based on previous Marbek energy efficiency potential studies
	Baseline (yrs.)	-	-		-	-		-		-	
Cost Savings ($/yr.)		$52	$36		$29	$20		$24		$40	
Simple Payback (yrs.)		13.1	20.0		15.4	24.4		21.9		17.58	
NPV of O&M Costs ($)		$0	$0		$0	$0		$0		$0	
Total Benefits ($)	Electric Energy	$77	$73		$49	$37		$26		$70	
	Electric Demand	$0	$0		$0	$0		$0		$0	
	Natural Gas	$677	$455		$380	$257		$321		$522	
	Oil	$0	$0		$0	$0		$0		$0	
	Water	$0	$0		$0	$0		$0		$0	
Measure TRC ($)		$79	-$185		-$22	-$194		-$178		-$78	
Benefit/Cost Ratio		1.12	0.74		0.95	0.60		0.66		0.88	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1		1	1		1		
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental		Incremental	Incremental		Incremental		
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No) Baseline	Upgrade	Measure Resource Savings (%) Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Ventilation and Circulation	-	1	1	5.5%	4.5%		5.5%	4.5%		5.0%		4.9%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes.
Space Cooling	-	1	1	2.5%	1.5%		2.5%	1.5%		2.0%		1.9%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes.
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No) Baseline	Upgrade	Measure Resource Savings (%) Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Space Heating	-	1	1	6.0%	5.0%		6.0%	5.0%		5.5%		5.4%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes.
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No) Baseline	Upgrade	Measure Resource Savings (%) Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	

Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	5.5%	4.5%		5.5%	4.5%		5.0%		4.9%	
Space Cooling	1	1	2.5%	1.5%		2.5%	1.5%		2.0%		1.9%	
Clothes Washers	0	0	-	-		-	-		-		-	
Dishwashers	0	0	-	-		-	-		-		-	
Other Electric Loads	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	6.0%	5.0%		6.0%	5.0%		5.5%		5.4%	
Domestic Hot Water (DHW)	0	0	-	-		-	-		-		-	
Fireplaces	0	0	-	-		-	-		-		-	
Cooking	0	0	-	-		-	-		-		-	
Clothes Dryers	0	0	-	-		-	-		-		-	
Pool and Spa Heaters	0	0	-	-		-	-		-		-	
Other	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-		-	-		-		-	
Domestic Hot Water (DHW)	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Wall Insulation

		References/Notes
Description:	It can be challenging to retrofit wall insulation in existing homes since the inside surfaces of the exterior walls are already finished. It is sometimes possible to add insulation to a wall by blowing insulating materials into the wall cavity, if sufficient space exists. Alternatively, if the siding is old and due for replacement, rigid foam insulation can be added before the new siding is installed. In this situation, it would also be quite cost-effective to install a more effective vapour and air barrier (e.g., Dupont Tyvek®) to reduce the amount of air leakage through the walls.	
Baseline:	A home with average wall insulation	
Upgrade:	Improving the wall insulation in an average home by RSI-1.76 (R-10) to RSI-4.2 (R-24)	Assumed that the homeowner is replacing the home's siding and improving the wall insulation on an incremental basis.

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)						
Electricity ($/kWh)	$0.083	$1.648	$1.648		$1.648	$1.648		$1.648	
Electricity ($/kW)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	
Natural Gas ($/MJ)	$0.010	$0.139	$0.139		$0.139	$0.139		$0.139	
Oil ($/L)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	
Water ($/1000L)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☐	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☐	Mobile (Existing) ☑	Mobile (New) ☐	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	1,152	1,352		700	700		501		1,191	
	Natural Gas (MJ/yr.)	81,113	65,361		45,482	36,932		41,932		68,475	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Upgrade Consumption	Electricity (kWh/yr.)	1,045	1,218		631	632		464		1,077	
	Natural Gas (MJ/yr.)	68,135	54,903		38,205	31,023		35,223		57,519	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%		0%	0%		0%		0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%		0%	0%		0%		0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-		-	-		-		-	
	Electricity, Cooling (kWh/yr.)	-	-		-	-		-		-	
	Electricity, Total (kWh/yr.)	-	-		-	-		-		-	
	Natural Gas (MJ/yr.)	-	-		-	-		-		-	
	Oil (L/yr.)	-	-		-	-		-		-	
Winter Peak Hours-Use Factor		-	-		-	-		-		-	
Resource Savings	Electricity (kWh/yr.)	107	134		69	67		37		115	
	Electricity (kW peak)	-	-		-	-		-		-	
	Natural Gas (MJ/yr.)	12,978	10,458		7,277	5,909		6,709		10,956	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Cost Parameters	Upgrade, Material ($)	$2,000.00	$2,000.00		$1,500.00	$1,500.00		$1,500.00		$1,940.97	Approx. material and installation costs, based on private communication with Tony Woods, CanAm Building Envelope Specialists (2009).
	Upgrade, Installation ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	Installation costs included above
	Baseline, Material ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	
	Baseline, Installation ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	
	Total Measure Cost ($)	$2,000.00	$2,000.00		$1,500.00	$1,500.00		$1,500.00		$1,940.97	
	Basis (Full/Incremental)	Incr.	Incr.		Incr.	Incr.		Incr.		Incr.	Forced to incremental because it would be done as part of siding replacement
Incremental O&M ($/yr.)		$0	$0		$0	$0		$0		$0	
Lifetimes	Upgrade (yrs.)	30	30		30	30		30		30	Approximate lifetime, based on previous Marbek energy efficiency potential studies
	Baseline (yrs.)	30	30		30	30		30		30	
Cost Savings ($/yr.)		$136	$114		$77	$63		$69		$117	
Simple Payback (yrs.)		14.7	17.6		19.5	23.6		21.8		17.07	
NPV of O&M Costs ($)		$0	$0		$0	$0		$0		$0	
Total Benefits ($)	Electric Energy	$176	$220		$114	$111		$61		$189	
	Electric Demand	$0	$0		$0	$0		$0		$0	
	Natural Gas	$1,805	$1,455		$1,012	$822		$933		$1,524	
	Oil	$0	$0		$0	$0		$0		$0	
	Water	$0	$0		$0	$0		$0		$0	
Measure TRC ($)		-$19	-$325		-$374	-$567		-$506		-$228	
Benefit/Cost Ratio		0.99	0.84		0.75	0.62		0.66		0.88	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1		1	1		1		
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental		Incremental	Incremental		Incremental		
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	15.0%	15.0%		15.0%	15.0%		15.0%		15.0%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes.
Space Cooling	-	1	1	3.0%	2.5%		3.0%	2.5%		2.5%		2.7%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes.
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	16.0%	16.0%		16.0%	16.0%		16.0%		16.0%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes.
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heater	-	0	0									-	
Pool and Spa Heater	Pool Heaters	0	0									-	
Pool and Spa Heater	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	

Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	15.0%	15.0%		15.0%	15.0%		15.0%		15.0%	
Space Cooling	1	1	3.0%	2.5%		3.0%	2.5%		2.5%		2.7%	
Clothes Washers	0	0	-	-		-	-		-		-	
Dishwashers	0	0	-	-		-	-		-		-	
Other Electric Loads	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	16.0%	16.0%		16.0%	16.0%		16.0%		16.0%	
Domestic Hot Water (DHW)	0	0	-	-		-	-		-		-	
Fireplaces	0	0	-	-		-	-		-		-	
Cooking	0	0	-	-		-	-		-		-	
Clothes Dryers	0	0	-	-		-	-		-		-	
Pool and Spa Heaters	0	0	-	-		-	-		-		-	
Other	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-		-	-		-		-	
Domestic Hot Water (DHW)	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Slab Insulation (Unfinished Basements)

		References/Notes
Description:	Insulation can be added both under and on top of basement slab floors. However, in existing homes, only the latter is practical. It is assumed that additional insulation is added to the slab floor while the basement is being finished. This can be done by purchasing insulated subfloor panels or laying down extruded polystyrene rigid foam insulation.	
Baseline:	Homes with unfinished basements	
Upgrade:	The addition of slab (basement floor) insulation in homes with unfinished basements. It is assumed that 2" polystyrene rigid foam insulation (RSI-1.76 (R-10)) is being added.	Assumed that the homeowner is finishing their basement and improving the slab/floor insulation on an incremental basis.

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.648	$1.648		$1.648	$1.648			
Electricity ($/kW)	$0.000	$0.000	$0.000		$0.000	$0.000			
Natural Gas ($/MJ)	$0.010	$0.139	$0.139		$0.139	$0.139			
Oil ($/L)	$0.000	$0.000	$0.000		$0.000	$0.000			
Water ($/1000L)	$0.000	$0.000	$0.000		$0.000	$0.000			

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☐	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☐	Mobile (Existing) ☐	Mobile (New) ☐	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	600	800		400	400				679	
	Natural Gas (MJ/yr.)	81,113	65,361		45,482	36,932				68,994	
	Oil (L/yr.)	-	-		-	-				-	
	Water (L/yr.)	-	-		-	-				-	
Upgrade Consumption	Electricity (kWh/yr.)	594	792		396	396				672	
	Natural Gas (MJ/yr.)	80,059	64,707		44,891	36,562				68,204	
	Oil (L/yr.)	-	-		-	-				-	
	Water (L/yr.)	-	-		-	-				-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%		0%	0%				0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%		0%	0%				0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-		-	-				-	
	Electricity, Cooling (kWh/yr.)	-	-		-	-				-	
	Electricity, Total (kWh/yr.)	-	-		-	-				-	
	Natural Gas (MJ/yr.)	-	-		-	-				-	
	Oil (L/yr.)	-	-		-	-				-	
Winter Peak Hours-Use Factor		-	-		-	-				-	
Resource Savings	Electricity (kWh/yr.)	6	8		4	4				7	
	Electricity (kW peak)	-	-		-	-				-	
	Natural Gas (MJ/yr.)	1,054	654		591	369				790	
	Oil (L/yr.)	-	-		-	-				-	
	Water (L/yr.)	-	-		-	-				-	
Cost Parameters	Upgrade, Material ($)	$1,125.00	$1,275.00		$975.00	$1,050.00				$1,190.52	Based on a retail scan (Home Depot), the cost of this type of insulation is ~$1.50/ft^2 ($16/m^2) (2010). Average basement areas based on ecoENERGY database data for BC and HOT2000 modelling.
	Upgrade, Installation ($)	$0.00	$0.00		$0.00	$0.00				$0.00	Assuming that additional labour costs are minimal since the basement is being finished
	Baseline, Material ($)	$0.00	$0.00		$0.00	$0.00				$0.00	
	Baseline, Installation ($)	$0.00	$0.00		$0.00	$0.00				$0.00	
	Total Measure Cost ($)	$1,125.00	$1,275.00		$975.00	$1,050.00				$1,190.52	
	Basis (Full/Incremental)	Incr.	Incr.		Incr.	Incr.				Incr.	Forced to incremental because it would be done as part of basement reno.
Incremental O&M ($/yr.)		$0	$0		$0	$0				$0	
Lifetimes	Upgrade (yrs.)	30	30		30	30				30	Approximate lifetime, based on previous Marbek energy efficiency potential studies
	Baseline (yrs.)	30	30		30	30				30	
Cost Savings ($/yr.)		$11	$7		$6	$4				$8	
Simple Payback (yrs.)		103.9	180.4		159.2	265.8				156.47	
NPV of O&M Costs ($)		$0	$0		$0	$0				$0	
Total Benefits ($)	Electric Energy	$10	$13		$7	$7				$11	
	Electric Demand	$0	$0		$0	$0				$0	
	Natural Gas	$147	$91		$82	$51				$110	
	Oil	$0	$0		$0	$0				$0	
	Water	$0	$0		$0	$0				$0	
Measure TRC ($)		-$968	-$1,171		-$886	-$992				-$1,069	
Benefit/Cost Ratio		0.14	0.08		0.09	0.06				0.10	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1		1	1				
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental		Incremental	Incremental				
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	1.0%	1.0%		1.0%	1.0%				1.0%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached homes.
Space Cooling	-	0	0									-	Space cooling savings are negligible, based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC.
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	1.3%	1.0%		1.3%	1.0%				1.1%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached homes.
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	

Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	1.0%	1.0%		1.0%	1.0%				1.0%	
Space Cooling	0	0	-	-		-	-				-	
Clothes Washers	0	0	-	-		-	-				-	
Dishwashers	0	0	-	-		-	-				-	
Other Electric Loads	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	1.3%	1.0%		1.3%	1.0%				1.1%	
Domestic Hot Water (DHW)	0	0	-	-		-	-				-	
Fireplaces	0	0	-	-		-	-				-	
Cooking	0	0	-	-		-	-				-	
Clothes Dryers	0	0	-	-		-	-				-	
Pool and Spa Heaters	0	0	-	-		-	-				-	
Other	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-		-	-				-	
Domestic Hot Water (DHW)	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Basement (Foundation) Insulation

		References/Notes
Description:	In many homes, the basement is often under-insulated or even left uninsulated. Increasing the insulation level in basements can be achieved in a number of ways, including constructing a new insulated frame wall, moving the existing frame wall to increase the insulation level, adding extra insulation to the existing frame wall, adding rigid board insulation to the exterior of the foundation, or using a combination of interior and exterior rigid board insulation. As a lower cost alternative, it is also possible to use polyurethane foam.	
Baseline:	A home with average insulation in the basement (foundation) walls	
Upgrade:	In average homes with basements, improving the foundation wall insulation by RSI-2.12 (R-12)	Assumed that the homeowner is finishing or refinishing the basement and improving the foundation insulation on an incremental basis.

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.648	$1.648		$1.648	$1.648			
Electricity ($/kW)	$0.000	$0.000	$0.000		$0.000	$0.000			
Natural Gas ($/MJ)	$0.010	$0.139	$0.139		$0.139	$0.139			
Oil ($/L)	$0.000	$0.000	$0.000		$0.000	$0.000			
Water ($/1000L)	$0.000	$0.000	$0.000		$0.000	$0.000			

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☐	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☐	Mobile (Existing) ☐	Mobile (New) ☐	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	1,152	1,352		700	700				1,205	
	Natural Gas (MJ/yr.)	81,113	65,361		45,482	36,932				68,994	
	Oil (L/yr.)	-	-		-	-				-	
	Water (L/yr.)	-	-		-	-				-	
Upgrade Consumption	Electricity (kWh/yr.)	1,086	1,260		668	666				1,129	
	Natural Gas (MJ/yr.)	71,380	56,864		40,934	33,054				60,453	
	Oil (L/yr.)	-	-		-	-				-	
	Water (L/yr.)	-	-		-	-				-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%		0%	0%				0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%		0%	0%				0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-		-	-				-	
	Electricity, Cooling (kWh/yr.)	-	-		-	-				-	
	Electricity, Total (kWh/yr.)	-	-		-	-				-	
	Natural Gas (MJ/yr.)	-	-		-	-				-	
	Oil (L/yr.)	-	-		-	-				-	
Winter Peak Hours-Use Factor		-	-		-	-				-	
Resource Savings	Electricity (kWh/yr.)	66	92		32	34				76	
	Electricity (kW peak)	-	-		-	-				-	
	Natural Gas (MJ/yr.)	9,734	8,497		4,548	3,878				8,541	
	Oil (L/yr.)	-	-		-	-				-	
	Water (L/yr.)	-	-		-	-				-	
Cost Parameters	Upgrade, Material ($)	$1,400.00	$1,500.00		$900.00	$1,000.00				$1,407.65	~$2.00/ft^2 (material and installation) for addition of R-12 to foundation insulation, based on private communication with Tony Woods, CanAm Building Envelope Specialists (2009), and assuming average foundation wall areas as per HOT2000 models and the ecoENERGY database.
	Upgrade, Installation ($)	$0.00	$0.00		$0.00	$0.00				$0.00	
	Baseline, Material ($)	$0.00	$0.00		$0.00	$0.00				$0.00	
	Baseline, Installation ($)	$0.00	$0.00		$0.00	$0.00				$0.00	
	Total Measure Cost ($)	$1,400.00	$1,500.00		$900.00	$1,000.00				$1,407.65	
	Basis (Full/Incremental)	Incr.	Incr.		Incr.	Incr.				Incr.	Forced to incremental because it would be done as part of basement reno.
Incremental O&M ($/yr.)		$0	$0		$0	$0				$0	
Lifetimes	Upgrade (yrs.)	30	30		30	30				30	Approximate lifetime, based on previous Marbek energy efficiency potential studies
	Baseline (yrs.)	30	30		30	30				30	
Cost Savings ($/yr.)		$101	$91		$47	$41				$90	
Simple Payback (yrs.)		13.9	16.5		19.1	24.5				16.17	
NPV of O&M Costs ($)		$0	$0		$0	$0				$0	
Total Benefits ($)	Electric Energy	$109	$152		$53	$56				$125	
	Electric Demand	$0	$0		$0	$0				$0	
	Natural Gas	$1,354	$1,182		$633	$539				$1,188	
	Oil	$0	$0		$0	$0				$0	
	Water	$0	$0		$0	$0				$0	
Measure TRC ($)		$63	-$167		-$215	-$405				-$95	
Benefit/Cost Ratio		1.04	0.89		0.76	0.60				0.92	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1		1	1				
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental		Incremental	Incremental				
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	11.0%	11.5%		8.0%	8.5%				11.0%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings in attached homes are slightly lower since a smaller percentage of their wall areas is exposed to the outdoors.
Space Cooling	-	1	1									-	Space cooling savings are negligible, based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC.
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	12.0%	13.0%		10.0%	10.5%				12.3%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings in attached homes are slightly lower since a smaller percentage of their wall areas is exposed to the outdoors.
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	

Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	11.0%	11.5%		8.0%	8.5%				11.0%	
Space Cooling	1	1	-	-		-	-				-	
Clothes Washers	0	0	-	-		-	-				-	
Dishwashers	0	0	-	-		-	-				-	
Other Electric Loads	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	12.0%	13.0%		10.0%	10.5%				12.3%	
Domestic Hot Water (DHW)	0	0	-	-		-	-				-	
Fireplaces	0	0	-	-		-	-				-	
Cooking	0	0	-	-		-	-				-	
Clothes Dryers	0	0	-	-		-	-				-	
Pool and Spa Heaters	0	0	-	-		-	-				-	
Other	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-		-	-				-	
Domestic Hot Water (DHW)	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Crawl Space Insulation

		References/Notes
Description:	Insulation levels remain below code in many homes that include crawlspaces as part of the basement design. If the floor is exposed, it would first be necessary to install a vapour barrier (e.g., 6 mil (600 gauge/0.15 mm) polyurethane barrier). Polyurethane foam could then be applied to the ceiling of the crawlspace (or the outer walls if there are pipes running below the floor). In addition to increasing the insulation of the crawlspace, this would help to eliminate any air leaks. Co-benefits of improved crawlspace insulation include improved thermal comfort, fewer drafts, and less condensation.	
Baseline:	Minimal crawlspace insulation in homes with crawlspaces	
Upgrade:	In homes with crawlspaces, the addition of crawlspace insulation to bring the thermal resistance values up to RSI-2.1 (R-12)	

Baseline Reference:	1. Annual consumption, end use
Heating Fuel Type:	All Fuels (Average Fuel Mix)
Main End Use:	Space Heating
Discount Rate:	7.38%
GHG Adder Incl.?	No
Resource Costs:	Baseload

= User Input
= Calculation

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.648	$1.648		$1.648	$1.648			
Electricity ($/kW)	$0.000	$0.000	$0.000		$0.000	$0.000			
Natural Gas ($/MJ)	$0.010	$0.139	$0.139		$0.139	$0.139			
Oil ($/L)	$0.000	$0.000	$0.000		$0.000	$0.000			
Water ($/1000L)	$0.000	$0.000	$0.000		$0.000	$0.000			

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☐	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☐	Mobile (Existing) ☐	Mobile (New) ☐	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	600	800		400	400				679	
	Natural Gas (MJ/yr.)	81,113	65,361		45,482	36,932				68,994	
	Oil (L/yr.)	-	-		-	-				-	
	Water (L/yr.)	-	-		-	-				-	
Upgrade Consumption	Electricity (kWh/yr.)	588	784		392	392				665	
	Natural Gas (MJ/yr.)	79,086	63,727		44,345	36,008				67,269	
	Oil (L/yr.)	-	-		-	-				-	
	Water (L/yr.)	-	-		-	-				-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%		0%	0%				0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%		0%	0%				0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-		-	-				-	
	Electricity, Cooling (kWh/yr.)	-	-		-	-				-	
	Electricity, Total (kWh/yr.)	-	-		-	-				-	
	Natural Gas (MJ/yr.)	-	-		-	-				-	
	Oil (L/yr.)	-	-		-	-				-	
Winter Peak Hours-Use Factor		-	-		-	-				-	
Resource Savings	Electricity (kWh/yr.)	12	16		8	8				14	
	Electricity (kW peak)	-	-		-	-				-	
	Natural Gas (MJ/yr.)	2,028	1,634		1,137	923				1,725	
	Oil (L/yr.)	-	-		-	-				-	
	Water (L/yr.)	-	-		-	-				-	
Cost Parameters	Upgrade, Material ($)	$800.00	$800.00		$800.00	$800.00				$800.00	Approx. material and installation costs, based on cost estimates from recent studies (i.e. 40 ft of walls x 4 ft high assumed) (2009)
	Upgrade, Installation ($)	$0.00	$0.00		$0.00	$0.00				$0.00	Installation costs included above
	Baseline, Material ($)	$0.00	$0.00		$0.00	$0.00				$0.00	
	Baseline, Installation ($)	$0.00	$0.00		$0.00	$0.00				$0.00	
	Total Measure Cost ($)	$800.00	$800.00		$800.00	$800.00				$800.00	
	Basis (Full/Incremental)	Full	Full		Full	Full				Full	
Incremental O&M ($/yr.)		$0	$0		$0	$0				$0	
Lifetimes	Upgrade (yrs.)	30	30		30	30				30	
	Baseline (yrs.)	-	-		-	-				-	
Cost Savings ($/yr.)		$21	$17		$12	$10				$18	
Simple Payback (yrs.)		38.3	46.1		67.8	82.4				46.42	
NPV of O&M Costs ($)		$0	$0		$0	$0				$0	
Total Benefits ($)	Electric Energy	$20	$26		$13	$13				$22	
	Electric Demand	$0	$0		$0	$0				$0	
	Natural Gas	$282	$227		$158	$128				$240	
	Oil	$0	$0		$0	$0				$0	
	Water	$0	$0		$0	$0				$0	
Measure TRC ($)		-$498	-$546		-$629	-$658				-$538	
Benefit/Cost Ratio		0.38	0.32		0.21	0.18				0.33	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1		1	1				
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental		Incremental	Incremental				
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	2.0%	2.0%		2.0%	2.0%				2.0%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached homes.
Space Cooling	-	0	0									-	Space cooling savings are negligible, based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC.
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	2.5%	2.5%		2.5%	2.5%				2.5%	Based on HOT2000 modeling results of average single detached homes with crawl spaces (different vintages) in BC. Assuming savings are similar in attached homes.
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heater	-	0	0									-	
Pool and Spa Heater	Pool Heaters	0	0									-	
Pool and Spa Heater	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	

Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	2.0%	2.0%		2.0%	2.0%				2.0%	
Space Cooling	0	0	-	-		-	-				-	
Clothes Washers	0	0	-	-		-	-				-	
Dishwashers	0	0	-	-		-	-				-	
Other Electric Loads	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	2.5%	2.5%		2.5%	2.5%				2.5%	
Domestic Hot Water (DHW)	0	0	-	-		-	-				-	
Fireplaces	0	0	-	-		-	-				-	
Cooking	0	0	-	-		-	-				-	
Clothes Dryers	0	0	-	-		-	-				-	
Pool and Spa Heaters	0	0	-	-		-	-				-	
Other	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-		-	-				-	
Domestic Hot Water (DHW)	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

Professional Air Sealing/Weather Stripping/Caulking

		References/Notes
Description:	Air leakage sealing of building envelopes includes completion of a blower door test to quantify leakage levels and to identify the location of air leaks. Generally, major leakage occurs at window-to-wall interfaces, around doors (especially patio doors), through electrical and plumbing penetrations and at the top of foundation walls. Installation of sealant and gaskets are generally accepted methods for reducing air leakage in buildings. Other sources of air leaks include pot lights, wall-to-floor interfaces (i.e., top and bottom of baseboards) and bathroom and kitchen exhaust piping.	
Baseline:	No action taken	
Upgrade:	A comprehensive air sealing job, which results in an air tightness (ACH @ 50 Pa) improvement of 30%	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.553	$1.553		$1.553	$1.553		$1.553	
Electricity ($/kW)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	
Natural Gas ($/MJ)	$0.010	$0.127	$0.127		$0.127	$0.127		$0.127	
]	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	
Water ($/1000L)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☐	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☐	Mobile (Existing) ☑	Mobile (New) ☐	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	1,152	1,352		700	700		501		1,191	
	Natural Gas (MJ/yr.)	81,113	65,361		45,482	36,932		41,932		68,475	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Upgrade Consumption	Electricity (kWh/yr.)	1,095	1,282		662	665		483		1,131	
	Natural Gas (MJ/yr.)	72,597	59,478		40,706	33,608		37,948		61,816	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%		0%	0%		0%		0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%		0%	0%		0%		0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-		-	-		-		-	
	Electricity, Cooling (kWh/yr.)	-	-		-	-		-		-	
	Electricity, Total (kWh/yr.)	-	-		-	-		-		-	
	Natural Gas (MJ/yr.)	-	-		-	-		-		-	
	Oil (L/yr.)	-	-		-	-		-		-	
Winter Peak Hours-Use Factor		-	-		-	-		-		-	
Resource Savings	Electricity (kWh/yr.)	57	70		37	35		18		60	
	Electricity (kW peak)	-	-		-	-		-		-	
	Natural Gas (MJ/yr.)	8,517	5,882		4,776	3,324		3,984		6,660	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Cost Parameters	Upgrade, Material ($)	$1,800.00	$1,800.00		$1,800.00	$1,800.00		$1,800.00		$1,800.00	Approx. mateial and installation costs, based on personal communication with Tony Woods, CanAm Building Envelope Specialists (material & installation) (2009). Assuming similar cost for all housing types.
	Upgrade, Installation ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	Installation costs included above
	Baseline, Material ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	
	Baseline, Installation ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	
	Total Measure Cost ($)	$1,800.00	$1,800.00		$1,800.00	$1,800.00		$1,800.00		$1,800.00	
	Basis (Full/Incremental)	Full	Full		Full	Full		Full		Full	
Incremental O&M ($/yr.)		$20	$20		$20	$20		$20		$20	Approximate annual cost to maintain weatherstripping, caulking, etc.
Lifetimes	Upgrade (yrs.)	25	25		25	25		25		25	Approximate lifetime, based on previous Marbek energy efficiency potential studies
	Baseline (yrs.)	-	-		-	-		-		-	
Cost Savings ($/yr.)		$68	$43		$30	$15		$21		$50	
Simple Payback (yrs.)		26.4	41.5		60.2	116.3		87.6		42.97	
NPV of O&M Costs ($)		$225	$225		$225	$225		$225		$225	
Total Benefits ($)	Electric Energy	$88	$108		$58	$54		$28		$93	
	Electric Demand	$0	$0		$0	$0		$0		$0	
	Natural Gas	$1,082	$747		$607	$422		$506		$846	
	Oil	$0	$0		$0	$0		$0		$0	
	Water	$0	$0		$0	$0		$0		$0	
Measure TRC ($)		-$855	-$1,170		-$1,360	-$1,549		-$1,491		-$1,086	
Benefit/Cost Ratio		0.58	0.42		0.33	0.24		0.26		0.46	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1		1	1		1		
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental		Incremental	Incremental		Incremental		
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	9.0%	8.0%		9.0%	8.0%		8.5%		8.4%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached homes.
Space Cooling	-	1	1	0.5%	1.0%		0.5%	1.0%		0.5%		0.8%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached homes.
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	10.5%	9.0%		10.5%	9.0%		9.5%		9.6%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached homes.
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	

Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	9.0%	8.0%		9.0%	8.0%		8.5%		8.4%	
Space Cooling	1	1	0.5%	1.0%		0.5%	1.0%		0.5%		0.8%	
Clothes Washers	0	0	-	-		-	-		-		-	
Dishwashers	0	0	-	-		-	-		-		-	
Other Electric Loads	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	10.5%	9.0%		10.5%	9.0%		9.5%		9.6%	
Domestic Hot Water (DHW)	0	0	-	-		-	-		-		-	
Fireplaces	0	0	-	-		-	-		-		-	
Cooking	0	0	-	-		-	-		-		-	
Clothes Dryers	0	0	-	-		-	-		-		-	
Pool and Spa Heaters	0	0	-	-		-	-		-		-	
Other	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-		-	-		-		-	
Domestic Hot Water (DHW)	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

Homeowner Air Sealing/Weather Stripping/Caulking

		References/Notes
Description:	Homeowner air leakage sealing does not include a blower door test to quantify leakage levels and to identify the location of air leaks. Homeowners are likely to identify leakage primarily in more visible areas of the envelope, for example, the major leakage at window-to-wall interfaces, around doors (especially patio doors), through electrical and plumbing penetrations and perhaps at the top of foundation walls. Installation of weather stripping, sealant and gaskets are the most likely methods to be used. Less visible sources of air leaks such as pot lights, wall-to-floor interfaces (i.e., top and bottom of baseboards), bathroom and kitchen exhaust piping, and leaks from the top of walls into the attic are less likely to be addressed by the homeowner.	
Baseline:	No action taken	
Upgrade:	A homeowner air sealing job, which results in an air tightness (ACH @ 50 Pa) improvement of 15-20%	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$0.952	$0.952		$0.952	$0.952		$0.952	
Electricity ($/kW)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	
Natural Gas ($/MJ)	$0.010	$0.067	$0.067		$0.067	$0.067		$0.067	
]	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	
Water ($/1000L)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☐	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☐	Mobile (Existing) ☑	Mobile (New) ☐	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	1,152	1,352		700	700		501		1,191	
	Natural Gas (MJ/yr.)	81,113	65,361		45,482	36,932		41,932		68,475	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Upgrade Consumption	Electricity (kWh/yr.)	1,119	1,312		678	680		491		1,157	
	Natural Gas (MJ/yr.)	76,247	61,999		42,753	35,032		39,655		64,670	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%		0%	0%		0%		0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%		0%	0%		0%		0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-		-	-		-		-	
	Electricity, Cooling (kWh/yr.)	-	-		-	-		-		-	
	Electricity, Total (kWh/yr.)	-	-		-	-		-		-	
	Natural Gas (MJ/yr.)	-	-		-	-		-		-	
	Oil (L/yr.)	-	-		-	-		-		-	
Winter Peak Hours-Use Factor		-	-		-	-		-		-	
Resource Savings	Electricity (kWh/yr.)	32	40		21	20		10		34	
	Electricity (kW peak)	-	-		-	-		-		-	
	Natural Gas (MJ/yr.)	4,867	3,361		2,729	1,899		2,276		3,805	3800 MJ from Innes Hood report for LiveSmartBC 2010 business case, March 2010
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Cost Parameters	Upgrade, Material ($)	$200.00	$200.00		$200.00	$200.00		$200.00		$200.00	Innes Hood report for LiveSmartBC 2010 business case, March 2010
	Upgrade, Installation ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	Installation costs included above
	Baseline, Material ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	
	Baseline, Installation ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	
	Total Measure Cost ($)	$200.00	$200.00		$200.00	$200.00		$200.00		$200.00	
	Basis (Full/Incremental)	Full	Full		Full	Full		Full		Full	
Incremental O&M ($/yr.)		$20	$20		$20	$20		$20		$20	Approximate annual cost to maintain weatherstripping, caulking, etc.
Lifetimes	Upgrade (yrs.)	10	10		10	10		10		10	Innes Hood report for LiveSmartBC 2010 business case, March 2010
	Baseline (yrs.)	-	-		-	-		-		-	
Cost Savings ($/yr.)		$30	$16		$9	$0		$3		$20	
Simple Payback (yrs.)		6.6	12.3		23.5	742.3		63.1		72.83	
NPV of O&M Costs ($)		$138	$138		$138	$138		$138		$138	
Total Benefits ($)	Electric Energy	$31	$38		$20	$19		$10		$33	
	Electric Demand	$0	$0		$0	$0		$0		$0	
	Natural Gas	$326	$225		$183	$127		$152		$255	
	Oil	$0	$0		$0	$0		$0		$0	
	Water	$0	$0		$0	$0		$0		$0	
Measure TRC ($)		$19	-$75		-$135	-$192		-$176		-$51	
Benefit/Cost Ratio		1.06	0.78		0.60	0.43		0.48		0.85	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1		1	1		1		
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental		Incremental	Incremental		Incremental		
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	5.1%	4.6%		5.1%	4.6%		4.9%		4.8%	Based on ratio of heating savings below to heating savings on Air Sealing tab, times electric savings on Air Sealing tab
Space Cooling	-	1	1	0.3%	0.6%		0.3%	0.6%		0.3%		0.4%	Based on ratio of heating savings below to heating savings on Air Sealing tab, times electric savings on Air Sealing tab
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	6.0%	5.1%		6.0%	5.1%		5.4%		5.5%	3800 MJ from Innes Hood report for LiveSmartBC 2010 business case, March 2010
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	

Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	5.1%	4.6%		5.1%	4.6%		4.9%		4.8%	
Space Cooling	1	1	0.3%	0.6%		0.3%	0.6%		0.3%		0.4%	
Clothes Washers	0	0	-	-		-	-		-		-	
Dishwashers	0	0	-	-		-	-		-		-	
Other Electric Loads	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	6.0%	5.1%		6.0%	5.1%		5.4%		5.5%	
Domestic Hot Water (DHW)	0	0	-	-		-	-		-		-	
Fireplaces	0	0	-	-		-	-		-		-	
Cooking	0	0	-	-		-	-		-		-	
Clothes Dryers	0	0	-	-		-	-		-		-	
Pool and Spa Heaters	0	0	-	-		-	-		-		-	
Other	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-		-	-		-		-	
Domestic Hot Water (DHW)	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

Air Leakage Sealing and Insulation (Old Homes)

		References/Notes
Description:	This measure is targeted at homes that are at least 30 years old, since many of these homes haven't had any work done to improve insulation and air-sealing deficiencies and it is generally most cost-effective to upgrade the insulation and the air sealing at the same time. This includes wall, attic, foundation, and crawlspace retrofits of older homes but, for the purposes of this analysis, it is assumed that a retrofit is being conducted on the attic. The air-sealing portion of the work could be accomplished by segmenting the attic. In each segment, the existing insulation could be moved to one side and polyurethane foam could be sprayed in (serves as an air sealant in addition to its insulating properties). It may also be necessary to install or refurbish top plates to prevent airflow into the attic through exterior wall cavities. Other considerations that would increase the cost of the air-sealing portion of the work and may be present in some homes include sealing pot lights and kitchen or bathroom exhaust piping. When completed, these measures would dramatically improve the air tightness of an older home. The attic insulation could subsequently be cost-effectively improved with cellulose insulation.	
Baseline:	An older home with average air tightness and attic insulation (for that particular vintage)	
Upgrade:	Improve both the attic insulation and the air tightness (ACH@50 Pa) in an old home. It is assumed that the air tightness is improved by 30% and that RSI-3.52 (R-20) of attic insulation is added.	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.553			$1.553				
Electricity ($/kW)	$0.000	$0.000			$0.000				
Natural Gas ($/MJ)	$0.010	$0.127			$0.127				
Oil ($/L)	$0.000	$0.000			$0.000				
Water ($/1000L)	$0.000	$0.000			$0.000				

Sub-sector		Detached (Pre-1976) ✓	Detached (Post-1976)	Detached (New)	Attached (Pre-1976) ✓	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	1,152			700					1,136	
	Natural Gas (MJ/yr.)	81,113			45,482					79,862	
	Oil (L/yr.)	-			-					-	
	Water (L/yr.)	-			-					-	
Upgrade Consumption	Electricity (kWh/yr.)	1,048			632					1,033	
	Natural Gas (MJ/yr.)	67,730			37,977					66,685	
	Oil (L/yr.)	-			-					-	
	Water (L/yr.)	-			-					-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%			0%					0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%			0%					0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-			-					-	
	Electricity, Cooling (kWh/yr.)	-			-					-	
	Electricity, Total (kWh/yr.)	-			-					-	
	Natural Gas (MJ/yr.)	-			-					-	
	Oil (L/yr.)	-			-					-	
Winter Peak Hours-Use Factor		-			-					-	
Resource Savings	Electricity (kWh/yr.)	104			67					103	
	Electricity (kW peak)	-			-					-	
	Natural Gas (MJ/yr.)	13,384			7,505					13,177	
	Oil (L/yr.)	-			-					-	
	Water (L/yr.)	-			-					-	
Cost Parameters	Upgrade, Material ($)	$3,000.00			$2,500.00					$2,982.44	Cost is variable depending on the approach that is used. Estimate is based on recent communication with air sealing and insulation contractors (2010).
	Upgrade, Installation ($)	$0.00			$0.00					$0.00	
	Baseline, Material ($)	$0.00			$0.00					$0.00	
	Baseline, Installation ($)	$0.00			$0.00					$0.00	
	Total Measure Cost ($)	$3,000.00			$2,500.00					$2,982.44	
	Basis (Full/Incremental)	Full			Full					Full	
Incremental O&M ($/yr.)		$20			$20					$20	Approximate annual cost to maintain weather-stripping, caulking, etc.
Lifetimes	Upgrade (yrs.)	25			25					25	Approximate lifetime, based on previous Marbek energy efficiency potential studies
	Baseline (yrs.)	-			-					-	
Cost Savings ($/yr.)		$120			$59					$118	
Simple Payback (yrs.)		25.1			42.3					25.66	
NPV of O&M Costs ($)		$225			$225					$225	
Total Benefits ($)	Electric Energy	$161			$105					$159	
	Electric Demand	$0			$0					$0	
	Natural Gas	$1,700			$953					$1,674	
	Oil	$0			$0					$0	
	Water	$0			$0					$0	
Measure TRC ($)		-$1,364			-$1,667					-$1,375	
Benefit/Cost Ratio		0.58			0.39					0.57	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1			1					
Cost Flag (i.e. way measure is typically applied)	Incremental			Incremental					
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	15.0%			15.0%					15.0%	Based on HOT2000 modeling results of average pre-1976 single detached homes. Assuming savings are similar in attached homes.
Space Cooling	-	1	1	2.5%			2.5%					2.5%	Based on HOT2000 modeling results of average pre-1976 single detached homes. Assuming savings are similar in attached homes.
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	16.5%			16.5%					16.5%	Based on HOT2000 modeling results of average pre-1976 single detached homes. Assuming savings are similar in attached homes.
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment	Applies? (1=Yes; 0=No)	Measure Resource Savings (%)	References/Notes

Main End Use	Use/Equipment (If Applicable)	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	15.0%			15.0%					15.0%	
Space Cooling	1	1	2.5%			2.5%					2.5%	
Clothes Washers	0	0	-			-					-	
Dishwashers	0	0	-			-					-	
Other Electric Loads	0	0	-			-					-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	16.5%			16.5%					16.5%	
Domestic Hot Water (DHW)	0	0	-			-					-	
Fireplaces	0	0	-			-					-	
Cooking	0	0	-			-					-	
Clothes Dryers	0	0	-			-					-	
Pool and Spa Heaters	0	0	-			-					-	
Other	0	0	-			-					-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-			-					-	
Domestic Hot Water (DHW)	0	0	-			-					-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-			-					-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

Zoned-Up Windows: (ENERGY STAR®) Rating for a Colder Zone

		References/Notes
Description:	High-performance windows incorporate a number of additional energy-saving features, including low-E (soft coating), insulating spacers, argon fill and low conductivity frames (which can be sliders, hinged or picture). These windows are certified based on their energy rating (ER), which is based on their tested energy performance, rather than on their specific combination of features. In this case, however, the Energy Star windows for a colder zone are specified instead of the Energy Star windows for the zone where the house is located - for example, Zone C Energy Star windows would be chosen for a house in Zone A. High-performance windows also provide occupant co-benefits, such as reduced interior noise, reduced air leakage, greater thermal comfort, and fewer condensation problems.	
Baseline:	ENERGY STAR windows for Zone A (double glazed, argon fill, low-e coating, insulating spacer, vinyl frame, hinged)	Assuming U-value of at least 2.0 W/m2 K (RSI of 0.5)
Upgrade:	In existing homes, replacing 50% of windows with ENERGY STAR windows from Zone C (double-glazed, argon fill, low-e coating, insulating spacer, vinyl frame, hinged). In hew homes, replacing 100% of windows.	Assuming windows with an approximate U-value of 1.6 W/m2 K (RSI of ~0.63), based on ENERGY STAR requirements for windows.

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.553	$1.553	$1.553	$1.553	$1.553	$1.553	$1.553	$1.553
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.127	$0.127	$0.127	$0.127	$0.127	$0.127	$0.127	$0.127
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	1,152	1,352	1,298	700	700	672	501	482	1,157	
	Natural Gas (MJ/yr.)	81,113	65,361	65,361	45,482	36,932	36,932	41,932	41,932	63,046	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	1,131	1,318	1,243	687	683	644	492	465	1,120	
	Natural Gas (MJ/yr.)	79,167	63,138	61,700	44,390	35,676	34,863	40,674	39,583	60,435	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	21	34	55	13	17	28	10	17	37	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	1,947	2,222	3,660	1,092	1,256	2,068	1,258	2,348	2,612	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$8,000.00	$9,600.00	$20,800.00	$6,400.00	$7,680.00	$16,640.00	$5,760.00	$12,800.00	$14,131.13	BCH program cost estimates are $1000 to $2000 per house, depending on number of windows done and number of Zones up. To match these numbers, we used $64/ft^2.
	Upgrade, Installation ($)	$1,875.00	$2,250.00	$4,875.00	$1,500.00	$1,800.00	$3,900.00	$1,350.00	$3,000.00	$3,311.98	Based on personal communication with SAWDAC (Siding and Window Dealers Association of Canada) in 2010, the installation cost of ENERGY STAR windows is about $15/ft^2
	Baseline, Material ($)	$7,000.00	$8,400.00	$18,200.00	$5,600.00	$6,720.00	$14,560.00	$5,040.00	$11,200.00	$12,364.74	Based on personal communication with SAWDAC (Siding and Window Dealers Association of Canada) in 2010, the material cost of ENERGY STAR windows is about $56/ft^2
	Baseline, Installation ($)	$1,875.00	$2,250.00	$4,875.00	$1,500.00	$1,800.00	$3,900.00	$1,350.00	$3,000.00	$3,311.98	Based on personal communication with SAWDAC (Siding and Window Dealers Association of Canada) in 2010, the installation cost of ENERGY STAR windows is about $15/ft^2
	Total Measure Cost ($)	$1,000.00	$1,200.00	$2,600.00	$800.00	$960.00	$2,080.00	$720.00	$1,600.00	$1,766.39	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	25	25	25	25	25	25	25	25	25	Approximate lifetime, based on previous Marbek energy efficiency potential studies and consistent with the market rate of window replacement
	Baseline (yrs.)	25	25	25	25	25	25	25	25	25	Approximate lifetime, based on previous Marbek energy efficiency potential studies
Cost Savings ($/yr.)		$21	$25	$40	$12	$14	$23	$13	$24	$29	
Simple Payback (yrs.)		48.0	48.8	64.4	67.9	69.9	92.1	54.9	65.5	61.10	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$33	$53	$85	$20	$27	$43	$15	$26	$57	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$247	$282	$465	$139	$159	$263	$160	$298	$332	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$720	-$865	-$2,050	-$641	-$774	-$1,774	-$545	-$1,275	-$1,377	
Benefit/Cost Ratio		0.28	0.28	0.21	0.20	0.19	0.15	0.24	0.20	0.23	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	2.4%	3.4%	5.6%	2.4%	3.4%	5.6%	3.0%	5.6%	4.3%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes. Further assuming that savings would scale with new homes (i.e. 100% of windows being replaced versus 50%). Then scaled down the savings: original figures were based on U-value improvement from 4.2 to 2.0, or 52% lower. This improvement from 2 to 1.6 is 20% lower. Therefore, savings percentage 40% of the original percentage is used.
Space Cooling	-	1	1	1.2%	1.2%	2.2%	1.2%	1.2%	2.2%	1.2%	2.2%	1.7%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes. Further assuming that savings would scale with new homes (i.e. 100% of windows being replaced versus 50%). Then scaled down the savings: original figures were based on U-value improvement from 4.2 to 2.0, or 52% lower. This improvement from 2 to 1.6 is 20% lower. Therefore, savings percentage 40% of the original percentage is used.
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	2.4%	3.4%	5.6%	2.4%	3.4%	5.6%	3.0%	5.6%	4.3%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes. Further assuming that savings would scale with new homes (i.e. 100% of windows being replaced versus 50%). Then scaled down the savings: original figures were based on U-value improvement from 4.2 to 2.0, or 52% lower. This improvement from 2 to 1.6 is 20% lower. Therefore, savings percentage 40% of the original percentage is used.
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	

Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	2.4%	3.4%	5.6%	2.4%	3.4%	5.6%	3.0%	5.6%	4.3%	
Space Cooling	1	1	1.2%	1.2%	2.2%	1.2%	1.2%	2.2%	1.2%	2.2%	1.7%	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	2.4%	3.4%	5.6%	2.4%	3.4%	5.6%	3.0%	5.6%	4.3%	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	

Back to Index

Super High-Performance Windows

		References/Notes
Description:	In addition to low-E coating, argon fill and insulating spacers, super-high performance windows incorporate features such as triple glazing, transparent insulating films, and fibreglass frames.	
Baseline:	Standard windows (double glazed, air fill, no coating, metal spacer, vinyl frame, slider with sash)	
Upgrade:	In existing homes, replacing 50% of windows with super high-performance windows (triple-glazed, krypton fill, low-e and insulating coatings, insulating spacer, fiberglass frame, hinged). In new homes, replacing all of the windows with super high-performance windows.	

Baseline Reference:	1. Annual consumption, end use
Heating Fuel Type:	All Fuels (Average Fuel Mix)
Main End Use:	Space Heating
Discount Rate:	7.38%
GHG Adder Incl.?	No
Resource Costs:	Baseload

= User Input
= Calculation

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.553	$1.553	$1.553	$1.553	$1.553	$1.553	$1.553	$1.553
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.127	$0.127	$0.127	$0.127	$0.127	$0.127	$0.127	$0.127
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	1,152	1,352	1,298	700	700	672	501	482	1,157	
	Natural Gas (MJ/yr.)	81,113	65,361	65,361	45,482	36,932	36,932	41,932	41,932	63,046	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	1,059	1,196	1,068	643	620	554	456	398	997	
	Natural Gas (MJ/yr.)	74,219	57,191	53,269	41,616	32,315	30,099	37,738	34,174	54,104	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	92	155	230	56	80	119	46	83	159	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	6,895	8,170	12,092	3,866	4,616	6,832	4,193	7,757	8,942	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$8,250.00	$9,900.00	$21,450.00	$6,600.00	$7,920.00	$17,160.00	$5,940.00	$13,200.00	$14,572.72	Based on personal communication with SAWDAC (Siding and Window Dealers Association of Canada) in 2010, the material cost of super high-performance windows is about $66/ft^2
	Upgrade, Installation ($)	$1,875.00	$2,250.00	$4,875.00	$1,500.00	$1,800.00	$3,900.00	$1,350.00	$3,000.00	$3,311.98	Based on personal communication with SAWDAC (Siding and Window Dealers Association of Canada) in 2010, the installation cost of super high-performance windows is about $15/ft^2
	Baseline, Material ($)	$6,875.00	$8,250.00	$17,875.00	$5,500.00	$6,600.00	$14,300.00	$4,950.00	$11,000.00	$12,143.94	Based on personal communication with SAWDAC (Siding and Window Dealers Association of Canada) in 2010, the material cost of std performance windows is about $55/ft^2
	Baseline, Installation ($)	$1,750.00	$2,100.00	$4,550.00	$1,400.00	$1,680.00	$3,640.00	$1,260.00	$2,800.00	$3,091.18	Based on personal communication with SAWDAC (Siding and Window Dealers Association of Canada) in 2010, the installation cost of std performance windows is about $14/ft^2
	Total Measure Cost ($)	$1,500.00	$1,800.00	$3,900.00	$1,200.00	$1,440.00	$3,120.00	$1,080.00	$2,400.00	$2,649.59	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	25	25	25	25	25	25	25	25	25	Approximate lifetime, based on previous Marbek energy efficiency potential studies
	Baseline (yrs.)	25	25	25	25	25	25	25	25	25	Approximate lifetime, based on previous Marbek energy efficiency potential studies
Cost Savings ($/yr.)		$75	$93	$138	$43	$52	$77	$45	$83	$101	
Simple Payback (yrs.)		19.9	19.4	28.4	28.2	27.8	40.6	24.1	28.9	26.02	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$143	$241	$357	$88	$124	$184	$71	$129	$247	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$876	$1,038	$1,536	$491	$586	$868	$533	$985	$1,136	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$481	-$521	-$2,008	-$621	-$729	-$2,068	-$477	-$1,285	-$1,266	
Benefit/Cost Ratio		0.68	0.71	0.49	0.48	0.49	0.34	0.56	0.46	0.56	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	8.5%	12.5%	18.5%	8.5%	12.5%	18.5%	10.0%	18.5%	14.7%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes. Further assuming that savings would scale with new homes (i.e. 100% of windows being replaced versus 50%)
Space Cooling	-	1	1	7.5%	10.0%	16.5%	7.5%	10.0%	16.5%	8.5%	16.5%	12.7%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes. Further assuming that savings would scale with new homes (i.e. 100% of windows being replaced versus 50%)
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	8.5%	12.5%	18.5%	8.5%	12.5%	18.5%	10.0%	18.5%	14.7%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes. Further assuming that savings would scale with new homes (i.e. 100% of windows being replaced versus 50%)
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	8.5%	12.5%	18.5%	8.5%	12.5%	18.5%	10.0%	18.5%	14.7%	
Space Cooling	1	1	7.5%	10.0%	16.5%	7.5%	10.0%	16.5%	8.5%	16.5%	12.7%	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	8.5%	12.5%	18.5%	8.5%	12.5%	18.5%	10.0%	18.5%	14.7%	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

High-Performance Homes (EGH 80/R2000/ENERGY STAR®)

Not used--EGH 80 is now the minimum

		References/Notes
Description:	There are several certification schemes for energy-efficient new homes that incorporate integrated design and multiple envelope measures. An EnerGuide for Houses (EGH) rating is a standard measure of a home's energy performance, calculated by a professional EGH advisor. The rating is based on information on the construction of the home and the results of a blower door test performed once the house has been built. The R2000 standard is one method of achieving an EGH 80 rating. However, R2000 homes are required to achieve an air tightness level of 1.5 ACH@50Pa, install a heat recovery ventilator (HRV), and meet other environmental requirements. This substantially increases the cost of the measure. The ENERGY STAR® for New Homes program has similar requirements and also requires that homes be rated EGH 80. Since these three high performance home standards all result in essentially the same energy performance, the costs assumed for the measure are those of the least expensive of the three. EGH 80 is the lowest cost, since it allows the builder the most flexibitility for achieving the energy performance.	
Baseline:	An average new home (EGH rating of 76 assumed)	
Upgrade:	A high-performance new home (EGH rating of 80 assumed). This option no longer applies as EGH of 80 is now the minimum.	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083			$1.648			$1.648		$1.648
Electricity ($/kW)	$0.000			$0.000			$0.000		$0.000
Natural Gas ($/MJ)	$0.010			$0.139			$0.139		$0.139
Oil ($/L)	$0.000			$0.000			$0.000		$0.000
Water ($/1000L)	$0.000			$0.000			$0.000		$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New) ☑	Attached (Pre-1976)	Attached (Post-1976)	Attached (New) ☑	Mobile (Existing)	Mobile (New) ☑	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)			-			-		-	-	
	Natural Gas (MJ/yr.)			-			-		-	-	
	Oil (L/yr.)			-			-		-	-	
	Water (L/yr.)			-			-		-	-	
Upgrade Consumption	Electricity (kWh/yr.)			-			-		-	-	
	Natural Gas (MJ/yr.)			-			-		-	-	
	Oil (L/yr.)			-			-		-	-	
	Water (L/yr.)			-			-		-	-	
Interactive Effects (Inputs)	Heating Penalty ☐			0%			0%		0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐			0%			0%		0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)			-			-		-	-	
	Electricity, Cooling (kWh/yr.)			-			-		-	-	
	Electricity, Total (kWh/yr.)			-			-		-	-	
	Natural Gas (MJ/yr.)			-			-		-	-	
	Oil (L/yr.)			-			-		-	-	
Winter Peak Hours-Use Factor				-			-		-	-	
Resource Savings	Electricity (kWh/yr.)			-			-		-	-	
	Electricity (kW peak)			-			-		-	-	
	Natural Gas (MJ/yr.)			-			-		-	-	
	Oil (L/yr.)			-			-		-	-	
	Water (L/yr.)			-			-		-	-	
Cost Parameters	Upgrade, Material ($)			$6,000.00			$4,800.00		$0.00	$5,577.06	Based on cost estimates for Saskatchewan homes from Rob Dumont (Dumont and Associates) and Dave Fetsch (Sun Ridge Group). Assuming cost scales to 80% for attached homes. Need value for mobile homes.
	Upgrade, Installation ($)			$0.00			$0.00		$0.00	$0.00	
	Baseline, Material ($)			$0.00			$0.00		$0.00	$0.00	
	Baseline, Installation ($)			$0.00			$0.00		$0.00	$0.00	
	Total Measure Cost ($)			$6,000.00			$4,800.00		$0.00	$5,577.06	
	Basis (Full/Incremental)			Full			Full		Full	Full	
Incremental O&M ($/yr.)				$0			$0		$0	$0	
Lifetimes	Upgrade (yrs.)			30			30		30	30	Approximate lifetime, based on previous Marbek energy efficiency potential studies
	Baseline (yrs.)			30			30		30	30	
Cost Savings ($/yr.)				$0			$0		$0	$0	
Simple Payback (yrs.)				N/A			N/A		N/A	0.00	
NPV of O&M Costs ($)				$0			$0		$0	$0	
Total Benefits ($)	Electric Energy			$0			$0		$0	$0	
	Electric Demand			$0			$0		$0	$0	
	Natural Gas			$0			$0		$0	$0	
	Oil			$0			$0		$0	$0	
	Water			$0			$0		$0	$0	
Measure TRC ($)				-$6,000			-$4,800		$0	-$5,577	
Benefit/Cost Ratio				0.00			0.00		0.00	0.00	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed			1			1		1	
Cost Flag (i.e. way measure is typically applied)			Incremental			Incremental		Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No) Baseline	Upgrade	Measure Resource Savings (%) Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	Standard EGH rating assumes no space cooling
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No) Baseline	Upgrade	Measure Resource Savings (%) Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No) Baseline	Upgrade	Measure Resource Savings (%) Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	

Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	**Sub End Use/Equipment (If Applicable)**	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
		Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Ventilation and Circulation	0	0			-			-		-	-	
Space Cooling	0	0			-			-		-	-	
Clothes Washers	0	0			-			-		-	-	
Dishwashers	0	0			-			-		-	-	
Other Electric Loads	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Space Heating	0	0			-			-		-	-	
Domestic Hot Water (DHW)	0	0			-			-		-	-	
Fireplaces	0	0			-			-		-	-	
Cooking	0	0			-			-		-	-	
Clothes Dryers	0	0			-			-		-	-	
Pool and Spa Heaters	0	0			-			-		-	-	
Other	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Space Heating	0	0			-			-		-	-	
Domestic Hot Water (DHW)	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Water	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

Net-Zero Ready Energy Homes

		References/Notes
Description:	Net-zero energy homes (NZEH) produce at least as much energy as they consume. This is accomplished by incorporating on-site power generation, such as solar PV panels or small wind turbines, to offset electrical loads. However, the energy consumption of a NZEH is significantly lower, due to the addition of a wide array of energy efficiency features. Measures that are typically considered include increased insulation, super high-performance windows, ENERGY STAR® appliances, solar thermal space and/or water heating, heat pumps, and passive solar designs. This measure is designed to produce a highly efficient house that is ready to be turned into a NZEH with the addition of on-site renewable energy generation.	
Baseline:	An average new home (Minimum EGH rating of 80 required)	
Upgrade:	A net-zero energy ready home (EGH rating of 86 assumed)	

Baseline Reference:	1. Annual consumption, end use
Heating Fuel Type:	All Fuels (Average Fuel Mix)
Main End Use:	Space Heating
Discount Rate:	7.38%
GHG Adder Incl.?	No
Resource Costs:	Baseload

= User Input
= Calculation

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083			$1.648			$1.648		$1.648
Electricity ($/kW)	$0.000			$0.000			$0.000		$0.000
Natural Gas ($/MJ)	$0.010			$0.139			$0.139		$0.139
Oil ($/L)	$0.000			$0.000			$0.000		$0.000
Water ($/1000L)	$0.000			$0.000			$0.000		$0.000

Sub-sector		Detached (Pre-1976) ☐	Detached (Post-1976) ☐	Detached (New) ☑	Attached (Pre-1976) ☐	Attached (Post-1976) ☐	Attached (New) ☑	Mobile (Existing) ☐	Mobile (New) ☑	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)			768			384		189	659	
	Natural Gas (MJ/yr.)			86,422			55,681		60,300	78,033	
	Oil (L/yr.)			-			-		-	-	
	Water (L/yr.)			-			-		-	-	
Upgrade Consumption	Electricity (kWh/yr.)			538			269		132	461	
	Natural Gas (MJ/yr.)			60,495			38,977		42,210	54,623	
	Oil (L/yr.)			-			-		-	-	
	Water (L/yr.)			-			-		-	-	
Interactive Effects (Inputs)	Heating Penalty ☐			0%			0%		0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐			0%			0%		0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)			-			-		-	-	
	Electricity, Cooling (kWh/yr.)			-			-		-	-	
	Electricity, Total (kWh/yr.)			-			-		-	-	
	Natural Gas (MJ/yr.)			-			-		-	-	
	Oil (L/yr.)			-			-		-	-	
Winter Peak Hours-Use Factor				-			-		-	-	
Resource Savings	Electricity (kWh/yr.)			230			115		57	198	
	Electricity (kW peak)			-			-		-	-	
	Natural Gas (MJ/yr.)			25,926			16,704		18,090	23,410	
	Oil (L/yr.)			-			-		-	-	
	Water (L/yr.)			-			-		-	-	
Cost Parameters	Upgrade, Material ($)			$14,000.00			$9,800.00		$9,800.00	$12,841.81	Working value of $14,000 based on NRCan's R-2000 renewal work (personal communication with Anil Parekh, Nov. 25, 2010). Assumed that cost scales by 75% for detached and mobile homes.
	Upgrade, Installation ($)			$0.00			$0.00		$0.00	$0.00	
	Baseline, Material ($)			$0.00			$0.00		$0.00	$0.00	
	Baseline, Installation ($)			$0.00			$0.00		$0.00	$0.00	
	Total Measure Cost ($)			$14,000.00			$9,800.00		$9,800.00	$12,841.81	
	Basis (Full/Incremental)			Full			Full		Full	Full	
Incremental O&M ($/yr.)				$0			$0		$0	$0	
Lifetimes	Upgrade (yrs.)			30			30		30	30	Maximum lifetime used in study.
	Baseline (yrs.)			30			30		30	30	
Cost Savings ($/yr.)				$273			$173		$182	$246	
Simple Payback (yrs.)				51.3			56.6		53.9	52.67	
NPV of O&M Costs ($)				$0			$0		$0	$0	
Total Benefits ($)	Electric Energy			$380			$190		$93	$326	
	Electric Demand			$0			$0		$0	$0	
	Natural Gas			$3,606			$2,323		$2,516	$3,256	
	Oil			$0			$0		$0	$0	
	Water			$0			$0		$0	$0	
Measure TRC ($)				-$10,014			-$7,287		-$7,191	-$9,260	
Benefit/Cost Ratio				0.28			0.26		0.27	0.28	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed			1			1		1	
Cost Flag (i.e. way measure is typically applied)			Incremental			Incremental		Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1			30.0%			30.0%		30.0%	30.0%	Going from EGH 80 to EGH 86 represents a savings of 30%. It is assumed that all major end uses are affected equally.
Space Cooling	-	0	0									-	Standard EGH rating assumes no space cooling
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1			30.0%			30.0%		30.0%	30.0%	Going from EGH 80 to EGH 86 represents a savings of 30%. It is assumed that all major end uses are affected equally.
Domestic Hot Water (DHW)	-	1	1			30.0%			30.0%		30.0%	30.0%	Going from EGH 80 to EGH 86 represents a savings of 30%. It is assumed that all major end uses are affected equally.
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	

Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1			30.0%			30.0%		30.0%	30.0%	
Space Cooling	0	0			-			-		-	-	
Clothes Washers	0	0			-			-		-	-	
Dishwashers	0	0			-			-		-	-	
Other Electric Loads	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1			30.0%			30.0%		30.0%	30.0%	
Domestic Hot Water (DHW)	1	1			30.0%			30.0%		30.0%	30.0%	
Fireplaces	0	0			-			-		-	-	
Cooking	0	0			-			-		-	-	
Clothes Dryers	0	0			-			-		-	-	
Pool and Spa Heaters	0	0			-			-		-	-	
Other	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0			-			-		-	-	
Domestic Hot Water (DHW)	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

High Efficiency Condensing Gas Furnaces

		References/Notes
Description:	Federal legislation now requires that all residential furnaces meet the minimum performance standard of 90% AFUE . However, higher efficiency condensing furnaces are available. These furnaces include more advanced heat exchanger designs that extract more heat from the flue gases before they are exhausted.	
Baseline:	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 90%	BC minimum
Upgrade:	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 96%	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	81,113	65,361	65,361	45,482	36,932	36,932	41,932	41,932	63,046	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	76,003	61,243	61,243	42,617	34,605	34,605	39,290	39,290	59,074	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	5,110	4,118	4,118	2,865	2,327	2,327	2,642	2,642	3,972	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$4,667.00	$4,667.00	$4,667.00	$4,667.00	$4,667.00	$4,667.00	$4,667.00	$4,667.00	$4,667.00	Cost of a 96% AFUE gas furnace, based on Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-41, April 16, 2009.
	Upgrade, Installation ($)	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	Approximate installation cost
	Baseline, Material ($)	$3,190.00	$3,190.00	$3,190.00	$3,190.00	$3,190.00	$3,190.00	$3,190.00	$3,190.00	$3,190.00	Cost of a 90% AFUE gas furnace, based on Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-41, April 16, 2009.
	Baseline, Installation ($)	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	Approximate installation cost
	Total Measure Cost ($)	$1,477.00	$1,477.00	$1,477.00	$1,477.00	$1,477.00	$1,477.00	$1,477.00	$1,477.00	$1,477.00	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	18	18	18	18	18	18	18	18	18	Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-41, April 16, 2009.
	Baseline (yrs.)	18	18	18	18	18	18	18	18	18	Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-41, April 16, 2009.
Cost Savings ($/yr.)		$50	$40	$40	$28	$23	$23	$26	$26	$39	
Simple Payback (yrs.)		29.5	36.6	36.6	52.6	64.8	64.8	57.1	57.1	40.50	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$534	$431	$431	$300	$243	$243	$276	$276	$415	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$943	-$1,046	-$1,046	-$1,177	-$1,234	-$1,234	-$1,201	-$1,201	-$1,062	
Benefit/Cost Ratio		0.36	0.29	0.29	0.20	0.16	0.16	0.19	0.19	0.28	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	96% AFUE versus 90% AFUE
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	

Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Early Retirement of Existing Gas Furnaces

Description:	Federal legislation now requires that all residential furnaces meet the minimum performance standard of 90% AFUE . However, consumers with less efficient furnaces that still work may wait years before replacing them. Early retirement of existing furnaces that are still functional is an option. Energy savings only last until the old furnace would have been replaced, because after that the energy consumption of the base case and upgrade is the same. The consumer has the added peace of mind of having a new furnace that is less likely to break down in winter.
Baseline:	Keep existing 77% efficient furnace until failure, assumed to be in 9 years; then replace with the same furnace as the upgrade
Upgrade:	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 90%

Baseline Reference:	1. Annual consumption, end use
Heating Fuel Type:	All Fuels (Average Fuel Mix)
Main End Use:	Space Heating
Discount Rate:	7.38%
GHG Adder Incl.?	No
Resource Costs:	Baseload

= User Input
= Calculation

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$0.884	$0.884		$0.884	$0.884		$0.884	
Electricity ($/kW)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	
Natural Gas ($/MJ)	$0.010	$0.061	$0.061		$0.061	$0.061		$0.061	
Oil ($/L)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	
Water ($/1000L)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☐	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☐	Mobile (Existing) ☑	Mobile (New) ☐	Weighted Avg.
Baseline Consumption	Electricity (kWh/yr.)	-	-		-	-		-		-
	Natural Gas (MJ/yr.)	81,113	65,361		45,482	36,932		41,932		68,475
	Oil (L/yr.)	-	-		-	-		-		-
	Water (L/yr.)	-	-		-	-		-		-
Upgrade Consumption	Electricity (kWh/yr.)	-	-		-	-		-		-
	Natural Gas (MJ/yr.)	69,397	55,920		38,912	31,597		35,875		58,584
	Oil (L/yr.)	-	-		-	-		-		-
	Water (L/yr.)	-	-		-	-		-		-
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%		0%	0%		0%		0%
	Cooling Benefits ☐	0%	0%		0%	0%		0%		0%
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-		-	-		-		-
	Electricity, Cooling (kWh/yr.)	-	-		-	-		-		-
	Electricity, Total (kWh/yr.)	-	-		-	-		-		-
	Natural Gas (MJ/yr.)	-	-		-	-		-		-
	Oil (L/yr.)	-	-		-	-		-		-
Winter Peak Hours-Use Factor		-	-		-	-		-		-
Resource Savings	Electricity (kWh/yr.)	-	-		-	-		-		-
	Electricity (kW peak)	-	-		-	-		-		-
	Natural Gas (MJ/yr.)	11,716	9,441		6,570	5,335		6,057		9,891
	Oil (L/yr.)	-	-		-	-		-		-
	Water (L/yr.)	-	-		-	-		-		-
	Upgrade, Material ($)	$3,190.00	$3,190.00		$3,190.00	$3,190.00		$3,190.00		$3,190.00
	Upgrade, Installation ($)	$750.00	$750.00		$750.00	$750.00		$750.00		$750.00

Cost Parameters	**Baseline, Material ($)**	$1,680.66	$1,680.66		$1,680.66	$1,680.66		$1,680.66		$1,680.66
	Baseline, Installation ($)	$395.14	$395.14		$395.14	$395.14		$395.14		$395.14
	Total Measure Cost ($)	$1,864.20	$1,864.20		$1,864.20	$1,864.20		$1,864.20		$1,864.20
	Basis (Full/Incremental)	Incr.	Incr.		Incr.	Incr.		Incr.		Incr.
Incremental O&M ($/yr.)		$0	$0		$0	$0		$0		$0
Lifetimes	**Upgrade (yrs.)**	9	9		9	9		9		9
	Baseline (yrs.)	9	9		9	9		9		9
Cost Savings ($/yr.)		$115	$93		$64	$52		$59		$97
Simple Payback (yrs.)		16.2	20.1		29.0	35.7		31.4		20.25
NPV of O&M Costs ($)		$0	$0		$0	$0		$0		$0
Total Benefits ($)	**Electric Energy**	$0	$0		$0	$0		$0		$0
	Electric Demand	$0	$0		$0	$0		$0		$0
	Natural Gas	$715	$576		$401	$326		$370		$604
	Oil	$0	$0		$0	$0		$0		$0
	Water	$0	$0		$0	$0		$0		$0
Measure TRC ($)		-$1,149	-$1,288		-$1,463	-$1,538		-$1,494		-$1,260
Benefit/Cost Ratio		0.38	0.31		0.22	0.17		0.20		0.32

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

Condensing Gas Boilers

		References/Notes
Description:	High-efficiency condensing boilers feature advanced heat exchanger designs that extract more heat from the flue gases before they are exhausted. So much heat is extracted that the flue gases condense and must be discharged as a condensate rather than a gas. In retrofit applications where condensing boilers are replacing non-condensing units, it may be necessary to modify the radiating system. Otherwise, the units may not actually condense the flue gas and realize their full efficiency potential.	
Baseline:	A non-condensing mid-efficiency natural gas boiler (82% AFUE assumed)	Minimum proposed standard for gas boilers, to take effect on Sept. 1, 2010 - Link.
Upgrade:	A condensing natural gas boiler (92% AFUE assumed)	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	81,113	65,361	65,361	45,482	36,932	36,932	41,932	41,932	63,046	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	72,272	58,236	58,236	40,524	32,906	32,906	37,361	37,361	56,174	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	8,841	7,124	7,124	4,958	4,026	4,026	4,571	4,571	6,872	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$8,200.00	$8,200.00	$8,200.00	$8,200.00	$8,200.00	$8,200.00	$8,200.00	$8,200.00	$8,200.00	Needs to be updated
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Installation costs included above
	Baseline, Material ($)	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	Needs to be updated
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Installation costs included above
	Total Measure Cost ($)	$3,200.00	$3,200.00	$3,200.00	$3,200.00	$3,200.00	$3,200.00	$3,200.00	$3,200.00	$3,200.00	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	20	20	20	20	20	20	20	20	20	Needs to be updated
	Baseline (yrs.)	20	20	20	20	20	20	20	20	20	Needs to be updated
Cost Savings ($/yr.)		$87	$70	$70	$49	$39	$39	$45	$45	$67	
Simple Payback (yrs.)		36.9	45.8	45.8	65.9	81.1	81.1	71.4	71.4	50.72	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$988	$796	$796	$554	$450	$450	$511	$511	$768	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$2,212	-$2,404	-$2,404	-$2,646	-$2,750	-$2,750	-$2,689	-$2,689	-$2,432	
Benefit/Cost Ratio		0.31	0.25	0.25	0.17	0.14	0.14	0.16	0.16	0.24	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	10.9%	10.9%	10.9%	10.9%	10.9%	10.9%	10.9%	10.9%	10.9%	92% AFUE versus 82% AFUE
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	

Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	10.9%	10.9%	10.9%	10.9%	10.9%	10.9%	10.9%	10.9%	10.9%	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

High Efficiency Gas Fireplaces

		References/Notes
Description:	All vented gas fireplaces sold in Canada must now be tested for their energy efficiency using the Canadian Standards Association CSA-P.4.1-02 standard if they are shipped across provincial lines. The energy-efficiency rating of the fireplace is printed on the EnerGuide label. EnerGuide does not set a minimum efficiency level, so savings are possible by using the EnerGuide label to choose the more efficient unit.	
Baseline:	An average efficiency natural gas fireplace (60% assumed)	NRCan data, obtained via personal communication, 2008
Upgrade:	A high efficiency natural gas fireplace (80% assumed)	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.226	$1.226	$1.226	$1.226	$1.226	$1.226	$1.226	$1.226
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.092	$0.092	$0.092	$0.092	$0.092	$0.092	$0.092	$0.092
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	25,833	25,833	25,833	15,709	15,709	15,709	15,389	15,389	23,833	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	19,374	19,374	19,374	11,781	11,781	11,781	11,542	11,542	17,875	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	6,458	6,458	6,458	3,927	3,927	3,927	3,847	3,847	5,958	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$150.00	$150.00	$150.00	$150.00	$150.00	$150.00	$150.00	$150.00	$150.00	Previous analyses have suggested that the cost of gas fireplaces has more to do with "add-ons" (e.g., mantles, etched glass, etc.) than with efficiency. An incremental cost of $150 is assumed for higher-efficiency models, based on a discussion 22 Nov 2010 with Paul Miles of Miles Industries.
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$150.00	$150.00	$150.00	$150.00	$150.00	$150.00	$150.00	$150.00	$150.00	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Set to incremental
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	15	15	15	15	15	15	15	15	15	Lifetime based on previous energy efficiency potential studies conducted by Marbek
	Baseline (yrs.)	15	15	15	15	15	15	15	15	15	Lifetime based on previous energy efficiency potential studies conducted by Marbek
Cost Savings ($/yr.)		$63	$63	$63	$38	$38	$38	$38	$38	$58	
Simple Payback (yrs.)		2.4	2.4	2.4	3.9	3.9	3.9	4.0	4.0	2.67	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$596	$596	$596	$362	$362	$362	$355	$355	$550	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		$446	$446	$446	$212	$212	$212	$205	$205	$400	
Benefit/Cost Ratio		3.97	3.97	3.97	2.42	2.42	2.42	2.37	2.37	3.67	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	1	1	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	Improvement from average efficiency of 60% to 80%.
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	

Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	1	1	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Programmable Thermostats (Central Heating and Cooling)

		References/Notes
Description:	Digital programmable thermostats provide improved temperature setting accuracy and allow occupants to preset temperatures for various time periods. A 4ºC temperature setback is often assumed during night and unoccupied periods. However, utility studies have indicated that a lower average setback value should be used to reflect the fact that the thermostat's setback capabilities do not completely reflect how they are used. For example, some home occupants reliably set back manual thermostats while others do not use the setback features on their electronic thermostats.	
Baseline:	Non-programmable thermostat installed on central forced-air natural gas furnace and electric space cooling system	
Upgrade:	Programmable thermostat installed on central forced-air natural gas furnace and electric space cooling system	

Baseline Reference:	1. Annual consumption, end use
Heating Fuel Type:	All Fuels (Average Fuel Mix)
Main End Use:	Space Heating
Discount Rate:	7.38%
GHG Adder Incl.?	No
Resource Costs:	Baseload

= User Input
= Calculation

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.015	$1.015	$1.015	$1.015	$1.015	$1.015	$1.015	$1.015
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.073	$0.073	$0.073	$0.073	$0.073	$0.073	$0.073	$0.073
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	1,152	1,352	1,298	700	700	672	501	482	1,157	
	Natural Gas (MJ/yr.)	81,113	65,361	65,361	45,482	36,932	36,932	41,932	41,932	63,046	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	1,131	1,329	1,277	688	688	661	491	472	1,137	
	Natural Gas (MJ/yr.)	75,841	61,112	61,112	42,526	34,531	34,531	39,206	39,206	58,948	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	21	22	22	12	12	11	10	10	20	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	5,272	4,248	4,248	2,956	2,401	2,401	2,726	2,726	4,098	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	Based on a retail scan of p-stats designed for central space heating and cooling (Home Depot, 2010)
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Assume that homeowners are able to install programmable thermostats on their own
	Baseline, Material ($)	$25.00	$25.00	$25.00	$25.00	$25.00	$25.00	$25.00	$25.00	$25.00	Based on a retail scan of manual thermostats designed for central space heating and cooling (Home Depot, 2010)
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Assume that homeowners are able to install thermostats on their own
	Total Measure Cost ($)	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	11	11	11	11	11	11	11	11	11	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 327, January 2010.
	Baseline (yrs.)	11	11	11	11	11	11	11	11	11	Assume similar lifetime for non-programmable thermostats
Cost Savings ($/yr.)		$53	$43	$43	$30	$25	$24	$28	$28	$42	
Simple Payback (yrs.)		0.9	1.1	1.2	1.7	2.0	2.0	1.8	1.8	1.28	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$21	$23	$22	$12	$12	$12	$11	$10	$20	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$383	$308	$308	$215	$174	$174	$198	$198	$297	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		$354	$281	$280	$177	$136	$136	$158	$158	$267	
Benefit/Cost Ratio		8.08	6.62	6.60	4.53	3.73	3.72	4.17	4.16	6.35	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	Assuming only night setback to 18°C (conservative estimate). Savings based on NRC, "The effects of thermostat set-back and set-up on seasonal energy consumption, surface temperatures and recovery times at the CCHT Twin House Facility", ASHRAE Transactions, v. 113, pt. 1, p. 5, 2007. Savings are conservative because testing was in R-2000 homes.
Space Cooling	-	1	1	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	Assuming day set-up to 25°C and low solar gains (conservative). Savings based on NRC, "The effects of thermostat set-back and set-up on seasonal energy consumption, surface temperatures and recovery times at the CCHT Twin House Facility", ASHRAE Transactions, v. 113, pt. 1, p. 8, 2007.
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	Assuming only night setback to 18°C (conservative estimate). Savings based on NRC, "The effects of thermostat set-back and set-up on seasonal energy consumption, surface temperatures and recovery times at the CCHT Twin House Facility", ASHRAE Transactions, v. 113, pt. 1, p. 5, 2007. Savings are conservative because testing was in R-2000 homes.
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment	Applies? (1=Yes; 0=No)	Measure Resource Savings (%)	References/Notes

Main End Use	Use/Equipment (If Applicable)	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	
Space Cooling	1	1	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Water

											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

Solar Pre-Heated Make-Up Air Systems (e.g., SolarWall®)

		References/Notes
Description:	Solar preheated ventilation systems preheat incoming ventilation air and reduce heat loss through the portion of the building shell covered by them. They consist of perforated steel or aluminum absorber sheets that are mounted vertically on a building's exterior surface and are ideally mounted on southerly facing walls, plus or minus 20 degrees. The dark coloured metal sheets that make up the system are mounted a small distance away from the building's surface, creating an air cavity. A negative pressure is created within the cavity by ventilation fans and air is drawn through small holes in the metal panels. On sunny winter days, these systems can raise incoming air temperatures by 25°C to 35°C. In summer months, ventilation air can be drawn directly from the outside through a bypass damper, while heated air is rejected through vents at the top of the air cavity. These systems are generally used in commercial and industrial applications but they have seen some limited residential use.	
Baseline:	Homes with ducting and heat recovery ventilators (HRVs)	
Upgrade:	A 10 m2 solar pre-heated make-up air system, located on the south side of a home	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.648	$1.648	$1.648	$1.648	$1.648	$1.648	$1.648	$1.648
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.139	$0.139	$0.139	$0.139	$0.139	$0.139	$0.139	$0.139
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	600	800	768	400	400	384	196	189	664	
	Natural Gas (MJ/yr.)	81,113	65,361	65,361	45,482	36,932	36,932	41,932	41,932	63,046	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	586	782	751	391	391	375	192	184	649	
	Natural Gas (MJ/yr.)	79,248	63,857	63,857	44,436	36,082	36,082	40,967	40,967	61,596	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	14	18	18	9	9	9	5	4	15	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	1,866	1,503	1,503	1,046	849	849	964	964	1,450	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$845.00	$845.00	$845.00	$845.00	$845.00	$845.00	$845.00	$845.00	$845.00	Based on private communication with Conserval, installed cost is about $130/m^2 - asumming 65% for material.
	Upgrade, Installation ($)	$455.00	$455.00	$455.00	$455.00	$455.00	$455.00	$455.00	$455.00	$455.00	Based on private communication with Conserval, installed cost is about $130/m^2 - asumming 35% for labour.
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$1,300.00	$1,300.00	$1,300.00	$1,300.00	$1,300.00	$1,300.00	$1,300.00	$1,300.00	$1,300.00	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	40	40	40	40	40	40	40	40	40	Personal communication, D McClenahan, NRCan, #### (year?)
	Baseline (yrs.)	-	-	-	-	-	-	-	-	-	
Cost Savings ($/yr.)		$19	$16	$16	$11	$9	$9	$10	$10	$15	
Simple Payback (yrs.)		66.9	80.0	80.3	118.0	143.1	143.6	132.3	132.5	89.59	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$23	$30	$29	$15	$15	$15	$7	$7	$25	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$259	$209	$209	$145	$118	$118	$134	$134	$202	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$1,018	-$1,061	-$1,062	-$1,139	-$1,167	-$1,167	-$1,158	-$1,159	-$1,073	
Benefit/Cost Ratio		0.22	0.18	0.18	0.12	0.10	0.10	0.11	0.11	0.17	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	Past Marbek work indicates approximately a 13% savings due to an HRV. An Enermodal paper indicates that a combined Solar Wall and HRV together would have a savings of 15%. This is a 2.3% savings.
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	See note above.
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heater	-	0	0									-	
Pool and Spa Heater	Pool Heaters	0	0									-	
Pool and Spa Heater	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	

Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

High Efficiency Heat Recovery Ventilators (HRVs)

		References/Notes
Description:	Heat recovery ventilators (HRVs) are heat exchangers that are integrated into the centralized ventilation and exhaust systems of many newer homes. In the winter, they allow for incoming fresh air to be heated by outgoing stale air. Conversely, in homes with central air conditioning systems, they allow incoming fresh air to be cooled by outgoing stale air in the summer. High efficiency HRVs incorporate more effective heat exchangers. Some models also include desiccant wheels so that latent heat (i.e. humidity) can be transferred between the two air streams.	
Baseline:	A standard-efficiency (sensible efficiency of approximately 70%) heat recovery ventilator (HRV), in a home with central heating and cooling	
Upgrade:	A high-efficiency heat recovery ventilator (HRV) (sensible efficiency of approximately 85%), in a home with central heating and cooling	

Baseline Reference:	1. Annual consumption, end use
Heating Fuel Type:	All Fuels (Average Fuel Mix)
Main End Use:	Space Heating
Discount Rate:	7.38%
GHG Adder Incl.?	No
Resource Costs:	Baseload

= User Input
= Calculation

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.226	$1.226	$1.226	$1.226	$1.226	$1.226	$1.226	$1.226
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/m^3)	$0.010	$0.092	$0.092	$0.092	$0.092	$0.092	$0.092	$0.092	$0.092
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☑	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☑	Mobile (Existing) ☑	Mobile (New) ☑	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	1,152	1,352	1,298	700	700	672	501	482	1,157	
	Natural Gas (m3/yr.)	81,113	65,361	65,361	45,482	36,932	36,932	41,932	41,932	63,046	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	1,122	1,316	1,264	682	682	655	488	469	1,127	
	Natural Gas (m3/yr.)	79,005	63,661	63,661	44,299	35,971	35,971	40,841	40,841	61,407	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	30	35	34	18	18	17	13	13	30	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Nat. Gas (m3/yr.)	2,109	1,699	1,699	1,183	960	960	1,090	1,090	1,639	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$1,600.00	$1,600.00	$1,600.00	$1,600.00	$1,600.00	$1,600.00	$1,600.00	$1,600.00	$1,600.00	Based on 2010 cost estimates for Saskatchewan homes from Rob Dumont (Dumont and Associates) and Dave Fetsch (Sun Ridge Group).
	Upgrade, Installation ($)	$800.00	$800.00	$800.00	$800.00	$800.00	$800.00	$800.00	$800.00	$800.00	Based on 2010 cost estimates for Saskatchewan homes from Rob Dumont (Dumont and Associates) and Dave Fetsch (Sun Ridge Group). Installation cost is very dependant on the home and accessibility within it.
	Baseline, Material ($)	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	Based on 2010 cost estimates for Saskatchewan homes from Rob Dumont (Dumont and Associates) and Dave Fetsch (Sun Ridge Group).
	Baseline, Installation ($)	$800.00	$800.00	$800.00	$800.00	$800.00	$800.00	$800.00	$800.00	$800.00	Based on 2010 cost estimates for Saskatchewan homes from Rob Dumont (Dumont and Associates) and Dave Fetsch (Sun Ridge Group). Installation cost is very dependant on the home and accessibility within it.
	Total Measure Cost ($)	$600.00	$600.00	$600.00	$600.00	$600.00	$600.00	$600.00	$600.00	$600.00	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	15	15	15	15	15	15	15	15	15	E Source Heating Technology Atlas. Also used in previous energy efficiency potential studies by Marbek. Most manufacturers provide limited lifetime warranties on HRV cores.
	Baseline (yrs.)	15	15	15	15	15	15	15	15	15	E Source Heating Technology Atlas. Also used in previous energy efficiency potential studies by Marbek. Most manufacturers provide limited lifetime warranties on HRV cores.
Cost Savings ($/yr.)		$23	$20	$19	$13	$11	$11	$12	$12	$19	
Simple Payback (yrs.)		25.9	30.7	30.9	45.8	55.0	55.3	51.0	51.2	34.48	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$37	$43	$41	$22	$22	$21	$16	$15	$37	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$195	$157	$157	$109	$89	$89	$101	$101	$151	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$369	-$400	-$402	-$469	-$489	-$490	-$483	-$484	-$412	
Benefit/Cost Ratio		0.39	0.33	0.33	0.22	0.18	0.18	0.19	0.19	0.31	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	Based on previous Marbek analyses, standard (~70% efficient) reduce space heating energy use by about 13% (i.e. for a similar ventilation rate). High efficiency models are about 20% more efficient.
Space Cooling	-	1	1	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	See comment for space heating. Similar savings are assumed for this end use.
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	See comment for space heating. Similar savings are assumed for this end use.
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment	Applies? (1=Yes; 0=No)	Measure Resource Savings (%)	References/Notes

Main End Use	Use/Equipment (If Applicable)	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	
Space Cooling	1	1	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Gas-Fired Air-Source Heat Pumps

Not used--not commercially available in residential sizes.

		References/Notes
Description:	Early gas-fired heat pumps, such as the York Triathlon, were unsuccessful due to their bulky size and poor quality design. A new generation of gas absorption heat pumps (GAHPs) is currently available through Robur, an Italian manufacturer. These systems can either be ground-source or air-source (i.e., the heat sink may be either an underground fluid loop or an above ground heat exchanger coil). Air-source systems are substantially less expensive since they don't require drilling to install underground fluid loops. However, they can also be much less efficient than ground-source versions since their efficiency is a function of outside air temperature. Commercial-sized GAHP systems have been available in Canada since mid-2007 but residential-sized systems are rare in North America. It is hoped that residential-sized units will become more available in Canada within the study period, but the current manufacturers do not have specific plans at this time. It is estimated that air-source systems can operate at temperatures as low as -29°C and have annual efficiencies of 105% in cold winter locations. In more moderate winter climates, an efficiency of up to 129% is advertised. Unlike electric heat pump systems, GAHPs do not require any auxiliary heating equipment. In addition, the lack of a mechanical compressor extends their lifetime and allows air-source systems to withstand more extreme temperatures.	
Baseline:	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 90%	
Upgrade:	A gas-fired air-source heat pump. This option is not valid because these units are not available in residential sizes.	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)								
Electricity ($/kWh)	$0.083	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	
Natural Gas ($/MJ)	$0.010	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	-	-	-	-	-	-	-	-	0	
	Baseline (yrs.)	-	-	-	-	-	-	-	-	-	
Cost Savings ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Simple Payback (yrs.)		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Benefit/Cost Ratio		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	

Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

Gas-Fired Ground-Source Heat Pumps

Not used--not yet commercially available in residential sizes.

		References/Notes
Description:	Early gas-fired heat pumps, such as the York Triathlon, were unsuccessful due to their bulky size and poor quality design. A new generation of gas absorption heat pumps (GAHPs) is currently available through Robur, an Italian manufacturer. These systems can either be ground-source or air-source (i.e., the heat sink may be either an underground fluid loop or an above ground heat exchanger coil). Air-source systems are substantially less expensive since they don't require drilling to install underground fluid loops. However, they can also be much less efficient than ground-source versions since their efficiency is a function of outside air temperature. Commercial-sized GAHP systems have been available in Canada since mid-2007 but residential-sized systems are not currently available outside of Europe. It is hoped that residential-sized units will become more available in Canada within the study period, but the current manufacturers do not have specific plans at this time. Ground-source GAHPs have efficiencies (COPs) ranging from 120% to 130% Unlike electric heat pump systems, GAHPs do not require any auxiliary heating equipment. In addition, the lack of a mechanical compressor extends their lifetime.	Need--Installed cost, maintenance costs/year, lifetime, savings (heating, cooling, HVAC)
Baseline:	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 90%	
Upgrade:	A gas-fired ground-source heat pump. This option is not valid because these units are not available in residential sizes.	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/m^3)	$0.010	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	-	-	-	-	-	-	-	-	0	
	Baseline (yrs.)	-	-	-	-	-	-	-	-	-	
Cost Savings ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Simple Payback (yrs.)		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Benefit/Cost Ratio		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	

Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

Integrated Heating and DHW (Forced Air Heating)

		References/Notes
Description:	Integrated mechanical systems combine the most efficient technologies for residential space heating and domestic water heating into one package. For example, the Matrix system by NTI NY Thermal incorporates a condensing furnace, condensing boiler, condensing water heater and HRV all in one unit. Primary benefits of the integrated units include compact construction, lower cost of installation (only one set of gas, water and circulation connections are required), and lower installation and maintenance costs (once the technology is mature). Since the minimum performance standards for furnaces was brought up to 90% efficiency at the end of 2009, the base case system is a 90% efficient forced-air furnace and a standard efficiency natural gas tank-style water heater. With this baseline, the integrated system would offer little in the way of space heating savings, but it does still offer DHW savings because the integrated system would heat domestic water with its high-efficiency, condensing combustion.	
Baseline:	A 90% AFUE efficient forced-air condensing furnace, a standard efficiency natural gas tank-style water heater (EF of 0.62 or 0.64 assumed) and a standard efficiency HRV	
Upgrade:	An integrated heating and DHW system, with a condensing furnace (AFUE of 94), a condensing natural gas water heater (EF of 0.80 assumed), and an HRV with an efficiency similar to that in the base case (72%).	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☑	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☑	Mobile (Existing) ☑	Mobile (New) ☑	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	102,174	86,422	86,422	64,232	55,681	55,681	60,300	60,300	83,645	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	93,000	77,925	77,925	57,214	49,031	49,031	53,905	53,905	75,379	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	9,174	8,497	8,497	7,018	6,651	6,651	6,395	6,395	8,266	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$15,000.00	$15,000.00	$10,000.00	$15,000.00	$15,000.00	$10,000.00	$15,000.00	$10,000.00	$12,500.00	Clifford Paite of Matrix estimates installed cost of $10,000 to $20,000, with the lowest cost in new homes. (2010 estimate)
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Included in cost above
	Baseline, Material ($)	$5,900.00	$5,900.00	$5,900.00	$5,900.00	$5,900.00	$5,900.00	$5,900.00	$5,900.00	$5,900.00	Installed costs of base furnace plus water heater. (Update if base costs are updated.)
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Included in cost above
	Total Measure Cost ($)	$8,505.78	$8,505.78	$3,505.78	$8,505.78	$8,505.78	$3,505.78	$8,505.78	$3,505.78	$6,005.78	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	18	18	18	18	18	18	18	18	18	Lifetime of high efficiency furnace--based on Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-41, April 16, 2009.
	Baseline (yrs.)	15	15	15	15	15	15	15	15	15	Lifetime of base efficiency furnace--based on Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-41, April 16, 2009.
Cost Savings ($/yr.)		$90	$83	$83	$69	$65	$65	$63	$63	$81	
Simple Payback (yrs.)		94.6	102.1	42.1	123.7	130.5	53.8	135.7	55.9	73.93	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$959	$888	$888	$734	$695	$695	$669	$669	$864	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$7,547	-$7,617	-$2,617	-$7,772	-$7,810	-$2,810	-$7,837	-$2,837	-$5,142	
Benefit/Cost Ratio		0.11	0.10	0.25	0.09	0.08	0.20	0.08	0.19	0.17	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	No savings as HRVs in base and proposed case are similar.
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	Difference between AFUE 94 and AFUE 90
Domestic Hot Water (DHW)	-	1	1	27.0%	27.0%	27.0%	27.0%	27.0%	27.0%	25.0%	25.0%	27.0%	Difference between Efs of .85 and .64 or .62.
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	

Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	
Domestic Hot Water (DHW)	1	1	27.0%	27.0%	27.0%	27.0%	27.0%	27.0%	25.0%	25.0%	27.0%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

Integrated Heating and DHW (Hydronic Heating)

		References/Notes
Description:	Integrated mechanical systems combine the most efficient technologies for residential space heating and domestic water heating into one package. For example, the Matrix system by NTI NY Thermal incorporates a condensing furnace, condensing boiler, condensing water heater and HRV all in one unit. Primary benefits of the integrated units include compact construction, lower cost of installation (only one set of gas, water and circulation connections are required), and lower installation and maintenance costs (once the technology is mature). Water heating in the base case is assumed to be provided by a standard efficiency natural gas tank-style water heater (EF of 0.62 or 0.64), while space heating is provided by a non-condensing boiler, assumed to have an AFUE of 82% . The HRV in the base case is assumed to be of similar efficiency to the HRV in the integrated unit.	
Baseline:	A non-condensing boiler with an AFUE of 82% and a standard efficiency natural gas tank-style water heater (EF of 0.62 or 0.64). An HRV of similar efficiency to the integrated unit (72%) is assumed.	
Upgrade:	An integrated heating and DHW system, with a condensing boiler (AFUE 92.7), a condensing natural gas water heater (EF of .85) and an HRV with an efficiency similar to that in the base case (72%).	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/m^3)	$0.010	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	102,174	86,422	86,422	64,232	55,681	55,681	60,300	60,300	83,645	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	86,754	72,892	72,892	53,712	46,187	46,187	50,676	50,676	70,525	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Nat. Gas (m3/yr.)	15,420	13,530	13,530	10,520	9,494	9,494	9,624	9,624	13,120	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$15,000.00	$15,000.00	$10,000.00	$15,000.00	$15,000.00	$10,000.00	$15,000.00	$10,000.00	$12,500.00	Clifford Paite of Matrix estimates installed cost of $10,000 to $20,000, with the lowest cost in new homes. (2010 estimate)
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Included in cost above.
	Baseline, Material ($)	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	Cost of base case boiler and water heater. (Update if base case costs are updated)
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$8,000.00	$8,000.00	$3,000.00	$8,000.00	$8,000.00	$3,000.00	$8,000.00	$3,000.00	$5,500.00	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	20	20	20	20	20	20	20	20	20	lifetime of high-efficiency condensing furnace. (Updated if condensing boiler option updated.)
	Baseline (yrs.)	20	20	20	20	20	20	20	20	20	lifetime of standard efficiency condensing furnace. (Updated if condensing boiler option updated.)
Cost Savings ($/yr.)		$151	$133	$133	$103	$93	$93	$94	$94	$129	
Simple Payback (yrs.)		52.9	60.3	22.6	77.6	86.0	32.2	84.8	31.8	42.78	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$1,723	$1,512	$1,512	$1,175	$1,061	$1,061	$1,075	$1,075	$1,466	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$6,277	-$6,488	-$1,488	-$6,825	-$6,939	-$1,939	-$6,925	-$1,925	-$4,034	
Benefit/Cost Ratio		0.22	0.19	0.50	0.15	0.13	0.35	0.13	0.36	0.33	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	No savings as HRVs in base and proposed case are similar.
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	Difference between AFUE 92.7 and AFUE 82
Domestic Hot Water (DHW)	-	1	1	27.0%	27.0%	27.0%	27.0%	27.0%	27.0%	25.0%	25.0%	27.0%	Difference between Efs of .85 and .64 or .62.
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	

Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	
Domestic Hot Water (DHW)	1	1	27.0%	27.0%	27.0%	27.0%	27.0%	27.0%	25.0%	25.0%	27.0%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Condensing Gas Water Heaters

		References/Notes
Description:	Condensing water heaters feature advanced heat exchanger designs that extract more heat from the flue gases before they are exhausted. So much heat is extracted that the flue gases condense and must be discharged as a condensate rather than a gas. As a result, the efficiency of these types of water heaters is significantly higher than standard water heaters.	
Baseline:	A conventional storage natural gas hot water heater (EF of 0.62 or 0.64 assumed)	Current BC hot water heater regulations require an EF of 0.62 for 40 gallon (151 L) tanks and 0.64 for 30 gallon (114 L) tanks.
Upgrade:	A condensing natural gas water heater (EF of 0.80 assumed)	ENERGY STAR requirement for condensing hot water heaters is an EF of 0.80

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.128	$1.128	$1.128	$1.128	$1.128	$1.128	$1.128	$1.128
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.083	$0.083	$0.083	$0.083	$0.083	$0.083	$0.083	$0.083
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	21,061	21,061	21,061	18,750	18,750	18,750	18,369	18,369	20,599	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	16,322	16,322	16,322	14,531	14,531	14,531	14,695	14,695	15,973	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	4,739	4,739	4,739	4,219	4,219	4,219	3,674	3,674	4,626	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$1,500.00	$1,500.00	$1,500.00	$1,500.00	$1,500.00	$1,500.00	$1,500.00	$1,500.00	$1,500.00	Habart & Associates, "Market Transformation: Domestic Water Heaters," July 2010
	Upgrade, Installation ($)	$1,305.00	$1,305.00	$1,333.00	$1,305.00	$1,305.00	$1,333.00	$1,305.00	$1,333.00	$1,319.00	Habart & Associates, "Market Transformation: Domestic Water Heaters," July 2010
	Baseline, Material ($)	$675.00	$675.00	$675.00	$675.00	$675.00	$675.00	$675.00	$675.00	$675.00	Habart & Associates, "Market Transformation: Domestic Water Heaters," July 2010
	Baseline, Installation ($)	$563.00	$563.00	$1,085.00	$563.00	$563.00	$1,085.00	$563.00	$1,085.00	$824.00	Habart & Associates, "Market Transformation: Domestic Water Heaters," July 2010
	Total Measure Cost ($)	$1,567.00	$1,567.00	$1,073.00	$1,567.00	$1,567.00	$1,073.00	$1,567.00	$1,073.00	$1,320.00	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	13	13	13	13	13	13	13	13	13	Assume similar lifetime to conventional tanks. Habart report also makes this assumption.
	Baseline (yrs.)	13	13	13	13	13	13	13	13	13	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 495, January 2010.
Cost Savings ($/yr.)		$46	$46	$46	$41	$41	$41	$36	$36	$45	
Simple Payback (yrs.)		33.7	33.7	23.1	37.9	37.9	26.0	43.5	29.8	29.15	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$393	$393	$393	$350	$350	$350	$305	$305	$384	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$1,174	-$1,174	-$680	-$1,217	-$1,217	-$723	-$1,262	-$768	-$936	
Benefit/Cost Ratio		0.25	0.25	0.37	0.22	0.22	0.33	0.19	0.28	0.30	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	1	1	22.5%	22.5%	22.5%	22.5%	22.5%	22.5%	20.0%	20.0%	22.5%	EF of 0.80 versus an EF of 0.62 (40 gal) or 0.64 (30 gal)
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	

Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	**Sub End Use/Equipment (If Applicable)**	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
		Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	22.5%	22.5%	22.5%	22.5%	22.5%	22.5%	20.0%	20.0%	22.5%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

Point-of-Use (Tankless) Water Heaters (Gas)

		References/Notes
Description:	Tankless water heaters heat water on demand, eliminating hot water storage. The absence of hot water storage reduces standby heat losses. The efficiency of tankless water heaters is generally improved by the addition of features such as modulating controls, electric spark ignitions and direct venting. The applicability of tankless gas-fired DHW systems is somewhat limited by venting constraints; the burner is significantly larger than for a standard water heater, so a larger vent is required. Some houses cannot accommodate the larger flue because of requirements for clearance from other structures, windows, etc.	
Baseline:	A conventional storage natural gas hot water heater (EF of 0.60 assumed)	Based on a scan of models certified by the Air Conditioning, Heating, and Refrigeration Institute (AHRI), the average energy factor (EF) for conventional storage natural gas water heaters is ~0.60.
Upgrade:	A tankless natural gas hot water heater (EF of 0.82 assumed)	Based on a scan of models certified by the Air Conditioning, Heating, and Refrigeration Institute (AHRI), the overwhelming majority of tankless gas hot water heaters have an energy factor (EF) of 0.82

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)								
Electricity ($/kWh)	$0.083	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	
Natural Gas ($/MJ)	$0.010	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	21,061	21,061	21,061	18,750	18,750	18,750	18,369	18,369	20,599	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	13,690	13,690	13,690	12,187	12,187	12,187	11,940	11,940	13,389	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	7,371	7,371	7,371	6,562	6,562	6,562	6,429	6,429	7,209	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$1,500.00	$1,500.00	$1,500.00	$1,500.00	$1,500.00	$1,500.00	$1,500.00	$1,500.00	$1,500.00	Habart & Associates, "Market Transformation: Domestic Water Heaters," July 2010
	Upgrade, Installation ($)	$2,331.00	$2,331.00	$2,359.00	$2,331.00	$2,331.00	$2,359.00	$2,331.00	$2,359.00	$2,345.00	Habart & Associates, "Market Transformation: Domestic Water Heaters," July 2010
	Baseline, Material ($)	$675.00	$675.00	$675.00	$675.00	$675.00	$675.00	$675.00	$675.00	$675.00	Habart & Associates, "Market Transformation: Domestic Water Heaters," July 2010
	Baseline, Installation ($)	$563.00	$563.00	$1,085.00	$563.00	$563.00	$1,085.00	$563.00	$1,085.00	$824.00	Habart & Associates, "Market Transformation: Domestic Water Heaters," July 2010
	Total Measure Cost ($)	$2,274.04	$2,274.04	$1,645.56	$2,274.04	$2,274.04	$1,645.56	$2,274.04	$1,645.56	$1,959.80	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	20	20	20	20	20	20	20	20	20	Habart & Associates report: 25 yrs. Navigant Consulting Inc., Measures and Assumptions for Demand Side Management (DSM) Planning, p. C-87, April 16, 2009 indicated 18 yrs. Using 20 years as an intermediate value, after personal communication with J. Habart, Dec 2010.
	Baseline (yrs.)	13	13	13	13	13	13	13	13	13	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 495, January 2010.
Cost Savings ($/yr.)		$72	$72	$72	$64	$64	$64	$63	$63	$71	
Simple Payback (yrs.)		31.5	31.5	22.8	35.4	35.4	25.6	36.1	26.1	27.76	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$824	$824	$824	$733	$733	$733	$718	$718	$805	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$1,450	-$1,450	-$822	-$1,541	-$1,541	-$912	-$1,556	-$927	-$1,154	
Benefit/Cost Ratio		0.36	0.36	0.50	0.32	0.32	0.45	0.32	0.44	0.42	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	1	1	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	Actual use study shows average of 37% savings. We've assumed 35% because conventional EF is slightly higher and instantanoues EF is slightly lower than used in the study.
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	

Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Active Solar Water Heating Systems

		References/Notes
Description:	Solar DHW systems use the energy of the sun to heat water. The primary components of a solar water heating system are a solar collector, a heat transfer fluid and a well-insulated storage tank. Due to Canada's colder climate and the higher likelihood of freezing, active closed-loop systems are generally used. These systems use a pump to circulate a non-freezing heat transfer fluid through the collectors and then through a heat exchanger so that the thermal energy can be transferred to the water. Solar DHW are not generally sized to supply all of the annual requirement for water heating in the home, because if the system is sized for cloudy winter periods it will have enormous excess capacity during sunny summer periods, and will cost far too much to install. The system analyzed here meets approximately 2/3 of the annual requirements	
Baseline:	No solar water heating system installed	
Upgrade:	Solar DHW systems use the energy of the sun to heat water. The primary components of a solar water heating system are a solar collector, a heat transfer fluid and a well-insulated storage tank. Due to Canada's colder climate and the higher likelihood of	System sizes of 5.75 m^2 are assumed .

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.553	$1.553	$1.553	$1.553	$1.553	$1.553	$1.553	$1.553
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.127	$0.127	$0.127	$0.127	$0.127	$0.127	$0.127	$0.127
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	21,061	21,061	21,061	18,750	18,750	18,750	18,369	18,369	20,599	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	7,793	7,793	7,793	6,000	6,000	6,000	4,960	4,960	7,420	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	13,268	13,268	13,268	12,750	12,750	12,750	13,409	13,409	13,179	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	SolarBC incentive program average cost of 100 installed systems
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Costs above are installed.
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	25	25	25	25	25	25	25	25	25	Retscreen default assumption.
	Baseline (yrs.)	-	-	-	-	-	-	-	-	-	
Cost Savings ($/yr.)		$130	$130	$130	$125	$125	$125	$131	$131	$129	
Simple Payback (yrs.)		53.8	53.8	53.8	56.0	56.0	56.0	53.3	53.3	54.21	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$1,685	$1,685	$1,685	$1,619	$1,619	$1,619	$1,703	$1,703	$1,674	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$5,315	-$5,315	-$5,315	-$5,381	-$5,381	-$5,381	-$5,297	-$5,297	-$5,326	
Benefit/Cost Ratio		0.24	0.24	0.24	0.23	0.23	0.23	0.24	0.24	0.24	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	1	1	63.0%	63.0%	63.0%	68.0%	68.0%	68.0%	73.0%	73.0%	64.1%	Based on RETScreen modeling results (Assuming average occupancies for detached, attached and mobile homes are 3.1, 2.4, 1.9 respectively, DHW use of 60 L/day/person, 55°C DHW temperature, southerly directional angle 30° away from optimal (i.e. azimuth)
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	

Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	63.0%	63.0%	63.0%	68.0%	68.0%	68.0%	73.0%	73.0%	64.1%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

DHW Tank Insulation

		References/Notes
Description:	Pre-cut tank jackets/blankets (DHW tank insulation) are readily available and can be installed on hot water storage tanks to reduce standby heat losses. Caution is required to install blankets on gas water heaters, to avoid blocking the flue, the air intake to the burner, or the drain at the bottom. The thermostat should also remain uncovered.	
Baseline:	No additional tank insulation installed on a conventional hot water storage tank	
Upgrade:	An insulating blanket installed on a hot water storage tank to reduce standby losses	

Baseline Reference:	1. Annual consumption, end use
Heating Fuel Type:	All Fuels (Average Fuel Mix)
Main End Use:	Space Heating
Discount Rate:	7.38%
GHG Adder Incl.?	No
Resource Costs:	Baseload

= User Input
= Calculation

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.128	$1.128	$1.128	$1.128	$1.128	$1.128	$1.128	$1.128
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.083	$0.083	$0.083	$0.083	$0.083	$0.083	$0.083	$0.083
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	1,580	1,580	1,580	1,406	1,406	1,406	1,378	1,378	1,545	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	1,185	1,185	1,185	1,055	1,055	1,055	1,033	1,033	1,159	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	395	395	395	352	352	352	344	344	386	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$35.00	$35.00	$35.00	$25.00	$25.00	$25.00	$25.00	$25.00	$33.03	Based on a 2010 retail scan of insulating blankets
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Assuming that homeowners are able to install the insulating blankets on their own.
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$35.00	$35.00	$35.00	$25.00	$25.00	$25.00	$25.00	$25.00	$33.03	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	13	13	13	13	13	13	13	13	13	Assuming a lifetime similar to that of a hot water heater (hot water heater lifetime based on OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 495, January 2010.)
	Baseline (yrs.)	-	-	-	-	-	-	-	-	-	
Cost Savings ($/yr.)		$4	$4	$4	$3	$3	$3	$3	$3	$4	
Simple Payback (yrs.)		9.0	9.0	9.0	7.3	7.3	7.3	7.4	7.4	8.69	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$33	$33	$33	$29	$29	$29	$29	$29	$32	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$2	-$2	-$2	$4	$4	$4	$4	$4	-$1	
Benefit/Cost Ratio		0.94	0.94	0.94	1.17	1.17	1.17	1.14	1.14	0.98	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	1	1	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	US DOE website suggests that insulating blankets can reduce standby losses by 25-45%. Lower end assumed to be conservative and accounts for fact that newer storage tanks are better insulated
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	

Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	1.9%	1.9%	1.9%	1.9%	1.9%	1.9%	1.9%	1.9%	1.9%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

DHW Pipe Insulation

		References/Notes
Description:	Hot water pipe insulation reduces the distribution losses for DHW. In general, only the first one or two metres of pipe nearest the DHW tank are accessible enough to insulate. However, since the dominant loss is from the pipe transferring heat out of the tank and then losing it to the basement, the first meter of pipe is the most important and only worthwhile section of pipe to insulate. Insulating this section of piping affects both the delivery of hot water and the losses from the tank. Delivery temperature is slightly increased during a hot water draw, and the water in the piping does not lose its stored heat as quickly between draws.	In SaskPower
Baseline:	No insulation installed on the piping leading out of a hot water storage tank	
Upgrade:	Installing pipe insulation on the first meter of piping leading out of a hot water storage tank	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.226	$1.226	$1.226	$1.226	$1.226	$1.226	$1.226	$1.226
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.092	$0.092	$0.092	$0.092	$0.092	$0.092	$0.092	$0.092
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	1,580	1,580	1,580	1,406	1,406	1,406	1,378	1,378	1,545	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	1,437	1,437	1,437	1,280	1,280	1,280	1,254	1,254	1,406	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	142	142	142	127	127	127	124	124	139	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$0.70	$0.70	$0.70	$0.70	$0.70	$0.70	$0.70	$0.70	$0.70	Based on OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 492, January 2010.
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Assuming that homeowners are able to install the insulation on their own.
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$0.70	$0.70	$0.70	$0.70	$0.70	$0.70	$0.70	$0.70	$0.70	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	15	15	15	15	15	15	15	15	15	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 495, January 2010.
	Baseline (yrs.)	-	-	-	-	-	-	-	-	-	
Cost Savings ($/yr.)		$1	$1	$1	$1	$1	$1	$1	$1	$1	
Simple Payback (yrs.)		0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.51	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$13	$13	$13	$12	$12	$12	$11	$11	$13	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		$12	$12	$12	$11	$11	$11	$11	$11	$12	
Benefit/Cost Ratio		18.74	18.74	18.74	16.68	16.68	16.68	16.34	16.34	18.33	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	1	1	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	Original number of 15% was used: this was just over 1% of DHW overall and was based on Shipley's engineering calculations for a pipe acting as a fin on the tank. A paper by Andersen, Fan & Furbo called "Heat Losses from Pipes Connected to Hot Water Storage Tanks" estimates a heat trap reduces the losses in the first section of pipe by 40%.
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	

Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

DHW Heat Traps

Not used because many or most new hot water heaters have integral heat traps

		References/Notes
Description:	This measure involves the installation of external "S-type" pre-bent copper pipe heat traps on both of the outlets ofwater heaters. This measure is only being considered during the installation of new tanks since it can be prohibitively expensive to bring in a plumber otherwise.	
Baseline:	No heat trap installed on a new electric storage hot water heater	
Upgrade:	Installing an external "S-type" pre-bent copper pipe heat trap on an gas-fired storage hot water heater. This option no longer applies because most new hot water heaters include an integrated heat trap.	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083			$1.128			$1.128		$1.128
Electricity ($/kW)	$0.000			$0.000			$0.000		$0.000
Natural Gas ($/MJ)	$0.010			$0.083			$0.083		$0.083
Oil ($/L)	$0.000			$0.000			$0.000		$0.000
Water ($/1000L)	$0.000			$0.000			$0.000		$0.000

Sub-sector		Detached (Pre-1976) ☐	Detached (Post-1976) ☐	Detached (New) ☑	Attached (Pre-1976) ☐	Attached (Post-1976) ☐	Attached (New) ☑	Mobile (Existing) ☐	Mobile (New) ☑	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)			-			-		-	-	
	Natural Gas (MJ/yr.)			-			-		-	-	
	Oil (L/yr.)			-			-		-	-	
	Water (L/yr.)			-			-		-	-	
Upgrade Consumption	Electricity (kWh/yr.)			-			-		-	-	
	Natural Gas (MJ/yr.)			-			-		-	-	
	Oil (L/yr.)			-			-		-	-	
	Water (L/yr.)			-			-		-	-	
Interactive Effects (Inputs)	Heating Penalty ☐			0%			0%		0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐			0%			0%		0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)			-			-		-	-	
	Electricity, Cooling (kWh/yr.)			-			-		-	-	
	Electricity, Total (kWh/yr.)			-			-		-	-	
	Natural Gas (MJ/yr.)			-			-		-	-	
	Oil (L/yr.)			-			-		-	-	
Winter Peak Hours-Use Factor				-			-		-	-	
Resource Savings	Electricity (kWh/yr.)			-			-		-	-	
	Electricity (kW peak)			-			-		-	-	
	Natural Gas (MJ/yr.)			-			-		-	-	
	Oil (L/yr.)			-			-		-	-	
	Water (L/yr.)			-			-		-	-	
Cost Parameters	Upgrade, Material ($)			$0.00			$0.00		$0.00	$0.00	
	Upgrade, Installation ($)			$0.00			$0.00		$0.00	$0.00	Minimal labour costs since tank is already being installed
	Baseline, Material ($)			$0.00			$0.00		$0.00	$0.00	
	Baseline, Installation ($)			$0.00			$0.00		$0.00	$0.00	
	Total Measure Cost ($)			$0.00			$0.00		$0.00	$0.00	
	Basis (Full/Incremental)			Full			Full		Full	Full	
Incremental O&M ($/yr.)				$0			$0		$0	$0	
Lifetimes	Upgrade (yrs.)			13			13		13	13	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 495, January 2010.
	Baseline (yrs.)			-			-		-	-	
Cost Savings ($/yr.)				$0			$0		$0	$0	
Simple Payback (yrs.)				N/A			N/A		N/A	0.00	
NPV of O&M Costs ($)				$0			$0		$0	$0	
Total Benefits ($)	Electric Energy			$0			$0		$0	$0	
	Electric Demand			$0			$0		$0	$0	
	Natural Gas			$0			$0		$0	$0	
	Oil			$0			$0		$0	$0	
	Water			$0			$0		$0	$0	
Measure TRC ($)				$0			$0		$0	$0	
Benefit/Cost Ratio				0.00			0.00		0.00	0.00	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed			1			1		1	
Cost Flag (i.e. way measure is typically applied)			Incremental			Incremental		Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No) Baseline	Upgrade	Measure Resource Savings (%) Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No) Baseline	Upgrade	Measure Resource Savings (%) Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0			25.0%			25.0%		25.0%	25.0%	Based on Acker, L. Advanced Conservation Technology Inc. Improving the Efficiency of Hot Water Distribution Systems, ACEEE Forum, p. 12, 2008, installing a heat trap improves the energy factor of a hot water heater by about 0.02 (i.e. 2%) or about 25% of pipe losses.
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No) Baseline	Upgrade	Measure Resource Savings (%) Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	

Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0			-			-		-	-	
Space Cooling	0	0			-			-		-	-	
Clothes Washers	0	0			-			-		-	-	
Dishwashers	0	0			-			-		-	-	
Other Electric Loads	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0			-			-		-	-	
Domestic Hot Water (DHW)	0	0			-			-		-	-	
Fireplaces	0	0			-			-		-	-	
Cooking	0	0			-			-		-	-	
Clothes Dryers	0	0			-			-		-	-	
Pool and Spa Heaters	0	0			-			-		-	-	
Other	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0			-			-		-	-	
Domestic Hot Water (DHW)	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Ultra Low-Flow Showerheads

		References/Notes
Description:	Ultra low-flow showerheads have aerators and flow restrictors to reduce water use. At 4.75 LPM (1.25 GPM), their flow rates are substantially lower than traditional low-flow fixtures, whose flow rates range between 7.6 LPM and 9.5 LPM (2.0-2.5 GPM).	
Baseline:	A low-flow showerhead with a 2.0 GPM (7.6 LPM) flow rate (conservative estimate)	
Upgrade:	An ultra low-flow showerhead with a 1.25 GPM (4.75) flow rate	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached ☑ (Pre-1976)	Detached ☑ (Post-1976)	Detached ☑ (New)	Attached ☑ (Pre-1976)	Attached ☑ (Post-1976)	Attached ☑ (New)	Mobile ☑ (Existing)	Mobile ☑ (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	5,476	5,476	5,476	4,875	4,875	4,875	4,776	4,776	5,356	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	3,422	3,422	3,422	3,047	3,047	3,047	2,985	2,985	3,347	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	2,053	2,053	2,053	1,828	1,828	1,828	1,791	1,791	2,008	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$13.00	$13.00	$13.00	$13.00	$13.00	$13.00	$13.00	$13.00	$13.00	Incremental cost of $7 based on OPA, OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 193, January 2010.
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Assuming that homeowners are able to install the showerheads on their own
	Baseline, Material ($)	$6.00	$6.00	$6.00	$6.00	$6.00	$6.00	$6.00	$6.00	$6.00	Based on a retail scan of low-flow showerheads (2010)
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Assuming that homeowners are able to install the showerheads on their own
	Total Measure Cost ($)	$13.00	$13.00	$13.00	$13.00	$13.00	$13.00	$13.00	$13.00	$13.00	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	10	10	10	10	10	10	10	10	10	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 193, January 2010.
	Baseline (yrs.)	10	10	10	10	10	10	10	10	10	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 193, January 2010.
Cost Savings ($/yr.)		$20	$20	$20	$18	$18	$18	$18	$18	$20	
Simple Payback (yrs.)		0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.66	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$138	$138	$138	$122	$122	$122	$120	$120	$135	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		$125	$125	$125	$109	$109	$109	$107	$107	$122	
Benefit/Cost Ratio		10.58	10.58	10.58	9.42	9.42	9.42	9.23	9.23	10.35	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	1	1	37.5%	37.5%	37.5%	37.5%	37.5%	37.5%	37.5%	37.5%	37.5%	1.25 GPM (4.75 LPM) showerhead versus a 2.0 GPM (7.6 LPM) showerhead and assuming that the length of showers does not change
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	

Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	9.8%	9.8%	9.8%	9.8%	9.8%	9.8%	9.8%	9.8%	9.8%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

Faucet Aerators

		References/Notes
Description:	Aerators can easily be attached to most faucets to restrict the flow rate of water flowing from them. This can result in savings to both water consumption and DHW energy.	Not in SaskPower
Baseline:	No faucet aerator installed on the kitchen faucet	
Upgrade:	A 1.5 GPM (5.7 LPM) faucet aerator installed on the kitchen faucet	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☑	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☑	Mobile (Existing) ☑	Mobile (New) ☑	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	4,002	4,002	4,002	3,562	3,562	3,562	3,490	3,490	3,914	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	2,761	2,761	2,761	2,458	2,458	2,458	2,408	2,408	2,700	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	1,240	1,240	1,240	1,104	1,104	1,104	1,082	1,082	1,213	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$15.00	$15.00	$15.00	$15.00	$15.00	$15.00	$15.00	$15.00	$15.00	Based on a 2010 retail scan of faucet aerators and OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 190, January 2010. The cost of faucet aerators is about $5. Assuming 3 aerators per home in order to realize full savings.
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$15.00	$15.00	$15.00	$15.00	$15.00	$15.00	$15.00	$15.00	$15.00	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	10	10	10	10	10	10	10	10	10	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 190, January 2010.
	Baseline (yrs.)	-	-	-	-	-	-	-	-	-	
Cost Savings ($/yr.)		$12	$12	$12	$11	$11	$11	$11	$11	$12	
Simple Payback (yrs.)		1.2	1.2	1.2	1.4	1.4	1.4	1.4	1.4	1.26	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$83	$83	$83	$74	$74	$74	$72	$72	$81	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		$68	$68	$68	$59	$59	$59	$57	$57	$66	
Benefit/Cost Ratio		5.54	5.54	5.54	4.93	4.93	4.93	4.83	4.83	5.42	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	1	1	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 190, January 2010.
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	

Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	5.9%	5.9%	5.9%	5.9%	5.9%	5.9%	5.9%	5.9%	5.9%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Wastewater Heat Recovery Systems

		References/Notes
Description:	Residential wastewater heat recovery systems transfer the waste heat from drains to preheat make-up water. These systems work well only for DHW uses in which the hot water use and the draining of wastewater are simultaneous. Thus, in homes, application to anything other than showers is difficult. Heat recovery systems incorporate shell-and-tube heat exchangers that typically have efficiencies in the range of 40% to 55%, depending on factors such as design, material, overall length, and fluid flow rate.	In SaskPower
Baseline:	No wastewater heat recovery system installed	
Upgrade:	A 60" wastewater heat recovery system	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.648	$1.648	$1.648	$1.648	$1.648	$1.648	$1.648	$1.648
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.139	$0.139	$0.139	$0.139	$0.139	$0.139	$0.139	$0.139
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	5,476	5,476	5,476	4,875	4,875	4,875	4,776	4,776	5,356	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	2,628	2,628	2,628	2,340	2,340	2,340	2,292	2,292	2,571	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	2,847	2,847	2,847	2,535	2,535	2,535	2,483	2,483	2,785	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$680.00	$680.00	$680.00	$611.00	$611.00	$611.00	$611.00	$611.00	$666.41	Based on the cost of a Powerpipe R3-60 (3" diameter, 60" length) model for detached and an R3-48 in attached and mobile homes. Costs from Home Depot (2010).
	Upgrade, Installation ($)	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	Assuming 2 hours of labour @ $60/hr
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$800.00	$800.00	$800.00	$731.00	$731.00	$731.00	$731.00	$731.00	$786.41	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	30	30	30	30	30	30	30	30	30	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 498, January 2010.
	Baseline (yrs.)	-	-	-	-	-	-	-	-	-	
Cost Savings ($/yr.)		$28	$28	$28	$25	$25	$25	$24	$24	$27	
Simple Payback (yrs.)		28.7	28.7	28.7	29.4	29.4	29.4	30.0	30.0	28.83	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$396	$396	$396	$353	$353	$353	$345	$345	$387	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$404	-$404	-$404	-$378	-$378	-$378	-$386	-$386	-$399	
Benefit/Cost Ratio		0.50	0.50	0.50	0.48	0.48	0.48	0.47	0.47	0.49	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	1	1	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	Avg efficiency is ~52% for 2.0 GPM flow rates and a 60" model, based on RenewABILITY Energy Inc., "Power-Pipe: Backgrounder for Homes" (Note: Estimate may be high since there would be heat losses between the showerhead and the top of the HEX)
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heater	-	0	0									-	
Pool and Spa Heater	Pool Heaters	0	0									-	
Pool and Spa Heater	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	

Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

DHW Recirculation Systems (e.g. Metlund D'MAND®)

		References/Notes
Description:	When turning on the hot water tap, it often takes a long time before hot water begins to flow. DHW recirculation systems can be used to pump hot water to a faucet at the demand of a user, getting hot water to the fixture four to five times quicker than traditional systems. Water that is in the hot water lines is pumped back to the water heater either through the cold water lines or through a dedicated line. This pumping continues until the temperature of the hot water at the point of use reaches a specified value. In retrofit situations, this pumping system is generally installed at the faucet that is furthest away from the water heater and the system is enabled by remote activation from the other points of use. Along with improved convenience and water savings (since water isn't flushed down the drain), energy savings are achieved since the water that is pumped back to the water heater is generally warmer than city water. In addition, since the pump gets water to the fixture more quickly, there is an overall reduction of hot water use.	
Baseline:	A home with no DHW recirculation system	
Upgrade:	A home with a DHW recirculation system installed on the point-of-use farthest away from the hot water tank	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	21,061	21,061	21,061	18,750	18,750	18,750	18,369	18,369	20,599	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	17,691	17,691	17,691	15,750	15,750	15,750	15,430	15,430	17,303	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	3,370	3,370	3,370	3,000	3,000	3,000	2,939	2,939	3,296	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$450.00	$450.00	$450.00	$350.00	$350.00	$350.00	$350.00	$350.00	$430.31	Material cost varies from $250 to $500, depending on pump size (based on an online retail scan of these systems (2010))
	Upgrade, Installation ($)	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	Assuming 2 hours of labour @ $60/hr
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$570.00	$570.00	$570.00	$470.00	$470.00	$470.00	$470.00	$470.00	$550.31	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	18	18	18	18	18	18	18	18	18	High lifetime assumed since the systems are fairly simple (i.e. lifetime of a pump is fairly high)
	Baseline (yrs.)	-	-	-	-	-	-	-	-	-	
Cost Savings ($/yr.)		$33	$33	$33	$29	$29	$29	$29	$29	$32	
Simple Payback (yrs.)		17.3	17.3	17.3	16.0	16.0	16.0	16.3	16.3	17.02	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$352	$352	$352	$314	$314	$314	$307	$307	$345	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$218	-$218	-$218	-$156	-$156	-$156	-$163	-$163	-$206	
Benefit/Cost Ratio		0.62	0.62	0.62	0.67	0.67	0.67	0.65	0.65	0.63	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	1	1	16.0%	16.0%	16.0%	16.0%	16.0%	16.0%	16.0%	16.0%	16.0%	Oak Ridge National Laboratory, "Water and Energy Savings using Demand Hot Water Recirculating Systems in Residential Homes: A Case Study of Five Homes in Palo Alto, California", Sept. 2002, suggests 16-32% savings on DHW. Lower end assumed since very little research is available on these devices and savings are uncertain.
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	

Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	**Sub End Use/Equipment (If Applicable)**	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
		Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	16.0%	16.0%	16.0%	16.0%	16.0%	16.0%	16.0%	16.0%	16.0%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

High-Efficiency (ENERGY STAR®) Dishwashers

		References/Notes
Description:	ENERGY STAR® dishwashers save energy by using improved technology for the primary wash cycle and by using less hot water to clean. Features include more effective washing action, energy-efficient motors, and sensors that determine the length of the wash cycle and the temperature of the water necessary to clean the dishes. In addition, some advanced dishwashers can sense and adjust for the amount of soil on dishes, using only as much water as necessary. These savings affect both the energy used for heating the water and the mechanical energy of the dishwasher.	
Baseline:	A standard-sized new dishwasher	Link to bulletin on performance standards (new standards took effect on Jan. 1, 2010).
Upgrade:	An ENERGY STAR® certified, standard-sized new dishwasher	ENERGY STAR® standard for dishwashers to improve to 307 kWh/yr by July 1, 2011 (assumed here)

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.015	$1.015	$1.015	$1.015	$1.015	$1.015	$1.015	$1.015
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.073	$0.073	$0.073	$0.073	$0.073	$0.073	$0.073	$0.073
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	92	92	90	71	71	69	76	74	87	
	Natural Gas (MJ/yr.)	2,527	2,527	2,527	2,250	2,250	2,250	2,204	2,204	2,472	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	80	80	78	61	61	60	66	64	75	
	Natural Gas (MJ/yr.)	2,186	2,186	2,186	1,946	1,946	1,946	1,907	1,907	2,138	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	12	12	12	10	10	9	10	10	12	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	341	341	341	304	304	304	298	298	334	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$395.00	$395.00	$395.00	$395.00	$395.00	$395.00	$395.00	$395.00	$395.00	Incr. cost of $45 indicated in OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 34, January 2010.
	Upgrade, Installation ($)	$60.00	$60.00	$60.00	$60.00	$60.00	$60.00	$60.00	$60.00	$60.00	Assuming 1 hour of labour @ $60/hr
	Baseline, Material ($)	$350.00	$350.00	$350.00	$350.00	$350.00	$350.00	$350.00	$350.00	$350.00	Based on a retail scan of dishwashers offered by Sears (lowest cost models by reliable manufacturers) (2010)
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Assuming 1 hour of labour @ $60/hr
	Total Measure Cost ($)	$105.00	$105.00	$105.00	$105.00	$105.00	$105.00	$105.00	$105.00	$105.00	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	11	11	11	11	11	11	11	11	11	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 34, January 2010.
	Baseline (yrs.)	11	11	11	11	11	11	11	11	11	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 34, January 2010.
Cost Savings ($/yr.)		$4	$4	$4	$4	$4	$4	$4	$4	$4	
Simple Payback (yrs.)		24.0	24.0	24.1	27.9	27.9	28.0	27.9	28.0	24.83	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$13	$13	$12	$10	$10	$9	$10	$10	$12	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$25	$25	$25	$22	$22	$22	$22	$22	$24	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$68	-$68	-$68	-$73	-$73	-$73	-$73	-$73	-$69	
Benefit/Cost Ratio		0.36	0.36	0.35	0.30	0.30	0.30	0.30	0.30	0.34	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	1	1	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%		
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	1	1	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	ENERGY STAR® standard for dishwashers to improve to 307 kWh/yr by July 1, 2011
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	

Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	1	1	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	1	1	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

High-Efficiency (ENERGY STAR®) Clothes Washers

		References/Notes
Description:	In January 2011, the ENERGY STAR® standard for clothes washers will be increased once again. As a result, very few top loading washers will meet ENERGY STAR® requirements. Instead, the overwhelming majority of ENERGY STAR® models will be front loading (horizontal axis) models. Compared to standard models, front loading washing machines use less hot water, less mechanical energy, and result in dryer energy savings due to faster spin cycle speeds.	
Baseline:	A standard 3.2 cu. ft. (90.6 L) top loading clothes washer	Link to minimum energy performance standards, which took effect on Jan. 1, 2007. Note: Top loading washer assumed since very few front loading models do not meet ENERGY STAR requirements
Upgrade:	An ENERGY STAR® certified, 3.2 cu. ft. (90.6 L) front loading clothes washer	Link to ENERGY STAR® standards -- new standards to take effect on Jan. 1, 2011

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.179	$1.179	$1.179	$1.179	$1.179	$1.179	$1.179	$1.179
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/m^3)	$0.010	$0.088	$0.088	$0.088	$0.088	$0.088	$0.088	$0.088	$0.088
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	78	78	78	59	59	59	59	59	74	
	Natural Gas (MJ/yr.)	8,398	8,398	8,398	7,477	7,477	7,477	7,314	7,314	8,214	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	49	49	49	37	37	37	37	37	47	
	Natural Gas (MJ/yr.)	5,291	5,291	5,291	4,710	4,710	4,710	4,608	4,608	5,175	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	29	29	29	22	22	22	22	22	27	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	3,107	3,107	3,107	2,766	2,766	2,766	2,706	2,706	3,039	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 25, January 2010.
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Material ($)	$450.00	$450.00	$450.00	$450.00	$450.00	$450.00	$450.00	$450.00	$450.00	Based on a scan of non-ENERGY STAR top-loading models available from various retailers (Note: Current ENERGY STAR models may not meet new standards) (2010). Top loading washer assumed since very few front loading models do not meet ENERGY STAR requirements.
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$300.00	$300.00	$300.00	$300.00	$300.00	$300.00	$300.00	$300.00	$300.00	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	14	14	14	14	14	14	14	14	14	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 24, January 2010.
	Baseline (yrs.)	14	14	14	14	14	14	14	14	14	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 24, January 2010.
Cost Savings ($/yr.)		$33	$33	$33	$29	$29	$29	$28	$28	$32	
Simple Payback (yrs.)		9.1	9.1	9.1	10.4	10.4	10.4	10.6	10.6	9.38	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$34	$34	$34	$26	$26	$26	$26	$26	$32	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$273	$273	$273	$243	$243	$243	$237	$237	$267	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		$7	$7	$7	-$32	-$32	-$32	-$37	-$37	-$1	
Benefit/Cost Ratio		1.02	1.02	1.02	0.89	0.89	0.89	0.88	0.88	1.00	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	1	1	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	Link to ENERGY STAR® standards -- new standards to take effect on Jan. 1, 2011 (these stds assumed)
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	1	1	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	Assuming water savings increase is approx. proportional to increase in mechanical energy savings with new standards (DHW savings included in MEF (Modified Energy Factor)).
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	1	1	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	Savings due to higher spin speeds (dryer savings are incorporated into MEF (Modified Energy Factor)). Assuming savings are proportional to the mechanical energy savings.
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	

Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	1	1	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	6.7%	6.7%	6.7%	6.7%	6.7%	6.7%	6.7%	6.7%	6.7%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	1	1	20.4%	20.4%	20.4%	20.4%	20.4%	20.4%	20.4%	20.4%	20.4%	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

High-Efficiency Gas Clothes Dryers

Not used--moisture sensors have become common.

		References/Notes
Description:	The major distinction with energy-efficient gas clothes dryer models is that they incorporate termination controls to sense dryness and turn off automatically. The most efficient models have moisture sensors in the drum for sensing dryness, while other lower-cost and slightly less efficient models infer dryness by sensing the temperature of the exhaust air. The majority of the retail models currently available employ some type of dryness sensing technology but it is unclear how often these controls are used by homeowners.	
Baseline:	A gas clothes dryer with a temperature sensor	
Upgrade:	A gas clothes dryer with a moisture sensor. This option is no longer valid because almost all new gas dryers have moisture sensors.	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$500.00	$500.00	$500.00	$500.00	$500.00	$500.00	$500.00	$500.00	$500.00	Based on a retail scan of low-cost gas dryers with moisture sensors (2009)
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Material ($)	$450.00	$450.00	$450.00	$450.00	$450.00	$450.00	$450.00	$450.00	$450.00	Based on a retail scan of low-cost gas dryers without moisture sensors (2009)
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	18	18	18	18	18	18	18	18	18	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 58, January 2010.
	Baseline (yrs.)	18	18	18	18	18	18	18	18	18	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 58, January 2010.
Cost Savings ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Simple Payback (yrs.)		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$50	-$50	-$50	-$50	-$50	-$50	-$50	-$50	-$50	
Benefit/Cost Ratio		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	Savings for moisture sensor relative to temperature sensor, according to Citizen Gas, "Buyer's Guide: Natural Gas Clothes Dryers"
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	

Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Insulating Pool Covers

		References/Notes
Description:	Between 30% and 50% of the heat loss from a swimming pool is due to evaporation. In an outdoor pool, this heat loss either adds to the cost of heating the pool or shortens the swimming season. Evaporation also increases the quantity of chemicals that must be added to the pool. A pool cover can reduce evaporation and other heat losses but can also reduce heat gains depending on the design. An insulating vinyl pool cover is assumed for this analysis. Although substantially more expensive than the bubble type covers, insulating vinyl pool covers are much more robust and, thus, have much longer lifetimes. They are also more effective at trapping heat.	In SaskPower
Baseline:	A pool with no insulating cover	
Upgrade:	Installing a pool cover to reduce the heat loss from a heated pool	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	23,096	23,096	23,096	23,096	23,096	23,096	23,096	23,096	23,096	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	15,397	15,397	15,397	15,397	15,397	15,397	15,397	15,397	15,397	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$1,200.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00	Based on quotes from suppliers for a 50 m^2 pool with a manual reel. Cost also used in several previous studies, particularly TG 2005, when this cost was endorsed by TG staff.
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Installation cost included above
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$1,200.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	10	10	10	10	10	10	10	10	10	Reasonable lifetime assumed
	Baseline (yrs.)	-	-	-	-	-	-	-	-	-	
Cost Savings ($/yr.)		$151	$151	$151	$151	$151	$151	$151	$151	$151	
Simple Payback (yrs.)		8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	7.95	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$1,031	$1,031	$1,031	$1,031	$1,031	$1,031	$1,031	$1,031	$1,031	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$169	-$169	-$169	-$169	-$169	-$169	-$169	-$169	-$169	
Benefit/Cost Ratio		0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	1	1	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	CanREN, "How Can I best Manage My Pool's Energy Use?", 2002., mid range of 30-50% savings estimate used
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	

Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	1	1	26.4%	26.4%	26.4%	26.4%	26.4%	26.4%	26.4%	26.4%	26.4%	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

Heat Pump Pool Heaters

Not used--this is a fuel-switching measure.

		References/Notes
Description:	Air source heat pumps can be used to replace electric or gas-fired pool heaters. The principal of operation for these types of heat pumps is very similar to refrigerators and air conditioning units, in that they are used to transfer heat from one place to another. This allows them to be significantly more efficient than electric or gas-fired pool heaters, since these types of heaters generate heat rather than transferring it.	
Baseline:	A standard efficiency gas-fired pool heater	
Upgrade:	A heat pump pool heater. This option is not valid in this study because it is a fuel-switching measure.	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/m^3)	$0.010	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☑	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☑	Mobile (Existing) ☑	Mobile (New) ☑	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Nat. Gas (m3/yr.)	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	Approximate cost of an 80,000 BTU heat pump pool heater, based on a scan of models available from online retailers
	Upgrade, Installation ($)	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	Assuming 2 hours of labour @ $60/hr
	Baseline, Material ($)	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	Based on Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-81, April 16, 2009.
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Included in cost above
	Total Measure Cost ($)	$524.65	$524.65	$524.65	$524.65	$524.65	$524.65	$524.65	$524.65	$524.65	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	Assuming no incremental O&M
Lifetimes	Upgrade (yrs.)	10	10	10	10	10	10	10	10	10	Lifetime based on a US DOE website on heat pump pool heaters
	Baseline (yrs.)	7	7	7	7	7	7	7	7	7	US DOE suggests lifetime of 5 years or longer.
Cost Savings ($/yr.)		$377	$377	$377	$377	$377	$377	$377	$377	$377	
Simple Payback (yrs.)		1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.39	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$2,578	$2,578	$2,578	$2,578	$2,578	$2,578	$2,578	$2,578	$2,578	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		$2,053	$2,053	$2,053	$2,053	$2,053	$2,053	$2,053	$2,053	$2,053	
Benefit/Cost Ratio		4.91	4.91	4.91	4.91	4.91	4.91	4.91	4.91	4.91	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	This is where electricity increase would go, in fuel switching analysis.

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	1	1	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	Heat pump pool heater replaces all gas use for pool heating
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	

Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	1	1	66.1%	66.1%	66.1%	66.1%	66.1%	66.1%	66.1%	66.1%	66.1%	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

High-Efficiency Gas-Fired Pool Heaters

		References/Notes
Description:	High-efficiency pool heaters incorporate advanced heat exchangers, forced draft combustion systems, pilot-less ignitions and innovations in hydraulics, which results in performance efficiencies that range between 90% and 95%, compared to efficiencies of 80% to 85% for standard models.	
Baseline:	A standard efficiency gas-fired pool heater (82.5% efficiency assumed)	
Upgrade:	A high efficiency gas-fired pool heater (92.5% efficiency assumed)	

Baseline Reference:	1. Annual consumption, end use
Heating Fuel Type:	All Fuels (Average Fuel Mix)
Main End Use:	Space Heating
Discount Rate:	7.38%
GHG Adder Incl.?	No
Resource Costs:	Baseload

= User Input
= Calculation

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$0.733	$0.733	$0.733	$0.733	$0.733	$0.733	$0.733	$0.733
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/m^3)	$0.010	$0.048	$0.048	$0.048	$0.048	$0.048	$0.048	$0.048	$0.048
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☑	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☑	Mobile (Existing) ☑	Mobile (New) ☑	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	34,259	34,259	34,259	34,259	34,259	34,259	34,259	34,259	34,259	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Nat. Gas (m3/yr.)	4,234	4,234	4,234	4,234	4,234	4,234	4,234	4,234	4,234	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$2,900.00	$2,900.00	$2,900.00	$2,900.00	$2,900.00	$2,900.00	$2,900.00	$2,900.00	$2,900.00	Personal communication with Jandy pool heater manufacturers, 2008<-- consider updating
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	installation costs included above
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Cost of upgrade is incremental cost
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	installation costs included above
	Total Measure Cost ($)	$2,900.00	$2,900.00	$2,900.00	$2,900.00	$2,900.00	$2,900.00	$2,900.00	$2,900.00	$2,900.00	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Set to incremental since cost above is incremental
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	7	7	7	7	7	7	7	7	7	US DOE suggests lifetime of 5 years or longer for a conventional heater. No evidence that high efficiency lifetimes are different.
	Baseline (yrs.)	7	7	7	7	7	7	7	7	7	US DOE suggests lifetime of 5 years or longer.
Cost Savings ($/yr.)		$41	$41	$41	$41	$41	$41	$41	$41	$41	
Simple Payback (yrs.)		69.9	69.9	69.9	69.9	69.9	69.9	69.9	69.9	69.89	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$204	$204	$204	$204	$204	$204	$204	$204	$204	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$2,696	-$2,696	-$2,696	-$2,696	-$2,696	-$2,696	-$2,696	-$2,696	-$2,696	
Benefit/Cost Ratio		0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	1	1	11.0%	11.0%	11.0%	11.0%	11.0%	11.0%	11.0%	11.0%	11.0%	Difference between energy use of 82.5% and 92.5% heaters.
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	

Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	1	1	7.3%	7.3%	7.3%	7.3%	7.3%	7.3%	7.3%	7.3%	7.3%	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Solar Pool Heaters

		References/Notes
Description:	Unlike other types of solar hot water systems, solar pool heaters do not include storage tanks or heat exchangers, and, since they are only used in warmer weather, they generally employ unglazed solar collectors that are composed of a polymer. These collectors are mounted of the roofs of homes or in an unshaded part of the yard. The heat transfer fluid is usually pool water that is pumped directly into the array of collectors and flows within the polymer in a serpentine array in order to pick up heat. Although solar DHW systems do require a pump, its consumption is similar to that used in electric and gas-fired pool heaters. Solar pool heaters can completely offset the energy requirements of conventional pool heaters. And, since they are much simpler than solar DHW systems, they are also much more affordable.	
Baseline:	A standard efficiency gas-fired pool heater	
Upgrade:	A solar pool heater with an unglazed collector	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$3,450.00	$3,450.00	$3,450.00	$3,450.00	$3,450.00	$3,450.00	$3,450.00	$3,450.00	$3,450.00	Based on Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-81, April 16, 2009.
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Installation costs included above
	Baseline, Material ($)	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	Based on Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-81, April 16, 2009.
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Installation costs included above
	Total Measure Cost ($)	$3,450.00	$3,450.00	$3,450.00	$3,450.00	$3,450.00	$3,450.00	$3,450.00	$3,450.00	$3,450.00	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	20	20	20	20	20	20	20	20	20	Based on Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-81, April 16, 2009.
	Baseline (yrs.)	7	7	7	7	7	7	7	7	7	US DOE suggests lifetime of 5 years or longer.
Cost Savings ($/yr.)		$377	$377	$377	$377	$377	$377	$377	$377	$377	
Simple Payback (yrs.)		9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.15	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$4,301	$4,301	$4,301	$4,301	$4,301	$4,301	$4,301	$4,301	$4,301	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		$851	$851	$851	$851	$851	$851	$851	$851	$851	
Benefit/Cost Ratio		1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	1	1	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	

Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	**Sub End Use/Equipment (If Applicable)**	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
		Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	1	1	66.1%	66.1%	66.1%	66.1%	66.1%	66.1%	66.1%	66.1%	66.1%	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

Micro-Combined Heat and Power (CHP)

		References/Notes
Description:	Several types of micro-combustion heat and power (micro CHP) systems are either available or under development. These units all generate electrical power and capture the resulting "waste" heat for space and/or water heating. Reciprocating engine units such as the Honda Freewatt use a well-developed technology and can be scaled to a residential size. Power generate efficiencies range from 20-40% and up to 90% of the waste heat can be captured. Various sizing and control strategies can be used: for example, the amount of heat can be maximized or the amount of electricity can be maximized. This example assumes a unit such as the Honda Freewatt hydronic system, which has a 1.2 kW maximum electrical output and a 3.5 kW thermal output. Heat load following control is assumed to avoid fuel-switching, however power load following control is usually more economically attractive for applications involving seasonally varying loads. A back-up boiler is included in the Honda Freewatt package. Net-metering is assumed.	
Baseline:	Condensing gas-fired boiler (92% AFUE)	
Upgrade:	Installing a microturbine system in an average home, offsetting both the electric consumption from the grid and the amount of space and water heating that must be provided by a boiler. Note that this technology is not currently available in Canada.	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)								
Electricity ($/kWh)	$0.083	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	
Natural Gas ($/m^3)	$0.010	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☑	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☑	Mobile (Existing) ☑	Mobile (New) ☑	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-2,000	-2,000	-2,000	-2,000	-2,000	-2,000	-2,000	-2,000	-2,000	
	Natural Gas (m3/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Nat. Gas (m3/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$13,000.00	$13,000.00	$13,000.00	$13,000.00	$13,000.00	$13,000.00	$13,000.00	$13,000.00	$13,000.00	Cost is anecdotal, gleaned from websites. Waiting for confirmation from Honda. This technology is not available in Canada and is not expected to be soon.
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Above cost includes installation
	Baseline, Material ($)	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	Cost is base case cost of 82 AFUE boiler. Update if base case for condensing boiler is updated.
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Above cost includes installation
	Total Measure Cost ($)	$8,000.00	$8,000.00	$8,000.00	$8,000.00	$8,000.00	$8,000.00	$8,000.00	$8,000.00	$8,000.00	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	20	20	20	20	20	20	20	20	20	Lifetime not well established--lifetime of base case boiler assumed.
	Baseline (yrs.)	20	20	20	20	20	20	20	20	20	
Cost Savings ($/yr.)		$166	$166	$166	$166	$166	$166	$166	$166	$166	
Simple Payback (yrs.)		48.3	48.3	48.3	48.3	48.3	48.3	48.3	48.3	48.31	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$2,837	$2,837	$2,837	$2,837	$2,837	$2,837	$2,837	$2,837	$2,837	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$5,163	-$5,163	-$5,163	-$5,163	-$5,163	-$5,163	-$5,163	-$5,163	-$5,163	
Benefit/Cost Ratio		0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	-1									-	RETSreen run indicates that mCHP delivers about 7200 MJ per year with heat following control

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	RETScreen run indicates heat load following strategy uses about the same amount of gas a 92 AFUE boiler would use.
Domestic Hot Water (DHW)	-	0	0										RETScreen run indicates heat load following strategy uses about the same amount of gas a 92 AFUE boiler would use.
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	

Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	-1	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

INDEX

Tab Name	Measure Description	Average B/C Ratio
HEATING: SHELL MEASURES		
Attic Insulation	Improving the attic insulation in an average home by RSI-3.5 (R-20), through the addition of cellulose insulation	1.10
Wall Insulation	Improving the wall insulation in an average home by RSI-1.76 (R-10) to RSI-4.2 (R-24)	1.14
Slab Insulation	The addition of slab (basement floor) insulation in homes with unfinished basements. It is assumed that 2" polystyrene rigid foam insulation (RSI-1.76 (R-10)) is being added.	0.13
Basement Insulation	In average homes with basements, improving the foundation wall insulation by RSI-2.12 (R-12)	1.22
Crawl Space Insul.	In homes with crawlspaces, the addition of crawlspace insulation to bring the thermal resistance values up to RSI-2.1 (R-12)	0.43
Air Sealing	A comprehensive air sealing job, which results in an air tightness (ACH @ 50 Pa) improvement of 30%	0.60
Homeowner Air Sealing	A homeowner air sealing job, which results in an air tightness (ACH @ 50 Pa) improvement of 15-20%	1.09
Sealing & Insul. - Old Homes	Improve both the attic insulation and the air tightness (ACH@50 Pa) in an old home. It is assumed that the air tightness is improved by 30% and that RSI-3.52 (R-20) of attic insulation is added.	0.73
ESTAR Windows	In existing homes, replacing 50% of windows with ENERGY STAR windows from Zone D (double-glazed, argon fill, low-e coating, insulating spacer, vinyl frame, hinged). In hew homes, replacing 100% of windows.	0.31
Super Windows	In existing homes, replacing 50% of windows with super high-performance windows (triple-glazed, krypton fill, low-e and insulating coatings, insulating spacer, fiberglass frame, hinged). In new homes, replacing all of the windows with super high-performance windows.	0.73
HEATING: SHELL MEASURES (NEW HOMES)		
High-Perf. New Homes	A high-performance new home (EGH rating of 80 assumed). This option no longer applies as EGH of 80 is now the minimum.	0.00
Net Zero Ready Homes	A net-zero energy ready home (EGH rating of 86 assumed)	0.34
HEATING: EQUIPMENT		
Condensing Gas Furnaces	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 96%	0.39
Early Retire Gas Furnaces	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 90%	0.34
Condensing Gas Boilers	A condensing natural gas boiler (92% AFUE assumed)	0.33
Gas Fireplaces	A high efficiency natural gas fireplace (80% assumed)	2.10
Prog. Thermostats	Programmable thermostat installed on central forced-air natural gas furnace and electric space cooling system	8.54
Solar Make-Up Air	A 10 m2 solar pre-heated make-up air system, located on the south side of a home	0.24
HRVs	A high-efficiency heat recovery ventilator (HRV) (sensible efficiency of approximately 85%), in a home with central heating and cooling	0.40
Air Heat Pumps	A gas-fired air-source heat pump. This option is not valid because these units are not available in residential sizes.	0.00
Ground Heat Pumps	A gas-fired ground-source heat pump. This option is not valid because these units are not available in residential sizes.	0.00
Heating & DHW	An integrated heating and DHW system, with a condensing furnace (AFUE of 94), a condensing natural gas water heater (EF of 0.80 assumed), and an HRV with an efficiency similar to that in the base case (72%).	0.17
Heating & DHW (Hydronic)	An integrated heating and DHW system, with a condensing boiler (AFUE 92.7), a condensing natural gas water heater (EF of .85) and an HRV with an efficiency similar to that in the base case (72%).	0.38
WATER HEATING		
Condensing Gas DHW	A condensing natural gas water heater (EF of 0.80 assumed)	0.24
Tankless Gas DHW	A tankless natural gas hot water heater (EF of 0.82 assumed)	0.34
Solar DHW	Solar DHW systems use the energy of the sun to heat water. The primary components of a solar water heating system are a solar collector, a heat transfer fluid and a well-insulated storage tank. Due to Canada's colder climate and the higher likelihood of	0.19
DHW Tank Insulation	An insulating blanket installed on a hot water storage tank to reduce standby losses	0.79
DHW Pipe Insulation	Installing pipe insulation on the first meter of piping leading out of a hot water storage tank	14.97
DHW Heat Traps	Installing an external "S-type" pre-bent copper pipe heat trap on an gas-fired storage hot water heater. This option no longer applies because most new hot water heaters include an integrated heat trap.	0.00
Showerheads	An ultra low-flow showerhead with a 1.25 GPM (4.75) flow rate	8.45
Faucet Aerators	A 1.5 GPM (5.7 LPM) faucet aerator installed on the kitchen faucet	4.42
Wastewater Heat Recovery	A 60" wastewater heat recovery system	0.40
DHW Recirculation	A home with a DHW recirculation system installed on the point-of-use farthest away from the hot water tank	0.51
APPLIANCES		
ESTAR Dishwashers	An ENERGY STAR® certified, standard-sized new dishwasher	0.28
ESTAR Clothes Washers	An ENERGY STAR® certified, 3.2 cu. ft. (90.6 L) front loading clothes washer	0.86
Gas Clothes Dryers	A gas clothes dryer with a moisture sensor. This option is no longer valid because almost all new gas dryers have moisture sensors.	0.00
OTHER		
Pool Covers	Installing a pool cover to reduce the heat loss from a heated pool	0.86
Heat Pump Pool Heaters	A heat pump pool heater. This option is not valid in this study because it is a fuel-switching measure.	4.91
Efficient Pool Heaters	A high efficiency gas-fired pool heater (92.5% efficiency assumed)	0.07
Solar Pool Heaters	A solar pool heater with an unglazed collector	1.25
Micro-CHP	Installing a microturbine system in an average home, offsetting both the electric consumption from the grid and the amount of space and water heating that must be provided by a boiler. Note that this technology is not currently available in Canada.	0.35

Measure Name	Basis (Full/ Incremental)	Weighted Average	
		B/C Ratio	Measure TRC ($)
DHW Pipe Insulation	Full	14.97	$10
Programmable Thermostats (Central Heating and Cooling)	Full	8.54	$377
Ultra Low-Flow Showerheads	Full	8.45	$97
Faucet Aerators	Full	4.42	$51
Solar Pool Heaters	Full	1.25	$851
Attic Insulation	Full	1.10	$70
Homeowner Air Sealing/Weather Stripping/Caulking	Full	1.09	$31
Insulating Pool Covers	Full	0.86	-$169
DHW Tank Insulation	Full	0.79	-$7
Air Leakage Sealing and Insulation (Old Homes)	Full	0.73	-$865
Professional Air Sealing/Weather Stripping/Caulking	Full	0.60	-$815
DHW Recirculation Systems (e.g. Metlund D'MAND®)	Full	0.51	-$274
Crawl Space Insulation	Full	0.43	-$452
Wastewater Heat Recovery Systems	Full	0.40	-$474
Net-Zero Ready Energy Homes	Full	0.34	-$8,657
Solar Pre-Heated Make-Up Air Systems (e.g., SolarWall®)	Full	0.24	-$993
Active Solar Water Heating Systems	Full	0.19	-$5,636
High-Performance Homes (EGH 80/R2000/ENERGY STAR®)	Full	0.00	-$5,538
High Efficiency Gas Fireplaces	Incr.	2.10	$164
Basement (Foundation) Insulation	Incr.	1.22	$318
Wall Insulation	Incr.	1.14	$279
High-Efficiency (ENERGY STAR®) Clothes Washers	Incr.	0.86	-$43
Super High-Performance Windows	Incr.	0.73	-$855
Early Retirement of Existing Gas Furnaces	Incr.	0.34	-$1,239
High Efficiency Heat Recovery Ventilators (HRVs)	Incr.	0.40	-$360
High Efficiency Condensing Gas Furnaces	Incr.	0.39	-$898
Integrated Heating and DHW (Hydronic Heating)	Incr.	0.38	-$3,816
Micro-Combined Heat and Power (CHP)	Incr.	0.35	-$5,163
Point-of-Use (Tankless) Water Heaters (Gas)	Incr.	0.34	-$1,302
Condensing Gas Boilers	Incr.	0.33	-$2,130
Zoned-Up Windows: (ENERGY STAR®) Rating for a Colder Zone	Incr.	0.31	-$1,262
High-Efficiency (ENERGY STAR®) Dishwashers	Incr.	0.28	-$75
Condensing Gas Water Heaters	Incr.	0.24	-$1,008
Integrated Heating and DHW (Forced Air Heating)	Incr.	0.17	-$5,137
Slab Insulation (Unfinished Basements)	Incr.	0.13	-$1,058
High-Efficiency Gas-Fired Pool Heaters	Incr.	0.07	-$2,696

Back to Index

Tab Name	Measure Name (Full)	General Measure Description	Baseline Description	Upgrade Description	
Attic Insulation	Attic Insulation	Insulation levels can be increased in attics by blowing insulation into the attic spaces to fill and cover the space within the roof frame. One technique is to make sure loose-fill or batt insulation fills the attic floor joists fully and then add an additional layer of unfaced fibreglass batt insulation across the joists. To reduce cost, it is also possible to blow in cellulose insulation on top of the existing insulation instead.	A home with average insulation in the attic	Improving the attic insulation in an average home by RSI-3.5 (R-20), through the addition of cellulose insulation	Cool
Wall Insulation	Wall Insulation	It can be challenging to retrofit wall insulation in existing homes since the inside surfaces of the exterior walls are already finished. It is sometimes possible to add insulation to a wall by blowing insulating materials into the wall cavity, if sufficient space exists. Alternatively, if the siding is old and due for replacement, rigid foam insulation can be added before the new siding is installed. In this situation, it would also be quite cost-effective to install a more effective vapour and air barrier (e.g., Dupont Tyvek®) to reduce the amount of air leakage through the walls.	A home with average wall insulation	Improving the wall insulation in an average home by RSI-1.76 (R-10) to RSI-4.2 (R-24)	Cool
Slab Insulation	Slab Insulation (Unfinished Basements)	Insulation can be added both under and on top of basement slab floors. However, in existing homes, only the latter is practical. It is assumed that additional insulation is added to the slab floor while the basement is being finished. This can be done by purchasing insulated subfloor panels or laying down extruded polystyrene rigid foam insulation.	Homes with unfinished basements	The addition of slab (basement floor) insulation in homes with unfinished basements. It is assumed that 2" polystyrene rigid foam insulation (RSI-1.76 (R-10)) is being added.	Cool
Basement Insulation	Basement (Foundation) Insulation	In many homes, the basement is often under-insulated or even left uninsulated. Increasing the insulation level in basements can be achieved in a number of ways, including constructing a new insulated frame wall, moving the existing frame wall to increase the insulation level, adding extra insulation to the existing frame wall, adding rigid board insulation to the exterior of the foundation, or using a combination of interior and exterior rigid board insulation. As a lower cost alternative, it is also possible to use polyurethane foam	A home with average insulation in the basement (foundation) walls	In average homes with basements, improving the foundation wall insulation by RSI-2.12 (R-12)	Cool
Crawl Space Insul.	Crawl Space Insulation	Insulation levels remain below code in many homes that include crawlspaces as part of the basement design. If the floor is exposed, it would first be necessary to install a vapour barrier (e.g., 6 mil (600 gauge/0.15 mm) polyurethane barrier). Polyurethane foam could then be applied to the ceiling of the crawlspace (or the outer walls if there are pipes running below the floor). In addition to increasing the insulation of the crawlspace, this would help to eliminate any air leaks. Co-benefits of improved crawlspace insulation include improved thermal comfort, fewer drafts, and less condensation.	Minimal crawlspace insulation in homes with crawlspaces	In homes with crawlspaces, the addition of crawlspace insulation to bring the thermal resistance values up to RSI-2.1 (R-12)	Cool
Air Sealing	Professional Air Sealing/Weather Stripping/Caulking	Air leakage sealing of building envelopes includes completion of a blower door test to quantify leakage levels and to identify the location of air leaks. Generally, major leakage occurs at window-to-wall interfaces, around doors (especially patio doors), through electrical and plumbing penetrations and at the top of foundation walls. Installation of sealant and gaskets are generally accepted methods for reducing air leakage in buildings. Other sources of air leaks include pot lights, wall-to-floor interfaces (i.e., top and bottom of baseboards) and bathroom and kitchen exhaust piping.	No action taken	A comprehensive air sealing job, which results in an air tightness (ACH @ 50 Pa) improvement of 30%	Cool
Homeowner Air Sealing	Homeowner Air Sealing/Weather Stripping/Caulking	Homeowner air leakage sealing does not include a blower door test to quantify leakage levels and to identify the location of air leaks. Homeowners are likely to identify leakage primarily in more visible areas of the envelope, for example, the major leakage at window-to-wall interfaces, around doors (especially patio doors), through electrical and plumbing penetrations and perhaps at the top of foundation walls. Installation of weather stripping, sealant and gaskets are the most likely methods to be used. Less visible sources of air leaks such as pot lights, wall-to-floor interfaces (i.e., top and bottom of baseboards), bathroom and kitchen exhaust piping, and leaks from the top of walls into the attic are less likely to be addressed by the homeowner	No action taken	A homeowner air sealing job, which results in an air tightness (ACH @ 50 Pa) improvement of 15-20%	Cool
Sealing & Insul. - Old Homes	Air Leakage Sealing and Insulation (Old Homes)	This measure is targeted at homes that are at least 30 years old, since many of these homes haven't had any work done to improve insulation and air-sealing deficiencies and it is generally most cost-effective to upgrade the insulation and the air sealing at the same time. This includes wall, attic, foundation, and crawlspace retrofits of older homes but, for the purposes of this analysis, it is assumed that a retrofit is being conducted on the attic. The air-sealing portion of the work could be accomplished by segmenting the attic. In each segment, the existing insulation could be moved to one side and polyurethane foam could be sprayed in (serves as an air sealant in addition to its insulating properties). It may also be necessary to install or refurbish top plates to prevent airflow into the attic through exterior wall cavities. Other considerations that would increase the cost of the air-sealing portion of the work and may be present in some homes include sealing pot lights and kitchen or bathroom exhaust piping. When completed, these measures would dramatically improve the air tightness of an older home. The attic insulation could subsequently be cost-effectively improved with cellulose insulation.	An older home with average air tightness and attic insulation (for that particular vintage)	Improve both the attic insulation and the air tightness (ACH@50 Pa) in an old home. It is assumed that the air tightness is improved by 30% and that RSI-3.52 (R-20) of attic insulation is added.	Cool
Zone Up Windows	Zoned-Up Windows: (ENERGY STAR®) Rating for a Colder Zone	High-performance windows incorporate a number of additional energy-saving features, including low-E (soft coating), insulating spacers, argon fill and low conductivity frames (which can be sliders, hinged or picture). These windows are certified based on their energy rating (ER), which is based on their tested energy performance, rather than on their specific combination of features. In this case, however, the Energy Star windows for a colder zone are specified instead of the Energy Star windows for the zone where the house is located - for example, Zone C Energy Star windows would be chosen for a house in Zone A. High-performance windows also provide occupant co-benefits, such as reduced interior noise, reduced air leakage, greater thermal comfort, and fewer condensation problems.	ENERGY STAR windows for Zone B (double glazed, argon fill, low-e coating, insulating spacer, vinyl frame, hinged)	In existing homes, replacing 50% of windows with ENERGY STAR windows from Zone D (double-glazed, argon fill, low-e coating, insulating spacer, vinyl frame, hinged). In hew homes, replacing 100% of windows.	Not cool
Super Windows	Super High-Performance Windows	In addition to low-E coating, argon fill and insulating spacers, super-high performance windows incorporate features such as triple glazing, transparent insulating films, and fibreglass frames.	Standard windows (double glazed, air fill, no coating, metal spacer, vinyl frame, slider with sash)	In existing homes, replacing 50% of windows with super high-performance windows (triple-glazed, krypton fill, low-e and insulating coatings, insulating spacer, fiberglass frame, hinged). In new homes, replacing all of the windows with super high-performance windows.	Cool
High-Perf. New Homes	High-Performance Homes (EGH 80/R2000/ENERGY STAR®)	There are several certification schemes for energy-efficient new homes that incorporate integrated design and multiple envelope measures. An EnerGuide for Houses (EGH) rating is a standard measure of a home's energy performance, calculated by a professional EGH advisor. The rating is based on information on the construction of the home and the results of a blower door test performed once the house has been built. The R2000 standard is one method of achieving an EGH 80 rating. However, R2000 homes are required to achieve an air tightness level of 1.5 ACH@50Pa, install a heat recovery ventilator (HRV), and meet other environmental requirements. This substantially increases the cost of the measure. The ENERGY STAR® for New Homes program has similar requirements and also requires that homes be rated EGH 80. Since these three high performance home standards all result in essentially the same energy performance, the costs assumed for the measure are those of the least expensive of the three. EGH 80 is the lowest cost, since it allows the builder the most flexibitility for achieving the energy performance.	An average new home (EGH rating of 76 assumed)	A high-performance new home (EGH rating of 80 assumed). This option no longer applies as EGH of 80 is now the minimum.	Cool
Net Zero Ready Homes	Net-Zero Ready Energy Homes	Net-zero energy homes (NZEH) produce at least as much energy as they consume. This is accomplished by incorporating on-site power generation, such as solar PV panels or small wind turbines, to offset electrical loads. However, the energy consumption of a NZEH is significantly lower, due to the addition of a wide array of energy efficiency features. Measures that are typically considered include increased insulation, super high-performance windows, ENERGY STAR® appliances, solar thermal space and/or water heating, heat pumps, and passive solar designs. This measure is designed to produce a highly efficient house that is ready to be turned into a NZEH with the addition of on-site renewable energy generation.	An average new home (Minimum EGH rating of 80 required)	A net-zero energy ready home (EGH rating of 86 assumed)	Cool
Condensing Gas Furnaces	High Efficiency Condensing Gas Furnaces	Federal legislation now requires that all residential furnaces meet the minimum performance standard of 90% AFUE . However, higher efficiency condensing furnaces are available. These furnaces include more advanced heat exchanger designs that extract more heat from the flue gases before they are exhausted.	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 90%	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 96%	Cool
Early Retire Gas Furnaces	Early Retirement of Existing Gas Furnaces	Federal legislation now requires that all residential furnaces meet the minimum performance standard of 90% AFUE . However, consumers with less efficient furnaces that still work may wait years before replacing them. Early retirement of existing furnaces that are still functional is an option. Energy savings only last until the old furnace would have been replaced, because after that the energy consumption of the base case and upgrade is the same. The consumer has the added peace of mind of having a new furnace that is less likely to break down in winter	Keep existing 80% efficient furnace until failure, assumed to be in 9 years; then replace with the same furnace as the upgrade	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 90%	Cool
Condensing Gas Boilers	Condensing Gas Boilers	High-efficiency condensing boilers feature advanced heat exchanger designs that extract more heat from the flue gases before they are exhausted. So much heat is extracted that the flue gases condense and must be discharged as a condensate rather than a gas. In retrofit applications where condensing boilers are replacing non-condensing units, it may be necessary to modify the radiating system. Otherwise, the units may not actually condense the flue gas and realize their full efficiency potential.	A non-condensing mid-efficiency natural gas boiler (82% AFUE assumed)	A condensing natural gas boiler (92% AFUE assumed)	Cool
Gas Fireplaces	High Efficiency Gas Fireplaces	All vented gas fireplaces sold in Canada must now be tested for their energy efficiency using the Canadian Standards Association CSA-P.4.1-02 standard if they are shipped across provincial lines. The energy-efficiency rating of the fireplace is printed on the EnerGuide label. EnerGuide does not set a minimum efficiency level, so savings are possible by using the EnerGuide label to choose the more efficient unit.	An average efficiency natural gas fireplace (60% assumed)	A high efficiency natural gas fireplace (80% assumed)	Cool
Prog. Thermostats	Programmable Thermostats (Central Heating and Cooling)	Digital programmable thermostats provide improved temperature setting accuracy and allow occupants to preset temperatures for various time periods. A 4ºC temperature setback is often assumed during night and unoccupied periods. However, utility studies have indicated that a lower average setback value should be used to reflect the fact that the thermostat's setback capabilities do not completely reflect how they are used. For example, some home occupants reliably set back manual thermostats while others do not use the setback features on their electronic thermostats.	Non-programmable thermostat installed on central forced-air natural gas furnace and electric space cooling system	Programmable thermostat installed on central forced-air natural gas furnace and electric space cooling system	Cool
Solar Make-Up Air	Solar Pre-Heated Make-Up Air Systems (e.g., SolarWall®)	Solar preheated ventilation systems preheat incoming ventilation air and reduce heat loss through the portion of the building shell covered by them. They consist of perforated steel or aluminum absorber sheets that are mounted vertically on a building's exterior surface and are ideally mounted on southerly facing walls, plus or minus 20 degrees. The dark coloured metal sheets that make up the system are mounted a small distance away from the building's surface, creating an air cavity. A negative pressure is created within the cavity by ventilation fans and air is drawn through small holes in the metal panels. On sunny winter days, these systems can raise incoming air temperatures by 25°C to 35°C. In summer months, ventilation air can be drawn directly from the outside through a bypass damper, while heated air is rejected through vents at the top of the air cavity. These systems are generally used in commercial and industrial applications but they have seen some limited residential use.	Homes with ducting and heat recovery ventilators (HRVs)	A 10 m2 solar pre-heated make-up air system, located on the south side of a home	Cool
HRVs	High Efficiency Heat Recovery Ventilators (HRVs)	Heat recovery ventilators (HRVs) are heat exchangers that are integrated into the centralized ventilation and exhaust systems of many newer homes. In the winter, they allow for incoming fresh air to be heated by outgoing stale air. Conversely, in homes with central air conditioning systems, they allow incoming fresh air to be cooled by outgoing stale air in the summer. High efficiency HRVs incorporate more effective heat exchangers. Some models also include desiccant wheels so that latent heat (i.e. humidity) can be transferred between the two air streams	A standard-efficiency (sensible efficiency of approximately 70%) heat recovery ventilator (HRV), in a home with central heating and cooling	A high-efficiency heat recovery ventilator (HRV) (sensible efficiency of approximately 85%), in a home with central heating and cooling	Cool
Air Heat Pumps	Gas-Fired Air-Source Heat Pumps	Early gas-fired heat pumps, such as the York Triathlon, were unsuccessful due to their bulky size and poor quality design. A new generation of gas absorption heat pumps (GAHPs) is currently available through Robur, an Italian manufacturer. These systems can either be ground-source or air-source (i.e., the heat sink may be either an underground fluid loop or an above ground heat exchanger coil). Air-source systems are substantially less expensive since they don't require drilling to install underground fluid loops. However, they can also be much less efficient than ground-source versions since their efficiency is a function of outside air temperature. Commercial-sized GAHP systems have been available in Canada since mid-2007 but residential-sized systems are rare in North America. It is hoped that residential-sized units will become more available in Canada within the study period, but the current manufacturers do not have specific plans at this time. It is estimated that air-source systems can operate at temperatures as low as -29°C and have annual efficiencies of 105% in cold winter locations. In more moderate winter climates, an efficiency of up to 129% is advertised. Unlike electric heat pump systems, GAHPs do not require any auxiliary heating equipment. In addition, the lack of a mechanical compressor extends their lifetime and allows air-source systems to withstand	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 90%	A gas-fired air-source heat pump. This option is not valid because these units are not available in residential sizes.	Cool

Ground Heat Pumps	Gas-Fired Ground-Source Heat Pumps	Early gas-fired heat pumps, such as the York Triathlon, were unsuccessful due to their bulky size and poor quality design. A new generation of gas absorption heat pumps (GAHPs) is currently available through Robur, an Italian manufacturer. These systems can either be ground-source or air-source (i.e., the heat sink may be either an underground fluid loop or an above ground heat exchanger coil). Air-source systems are substantially less expensive since they don't require drilling to install underground fluid loops. However, they can also be much less efficient than ground-source versions since their efficiency is a function of outside air temperature. Commercial-sized GAHP systems have been available in Canada since mid-2007 but residential-sized systems are not currently available outside of Europe. It is hoped that residential-sized units will become more available in Canada within the study period, but the current manufacturers do not have specific plans at this time. Ground-source GAHPs have efficiencies (COPs) ranging from 120% to 130% Unlike electric heat pump systems, GAHPs do not require any auxiliary heating equipment. In addition, the lack of a mechanical compressor extends their lifetime.	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 90%	A gas-fired ground-source heat pump. This option is not valid because these units are not available in residential sizes.	Cool
Heating & DHW	Integrated Heating and DHW (Forced Air Heating)	Integrated mechanical systems combine the most efficient technologies for residential space heating and domestic water heating into one package. For example, the Matrix system by NTI NY Thermal incorporates a condensing furnace, condensing boiler, condensing water heater and HRV all in one unit. Primary benefits of the integrated units include compact construction, lower cost of installation (only one set of gas, water and circulation connections are required), and lower installation and maintenance costs (once the technology is mature). Since the minimum performance standards for furnaces was brought up to 90% efficiency at the end of 2009, the base case system is a 90% efficient forced-air furnace and a standard efficiency natural gas tank-style water heater. With this baseline, the integrated system would offer little in the way of space heating savings, but it does still offer DHW savings because the integrated system would heat domestic water with	A 90% AFUE efficient forced-air condensing furnace, a standard efficiency natural gas tank-style water heater (EF of 0.62 or 0.64 assumed) and a standard efficiency HRV	An integrated heating and DHW system, with a condensing furnace (AFUE of 94), a condensing natural gas water heater (EF of 0.80 assumed), and an HRV with an efficiency similar to that in the base case (72%).	Cool
Heating & DHW (Hydronic)	Integrated Heating and DHW (Hydronic Heating)	Integrated mechanical systems combine the most efficient technologies for residential space heating and domestic water heating into one package. For example, the Matrix system by NTI NY Thermal incorporates a condensing furnace, condensing boiler, condensing water heater and HRV all in one unit. Primary benefits of the integrated units include compact construction, lower cost of installation (only one set of gas, water and circulation connections are required), and lower installation and maintenance costs (once the technology is mature). Water heating in the base case is assumed to be provided by a standard efficiency natural gas tank-style water heater (EF of 0.62 or 0.64), while space heating is provided by a non-condensing boiler, assumed to have an AFUE of 82% . The HRV in the base case is assumed to be of similar efficiency to the HRV in the	A non-condensing boiler with an AFUE of 82% and a standard efficiency natural gas tank-style water heater (EF of 0.62 or 0.64). An HRV of similar efficiency to the integrated unit (72%) is assumed.	An integrated heating and DHW system, with a condensing boiler (AFUE 92.7), a condensing natural gas water heater (EF of .85) and an HRV with an efficiency similar to that in the base case (72%).	Cool
Condensing Gas DHW	Condensing Gas Water Heaters	Condensing water heaters feature advanced heat exchanger designs that extract more heat from the flue gases before they are exhausted. So much heat is extracted that the flue gases condense and must be discharged as a condensate rather than a gas. As a result, the efficiency of these types of water heaters is significantly higher than standard water heaters.	A conventional storage natural gas hot water heater (EF of 0.62 or 0.64 assumed)	A condensing natural gas water heater (EF of 0.80 assumed)	Cool
Tankless Gas DHW	Point-of-Use (Tankless) Water Heaters (Gas)	Tankless water heaters heat water on demand, eliminating hot water storage. The absence of hot water storage reduces standby heat losses. The efficiency of tankless water heaters is generally improved by the addition of features such as modulating controls, electric spark ignitions and direct venting. The applicability of tankless gas-fired DHW systems is somewhat limited by venting constraints; the burner is significantly larger than for a standard water heater, so a larger vent is required. Some houses cannot accommodate the larger flue because of requirements for clearance from other structures, windows, etc.	A conventional storage natural gas hot water heater (EF of 0.60 assumed)	A tankless natural gas hot water heater (EF of 0.82 assumed)	Cool
Solar DHW	Active Solar Water Heating Systems	Solar DHW systems use the energy of the sun to heat water. The primary components of a solar water heating system are a solar collector, a heat transfer fluid and a well-insulated storage tank. Due to Canada's colder climate and the higher likelihood of freezing, active closed-loop systems are generally used. These systems use a pump to circulate a non-freezing heat transfer fluid through the collectors and then through a heat exchanger so that the thermal energy can be transferred to the water. Solar DHW are not generally sized to supply all of the annual requirement for water heating in the home, because if the system is sized for cloudy winter periods it will have enormous excess capacity during sunny summer periods, and will cost far too much to install. The system analyzed here meets approximately 2/3 of the annual requirements.	No solar water heating system installed	Solar DHW systems use the energy of the sun to heat water. The primary components of a solar water heating system are a solar collector, a heat transfer fluid and a well-insulated storage tank. Due to Canada's colder climate and the higher likelihood of	Cool
DHW Tank Insulation	DHW Tank Insulation	Pre-cut tank jackets/blankets (DHW tank insulation) are readily available and can be installed on hot water storage tanks to reduce standby heat losses. Caution is required to install blankets on gas water heaters, to avoid blocking the flue, the air intake to the burner, or the drain at the bottom. The thermostat should also remain uncovered.	No additional tank insulation installed on a conventional hot water storage tank	An insulating blanket installed on a hot water storage tank to reduce standby losses	Cool
DHW Pipe Insulation	DHW Pipe Insulation	Hot water pipe insulation reduces the distribution losses for DHW. In general, only the first one or two metres of pipe nearest the DHW tank are accessible enough to insulate. However, since the dominant loss is from the pipe transferring heat out of the tank and then losing it to the basement, the first meter of pipe is the most important and only worthwhile section of pipe to insulate. Insulating this section of piping affects both the delivery of hot water and the losses from the tank. Delivery temperature is slightly increased during a hot water draw, and the water in the piping does not lose its stored heat as quickly between draws	No insulation installed on the piping leading out of a hot water storage tank	Installing pipe insulation on the first meter of piping leading out of a hot water storage tank	Cool
DHW Heat Traps	DHW Heat Traps	This measure involves the installation of external "S-type" pre-bent copper pipe heat traps on both of the outlets ofwater heaters. This measure is only being considered during the installation of new tanks since it can be prohibitively expensive to bring in a plumber otherwise.	No heat trap installed on a new electric storage hot water heater	Installing an external "S-type" pre-bent copper pipe heat trap on an gas-fired storage hot water heater. This option no longer applies because most new hot water heaters include an integrated heat trap.	Cool
Showerheads	Ultra Low-Flow Showerheads	Ultra low-flow showerheads have aerators and flow restrictors to reduce water use. At 4.75 LPM (1.25 GPM), their flow rates are substantially lower than traditional low-flow fixtures, whose flow rates range between 7.6 LPM and 9.5 LPM (2.0-2.5 GPM).	A low-flow showerhead with a 2.0 GPM (7.6 LPM) flow rate (conservative estimate)	An ultra low-flow showerhead with a 1.25 GPM (4.75) flow rate	Cool
Faucet Aerators	Faucet Aerators	Aerators can easily be attached to most faucets to restrict the flow rate of water flowing from them. This can result in savings to both water consumption and DHW energy.	No faucet aerator installed on the kitchen faucet	A 1.5 GPM (5.7 LPM) faucet aerator installed on the kitchen faucet	Cool
Wastewater Heat Recovery	Wastewater Heat Recovery Systems	Residential wastewater heat recovery systems transfer the waste heat from drains to preheat make-up water. These systems work well only for DHW uses in which the hot water use and the draining of wastewater are simultaneous. Thus, in homes, application to anything other than showers is difficult. Heat recovery systems incorporate shell-and-tube heat exchangers that typically have efficiencies in the range of 40% to 55%, depending on factors such as design, material, overall length, and fluid flow rate.	No wastewater heat recovery system installed	A 60" wastewater heat recovery system	Cool
DHW Recirculation	DHW Recirculation Systems (e.g. Metlund D'MAND®)	When turning on the hot water tap, it often takes a long time before hot water begins to flow. DHW recirculation systems can be used to pump hot water to a faucet at the demand of a user, getting hot water to the fixture four to five times quicker than traditional systems. Water that is in the hot water lines is pumped back to the water heater either through the cold water lines or through a dedicated line. This pumping continues until the temperature of the hot water at the point of use reaches a specified value. In retrofit situations, this pumping system is generally installed at the faucet that is furthest away from the water heater and the system is enabled by remote activation from the other points of use. Along with improved convenience and water savings (since water isn't flushed down the drain), energy savings are achieved since the water that is pumped back to the water heater is generally warmer than city water. In addition, since the pump gets water to the fixture more quickly, there is an overall reduction of hot water use.	A home with no DHW recirculation system	A home with a DHW recirculation system installed on the point-of-use farthest away from the hot water tank	Cool
ESTAR Dishwashers	High-Efficiency (ENERGY STAR®) Dishwashers	ENERGY STAR® dishwashers save energy by using improved technology for the primary wash cycle and by using less hot water to clean. Features include more effective washing action, energy-efficient motors, and sensors that determine the length of the wash cycle and the temperature of the water necessary to clean the dishes. In addition, some advanced dishwashers can sense and adjust for the amount of soil on dishes, using only as much water as necessary. These savings affect both the energy used for heating the water and the mechanical energy of the dishwasher	A standard-sized new dishwasher	An ENERGY STAR® certified, standard-sized new dishwasher	Cool
ESTAR Clothes Washers	High-Efficiency (ENERGY STAR®) Clothes Washers	In January 2011, the ENERGY STAR® standard for clothes washers will be increased once again. As a result, very few top loading washers will meet ENERGY STAR® requirements. Instead, the overwhelming majority of ENERGY STAR® models will be front loading (horizontal axis) models. Compared to standard models, front loading washing machines use less hot water, less mechanical energy, and result in dryer energy savings due to faster spin cycle speeds	A standard 3.2 cu. ft. (90.6 L) top loading clothes washer	An ENERGY STAR® certified, 3.2 cu. ft. (90.6 L) front loading clothes washer	Cool
Gas Clothes Dryers	High-Efficiency Gas Clothes Dryers	The major distinction with energy-efficient gas clothes dryer models is that they incorporate termination controls to sense dryness and turn off automatically. The most efficient models have moisture sensors in the drum for sensing dryness, while other lower-cost and slightly less efficient models infer dryness by sensing the temperature of the exhaust air. The majority of the retail models currently available employ some type of dryness sensing technology but it is unclear how often these controls are used by homeowners	A gas clothes dryer with a temperature sensor	A gas clothes dryer with a moisture sensor. This option is no longer valid because almost all new gas dryers have moisture sensors.	Cool
Pool Covers	Insulating Pool Covers	Between 30% and 50% of the heat loss from a swimming pool is due to evaporation. In an outdoor pool, this heat loss either adds to the cost of heating the pool or shortens the swimming season. Evaporation also increases the quantity of chemicals that must be added to the pool. A pool cover can reduce evaporation and other heat losses but can also reduce heat gains depending on the design. An insulating vinyl pool cover is assumed for this analysis. Although substantially more expensive than the bubble type covers, insulating vinyl pool covers are much more robust and, thus, have much longer lifetimes. They are also more effective at trapping heat	A pool with no insulating cover	Installing a pool cover to reduce the heat loss from a heated pool	Cool
Heat Pump Pool Heaters	Heat Pump Pool Heaters	Air source heat pumps can be used to replace electric or gas-fired pool heaters. The principal of operation for these types of heat pumps is very similar to refrigerators and air conditioning units, in that they are used to transfer heat from one place to another. This allows them to be significantly more efficient than electric or gas-fired pool heaters, since these types of heaters generate heat rather than transferring it.	A standard efficiency gas-fired pool heater	A heat pump pool heater. This option is not valid in this study because it is a fuel-switching measure.	Cool
Efficient Pool Heaters	High-Efficiency Gas-Fired Pool Heaters	High-efficiency pool heaters incorporate advanced heat exchangers, forced draft combustion systems, pilot-less ignitions and innovations in hydraulics, which results in performance efficiencies that range between 90% and 95%, compared to efficiencies of 80% to 85% for standard models.	A standard efficiency gas-fired pool heater (82.5% efficiency assumed)	A high efficiency gas-fired pool heater (92.5% efficiency assumed)	Cool
Solar Pool Heaters	Solar Pool Heaters	Unlike other types of solar hot water systems, solar pool heaters do not include storage tanks or heat exchangers, and, since they are only used in warmer weather, they generally employ unglazed solar collectors that are composed of a polymer. These collectors are mounted of the roofs of homes or in an unshaded part of the yard. The heat transfer fluid is usually pool water that is pumped directly into the array of collectors and flows within the polymer in a serpentine array in order to pick up heat. Although solar DHW systems do require a pump, its consumption is similar to that used in electric and gas-fired pool heaters. Solar pool heaters can completely offset the energy requirements of conventional pool heaters. And,	A standard efficiency gas-fired pool heater	A solar pool heater with an unglazed collector	Cool
Micro-CHP	Micro-Combined Heat and Power (CHP)	Several types of micro-combustion heat and power (micro CHP) systems are either available or under development. These units all generate electrical power and capture the resulting "waste" heat for space and/or water heating. Reciprocating engine units such as the Honda Freewatt use a well-developed technology and can be scaled to a residential size. Power generate efficiencies range from 20-40% and up to 90% of the waste heat can be captured. Various sizing and control strategies can be used: for example, the amount of heat can be maximized or the amount of electricity can be maximized. This example assumes a unit such as the Honda Freewatt hydronic system, which has a 1.2 kW maximum electrical output and a 3.5 kW thermal output. Heat load following control is assumed to avoid fuel-switching, however power load following control is usually more economically attractive for applications involving seasonally varying loads. A back-up boiler is included in the Honda Freewatt package. Net-metering is	Condensing gas-fired boiler (92% AFUE)	Installing a microturbine system in an average home, offsetting both the electric consumption from the grid and the amount of space and water heating that must be provided by a boiler. Note that this technology is not currently available in Canada.	Cool

MISCELLANEOUS INPUTS

Back to Index

Measure Sheet Title: TERASEN GAS: RESIDENTIAL SECTOR, NORTHERN INTERIOR - NATURAL GAS EFFICIENCY

Number of Sub-Sectors (1 to 15): 8

	1	2	3	4	5	6	7	8	Average
Sub-Sector Names:	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.

FUEL MIX

Space Heating

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Electricity	5.5%	5.5%	5.5%	6.3%	6.3%	6.3%	5.5%	5.5%	5.6%	
Natural Gas	93.5%	93.5%	93.5%	93.5%	93.5%	93.5%	93.5%	93.5%	93.5%	
Oil									0.0%	Not used
Wood									0.0%	Not used
Total	**99.0%**	**99.0%**	**99.0%**	**99.8%**	**99.8%**	**99.8%**	**99.0%**	**99.0%**	**99.1%**	

DHW

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Electricity	10.0%	10.0%	10.0%	10.6%	10.6%	10.6%	9.8%	9.8%	10.0%	
Natural Gas	88.8%	88.8%	88.8%	88.2%	88.2%	88.2%	88.8%	88.8%	88.7%	
Oil									0.0%	Not used
Total	**98.8%**	**98.8%**	**98.8%**	**98.8%**	**98.8%**	**98.8%**	**98.6%**	**98.6%**	**98.8%**	

Cooking

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Electricity	79.3%	79.3%	79.3%	84.6%	84.6%	84.6%	79.6%	79.6%	79.8%	
Natural Gas	20.7%	20.7%	20.7%	15.4%	15.4%	15.4%	20.4%	20.4%	20.2%	
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	

Clothes Dryers

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Electricity	91.0%	91.0%	91.0%	94.3%	94.3%	94.3%	91.2%	91.2%	91.3%	
Natural Gas	9.0%	9.0%	9.0%	5.7%	5.7%	5.7%	8.8%	8.8%	8.7%	
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	

Pools and Spas

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Electricity	83.5%	83.5%	83.5%	83.5%	83.5%	83.5%	83.5%	83.5%	83.5%	
Natural Gas	16.5%	16.5%	16.5%	16.5%	16.5%	16.5%	16.5%	16.5%	16.5%	
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	

HEATING PENALTY/ COOLING BENEFITS

Mix of Heating Fuels (for heating penalty and cooling benefits calculations)

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Electricity	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	Not used
Natural Gas	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	Not used
Oil	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	Not used
Wood	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	Not used
Total	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	

Average Heating System Efficiency by Fuel

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Electricity	110.0%	110.0%	110.0%	110.0%	110.0%	110.0%	100.0%	100.0%	109.5%	Not used
Natural Gas	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	Not used
Oil	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	Not used

Average Cooling System Efficiency by Fuel

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Electricity	300.0%	300.0%	300.0%	300.0%	300.0%	300.0%	300.0%	300.0%	300.0%	Not used

HOUSING STOCK

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Occupancy Rates	3.1	3.1	3.1	2.4	2.4	2.4	1.9	1.9	3.0	Stats Canada, values for Vancouver
Distribution of Housing Types	31.2%	59.1%	80.6%	0.6%	4.4%	14.6%	4.8%	4.8%	N/A	

ECONOMIC PARAMETERS

Back to Index

Customer Resource Costs

Electric Energy ($/kWh)	$0.083
Electric Demand ($/kW)	
Natural Gas ($/MJ)	$0.010
Oil ($/L)	
Water ($/1000L)	

Sources:

Electricity: Residential retail cost of electricity and demand taken from the spreadsheet "20100111_Planning Tool with Partners_TGVI_Res.xlsx" provided by Terasen

Gas: TGI rate taken from the spreadsheet "20100111_Planning Tool with Partners_TGVI_Res.xlsx" provided by Terasen

Oil: Cost not used

Water: Cost not used

GHG Adder Inputs

	Electricity (kWh)	Natural Gas (m^3)	Fuel Oil (L)	Water (1000L)	
			Not used	Not used	
GHG Cost, 2010 ($/tonne CO_2e)					Not used--GHG costs already in avoided cost
GHG Cost, 2011 ($/tonne CO_2e)					Not used--GHG costs already in avoided cost
GHG Cost, 2012+ ($/tonne CO_2e)					Not used--GHG costs already in avoided cost
Emissions Coefficient (tonnes CO_2e/unit)	0.0000	0			Not used--GHG costs already in avoided cost
GHG Adder, 2010 ($/unit)	0.0000	0	0.0000	0.0000	Not used--GHG costs already in avoided cost
GHG Adder, 2011 ($/unit)	0.0000	0	0.0000	0.0000	Not used--GHG costs already in avoided cost
GHG Adder, 2012+ ($/unit)	0.0000	0	0.0000	0.0000	Not used--GHG costs already in avoided cost

- Electricity emissions factors based on BC emission factors presented on http://www.ec.gc.ca/ges-ghg/default.asp?lang=En&n=EAF0E96A-1#section11, from Environment Canada; *National Inventory Report (1990-2008): Greenhouse Gas Sources and Sinks in Canada* , May 2008.

- Natural gas emissions factors based on BC emission factors presented on http://www.ec.gc.ca/ges-ghg/default.asp?lang=En&n=AC2B7641-1 from Environment Canada; *National Inventory Report (1990-2008): Greenhouse Gas Sources and Sinks in Canada* , May 2008.

Other Economic Parameters

Discount Rate	7.38%

AVOIDED COSTS (2009)

Back to Index

GHG Adder	No	**Note:** GHG adders already added to avoided costs
Inflation Factor	N/A	**Note:** Not currently being used
Discount Rate	7.38%	

YEAR	ELECTRICITY (ENERGY) ☑				ELECTRICITY (DEMAND) ☐				NATURAL GAS ☑				FUEL OIL ☐		WATER ☐	
	Baseload		Peak		Baseload		Peak		Baseload		Weather Sensitive		Rates	NPV	Rates	NPV
	Rates	NPV	Rates	NPV	Rates	NPV	Rates	NPV	Rates	NPV	Rates	NPV				
1	0.1284	0.1284	0.1584	0.1584	0.0000	0.0000	0.0000	0.0000	0.0065	0.0065	0.3407	0.3407	0.00000	0.00000	0.00000	0.00000
2	0.1284	0.2480	0.1584	0.3059	0.0000	0.0000	0.0000	0.0000	0.0070	0.0130	0.3251	0.6434	0.00000	0.00000	0.00000	0.00000
3	0.1284	0.3593	0.1584	0.4433	0.0000	0.0000	0.0000	0.0000	0.0080	0.0200	0.3324	0.9317	0.00000	0.00000	0.00000	0.00000
4	0.1284	0.4630	0.1584	0.5712	0.0000	0.0000	0.0000	0.0000	0.0090	0.0272	0.3265	1.1954	0.00000	0.00000	0.00000	0.00000
5	0.1284	0.5596	0.1584	0.6904	0.0000	0.0000	0.0000	0.0000	0.0096	0.0344	0.3408	1.4517	0.00000	0.00000	0.00000	0.00000
6	0.1284	0.6496	0.1584	0.8013	0.0000	0.0000	0.0000	0.0000	0.0101	0.0415	0.3535	1.6993	0.00000	0.00000	0.00000	0.00000
7	0.1284	0.7333	0.1584	0.9046	0.0000	0.0000	0.0000	0.0000	0.0105	0.0483	0.3599	1.9341	0.00000	0.00000	0.00000	0.00000
8	0.1284	0.8113	0.1584	1.0009	0.0000	0.0000	0.0000	0.0000	0.0108	0.0548	0.3557	2.1501	0.00000	0.00000	0.00000	0.00000
9	0.1284	0.8840	0.1584	1.0905	0.0000	0.0000	0.0000	0.0000	0.0110	0.0611	0.3626	2.3553	0.00000	0.00000	0.00000	0.00000
10	0.1284	0.9516	0.1584	1.1739	0.0000	0.0000	0.0000	0.0000	0.0112	0.0670	0.3697	2.5500	0.00000	0.00000	0.00000	0.00000
11	0.1284	1.0146	0.1584	1.2517	0.0000	0.0000	0.0000	0.0000	0.0114	0.0726	0.3769	2.7349	0.00000	0.00000	0.00000	0.00000
12	0.1284	1.0733	0.1584	1.3240	0.0000	0.0000	0.0000	0.0000	0.0116	0.0779	0.3842	2.9105	0.00000	0.00000	0.00000	0.00000
13	0.1284	1.1279	0.1584	1.3914	0.0000	0.0000	0.0000	0.0000	0.0119	0.0829	0.3917	3.0771	0.00000	0.00000	0.00000	0.00000
14	0.1284	1.1788	0.1584	1.4542	0.0000	0.0000	0.0000	0.0000	0.0121	0.0877	0.3993	3.2354	0.00000	0.00000	0.00000	0.00000
15	0.1284	1.2262	0.1584	1.5127	0.0000	0.0000	0.0000	0.0000	0.0123	0.0923	0.4071	3.3856	0.00000	0.00000	0.00000	0.00000
16	0.1284	1.2703	0.1584	1.5671	0.0000	0.0000	0.0000	0.0000	0.0125	0.0966	0.4150	3.5282	0.00000	0.00000	0.00000	0.00000
17	0.1284	1.3114	0.1584	1.6178	0.0000	0.0000	0.0000	0.0000	0.0128	0.1007	0.4231	3.6636	0.00000	0.00000	0.00000	0.00000
18	0.1284	1.3497	0.1584	1.6650	0.0000	0.0000	0.0000	0.0000	0.0130	0.1045	0.4313	3.7922	0.00000	0.00000	0.00000	0.00000
19	0.1284	1.3853	0.1584	1.7090	0.0000	0.0000	0.0000	0.0000	0.0133	0.1082	0.4397	3.9143	0.00000	0.00000	0.00000	0.00000
20	0.1284	1.4185	0.1584	1.7499	0.0000	0.0000	0.0000	0.0000	0.0135	0.1117	0.4483	4.0302	0.00000	0.00000	0.00000	0.00000
21	0.1284	1.4494	0.1584	1.7881	0.0000	0.0000	0.0000	0.0000	0.0139	0.1151	0.4570	4.1402	0.00000	0.00000	0.00000	0.00000
22	0.1284	1.4782	0.1584	1.8236	0.0000	0.0000	0.0000	0.0000	0.0143	0.1183	0.4659	4.2446	0.00000	0.00000	0.00000	0.00000
23	0.1284	1.5050	0.1584	1.8566	0.0000	0.0000	0.0000	0.0000	0.0146	0.1213	0.4750	4.3438	0.00000	0.00000	0.00000	0.00000
24	0.1284	1.5300	0.1584	1.8874	0.0000	0.0000	0.0000	0.0000	0.0150	0.1242	0.4843	4.4380	0.00000	0.00000	0.00000	0.00000
25	0.1284	1.5532	0.1584	1.9161	0.0000	0.0000	0.0000	0.0000	0.0154	0.1270	0.4937	4.5274	0.00000	0.00000	0.00000	0.00000
26	0.1284	1.5749	0.1584	1.9428	0.0000	0.0000	0.0000	0.0000	0.0157	0.1297	0.5033	4.6122	0.00000	0.00000	0.00000	0.00000
27	0.1284	1.5950	0.1584	1.9677	0.0000	0.0000	0.0000	0.0000	0.0161	0.1322	0.5131	4.6928	0.00000	0.00000	0.00000	0.00000
28	0.1284	1.6138	0.1584	1.9909	0.0000	0.0000	0.0000	0.0000	0.0165	0.1346	0.5231	4.7693	0.00000	0.00000	0.00000	0.00000
29	0.1284	1.6313	0.1584	2.0124	0.0000	0.0000	0.0000	0.0000	0.0168	0.1369	0.5333	4.8419	0.00000	0.00000	0.00000	0.00000
30	0.1284	1.6476	0.1584	2.0325	0.0000	0.0000	0.0000	0.0000	0.0172	0.1391	0.5419	4.9107	0.00000	0.00000	0.00000	0.00000

AVOIDED COSTS (2009) - RAW INPUTS

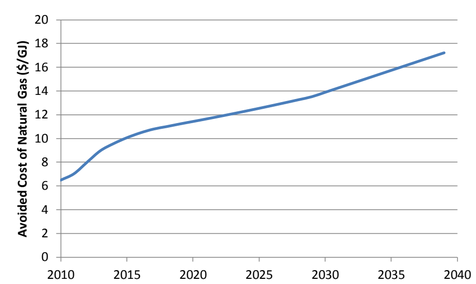
Back to Index

GHG Adder	N/A	**Note:** Not to be modified here
Inflation Factor	N/A	**Note:** Not currently being used
Discount Rate	7.38%	

Units are $/MJ

YEAR	ELECTRICITY (ENERGY)				ELECTRICITY (DEMAND)				NATURAL GAS				FUEL OIL		WATER	
	Baseload		Peak		Baseload		Peak		Baseload		Weather Sensitive		Rates	NPV	Rates	NPV
	Rates	NPV	Rates	NPV	Rates	NPV	Rates	NPV	Rates	NPV	Rates	NPV				
			Not used		Not used		Not used				Not used		Not used		Not used	
1	0.1284	0.1284	0.1584	0.1584	15.0000	15.0000	15.0000	15.0000	0.0065	0.0065	0.3407	0.3407	0.75000	0.75000	1.68504	1.68504
2	0.1284	0.2480	0.1584	0.3059	15.1000	29.0622	15.1000	29.0622	0.0070	0.0130	0.3251	0.6434	0.76000	1.45777	1.71705	3.28408
3	0.1284	0.3593	0.1584	0.4433	15.2000	42.2447	15.2000	42.2447	0.0080	0.0200	0.3324	0.9317	0.77000	2.12556	1.74967	4.80151
4	0.1284	0.4630	0.1584	0.5712	15.3000	54.6019	15.3000	54.6019	0.0090	0.0272	0.3265	1.1954	0.78000	2.75554	1.78292	6.24151
5	0.1284	0.5596	0.1584	0.6904	15.4000	66.1851	15.4000	66.1851	0.0096	0.0344	0.3408	1.4517	0.79000	3.34974	1.81679	7.60802
6	0.1284	0.6496	0.1584	0.8013	15.5000	77.0422	15.5000	77.0422	0.0101	0.0415	0.3535	1.6993	0.80000	3.91011	1.85131	8.90479
7	0.1284	0.7333	0.1584	0.9046	15.6000	87.2184	15.6000	87.2184	0.0105	0.0483	0.3599	1.9341	0.81000	4.43849	1.88649	10.13538
8	0.1284	0.8113	0.1584	1.0009	15.7000	96.7559	15.7000	96.7559	0.0108	0.0548	0.3557	2.1501	0.82000	4.93662	1.92233	11.30317
9	0.1284	0.8840	0.1584	1.0905	15.8000	105.6945	15.8000	105.6945	0.0110	0.0611	0.3626	2.3553	0.83000	5.40618	1.95886	12.41136
10	0.1284	0.9516	0.1584	1.1739	15.9000	114.0715	15.9000	114.0715	0.0112	0.0670	0.3697	2.5500	0.84000	5.84874	1.99607	13.46300
11	0.1284	1.0146	0.1584	1.2517	16.0000	121.9218	16.0000	121.9218	0.0114	0.0726	0.3769	2.7349	0.85000	6.26579	2.03400	14.46096
12	0.1284	1.0733	0.1584	1.3240	16.1000	129.2782	16.1000	129.2782	0.0116	0.0779	0.3842	2.9105	0.86000	6.65874	2.07265	15.40800
13	0.1284	1.1279	0.1584	1.3914	16.2000	136.1716	16.2000	136.1716	0.0119	0.0829	0.3917	3.0771	0.87000	7.02894	2.11203	16.30671
14	0.1284	1.1788	0.1584	1.4542	16.3000	142.6309	16.3000	142.6309	0.0121	0.0877	0.3993	3.2354	0.88000	7.37766	2.15215	17.15955
15	0.1284	1.2262	0.1584	1.5127	16.4000	148.6831	16.4000	148.6831	0.0123	0.0923	0.4071	3.3856	0.89000	7.70611	2.19304	17.96887
16	0.1284	1.2703	0.1584	1.5671	16.5000	154.3538	16.5000	154.3538	0.0125	0.0966	0.4150	3.5282	0.90000	8.01542	2.23471	18.73689
17	0.1284	1.3114	0.1584	1.6178	16.6000	159.6667	16.6000	159.6667	0.0128	0.1007	0.4231	3.6636	0.91000	8.30667	2.27717	19.46571
18	0.1284	1.3497	0.1584	1.6650	16.7000	164.6443	16.7000	164.6443	0.0130	0.1045	0.4313	3.7922	0.92000	8.58088	2.32044	20.15734
19	0.1284	1.3853	0.1584	1.7090	16.8000	169.3075	16.8000	169.3075	0.0133	0.1082	0.4397	3.9143	0.93000	8.83903	2.36453	20.81367
20	0.1284	1.4185	0.1584	1.7499	16.9000	173.6761	16.9000	173.6761	0.0135	0.1117	0.4483	4.0302	0.94000	9.08201	2.40945	21.43651
21	0.1284	1.4494	0.1584	1.7881	17.0000	177.7686	17.0000	177.7686	0.0139	0.1151	0.4570	4.1402	0.95000	9.31071	2.45523	22.02756
22	0.1284	1.4782	0.1584	1.8236	17.1000	181.6021	17.1000	181.6021	0.0143	0.1183	0.4659	4.2446	0.96000	9.52593	2.50188	22.58844
23	0.1284	1.5050	0.1584	1.8566	17.2000	185.1931	17.2000	185.1931	0.0146	0.1213	0.4750	4.3438	0.97000	9.72844	2.54942	23.12071
24	0.1284	1.5300	0.1584	1.8874	17.3000	188.5568	17.3000	188.5568	0.0150	0.1242	0.4843	4.4380	0.98000	9.91898	2.59786	23.62581
25	0.1284	1.5532	0.1584	1.9161	17.4000	191.7073	17.4000	191.7073	0.0154	0.1270	0.4937	4.5274	0.99000	10.09824	2.64722	24.10513
26	0.1284	1.5749	0.1584	1.9428	17.5000	194.6582	17.5000	194.6582	0.0157	0.1297	0.5033	4.6122	1.00000	10.26686	2.69751	24.55999
27	0.1284	1.5950	0.1584	1.9677	17.6000	197.4220	17.6000	197.4220	0.0161	0.1322	0.5131	4.6928	1.01000	10.42546	2.74877	24.99164
28	0.1284	1.6138	0.1584	1.9909	17.7000	200.0105	17.7000	200.0105	0.0165	0.1346	0.5231	4.7693	1.02000	10.57463	2.80099	25.40126
29	0.1284	1.6313	0.1584	2.0124	17.8000	202.4346	17.8000	202.4346	0.0168	0.1369	0.5333	4.8419	1.03000	10.71490	2.85421	25.78997
30	0.1284	1.6476	0.1584	2.0325	17.9000	204.7049	17.9000	204.7049	0.0172	0.1391	0.5419	4.9107	1.04000	10.84681	2.90844	26.15885

2010	6.490252		1	
2011	7.025272	0.53502	2	
2012	8.005337	0.980065	3	
2013	8.966252	0.960915	4	
2014	9.567327	0.601075	5	
2015	10.06053	0.493207	6	
2016	10.46367	0.403134	7	
2017	10.78438	0.320707	8	
2018	10.99733	0.212952	9	
2019	11.22083	0.223501	10	
2020	11.42842	0.207588	11	
2021	11.64064	0.212223	12	
2022	11.8576	0.216965	13	
2023	12.07942	0.221816	14	
2024	12.3062	0.22678	15	
2025	12.53806	0.23186	16	
2026	12.77512	0.237057	17	
2027	13.01749	0.242375	18	
2028	13.26531	0.247816	19	
2029	13.51869	0.253384	20	
2030	13.88861	0.369918	21	
2031	14.25853	0.369918	22	
2032	14.62845	0.369918	23	
2033	14.99836	0.369918	24	
2034	15.36828	0.369918	25	
2035	15.7382	0.369918	26	df
2036	16.10812	0.369918	27	
2037	16.47803	0.369918	28	
2038	16.84795	0.369918	29	
2039	17.21787	0.369918	30	
2040	17.58779	0.369918	31	
2041	17.95771	0.369918	32	
2042	18.32762	0.369918	33	
2043	18.69754	0.369918	34	
2044	19.06746	0.369918	35	
2045	19.43738	0.369918	36	
2046	19.8073	0.369918	37	
2047	20.17721	0.369918	38	
2048	20.54713			



	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Avoided commodity and Mindstream cost($/GJ)	$ 5.59	$ 5.88	$ 6.61	$ 7.32	$ 7.92	$ 8.41	$ 8.82	$ 9.14	$ 9.35	$ 9.57	$ 9.78	$ 9.99	$ 10.21	$ 10.43	$ 10.66	$ 10.89	$ 11.13	$ 11.37	$ 11.62	$ 11.87
Distribut	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
CARBOI	*0.75*	*1.00*	*1.25*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*
Total	$ 6.49	$ 7.03	$ 8.01	$ 8.97	$ 9.57	$ 10.06	$ 10.46	$ 10.78	$ 11.00	$ 11.22	$ 11.43	$ 11.64	$ 11.86	$ 12.08	$ 12.31	$ 12.54	$ 12.78	$ 13.02	$ 13.27	$ 13.52

Baseline Consumption (Case 1)

Back to Index

BASIS/TAG: 1. Annual consumption, end use
DESCRIPTION: Annual energy consumption, at the end use level
UNIT: /yr.

CONVERSION FACTORS:

Electricity (kWh to MJ):	3.60	
Natural Gas (m^3 to MJ):	39.62	Not used
Fuel Oil (L to MJ):	36.74	Not used

NATURAL UNITS:

Electricity

#	Main End Use	Sub End Use/Equipment (If Applicable)	% of Main End-Use (Default)	Average Consumption (kWh/yr.)									References/Notes
				Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
1	**Ventilation and Circulation**		**100.0%**	600.0	800.0	768.3	400.0	400.0	384.2	207.4	199.2	687.3	
2	**Space Cooling**		**100.0%**	247.0	247.0	237.2	131.7	131.7	126.5	154.8	148.7	226.9	
3	**Clothes Washers**		**100.0%**	64.0	64.0	64.0	48.2	48.2	48.2	51.0	51.0	61.8	
4	**Dishwashers**		**100.0%**	75.0	75.0	75.0	57.6	57.6	57.6	60.0	60.0	72.6	
5	**Other Electric Loads**		**100.0%**	2,000.0	2,000.0	2,000.0	2,000.0	2,000.0	2,000.0	2,000.0	2,000.0	2,000.0	Value based on electricity generated by micro-CHP measure
6			**100.0%**									0.0	
7			**100.0%**									0.0	
8			**100.0%**									0.0	
9			**100.0%**									0.0	
10			**100.0%**									0.0	
11			**100.0%**									0.0	
12			**100.0%**									0.0	
13			**100.0%**									0.0	
14			**100.0%**									0.0	
15			**100.0%**									0.0	
16			**100.0%**									0.0	
17			**100.0%**									0.0	
18			**100.0%**									0.0	
19			**100.0%**									0.0	
20			**100.0%**									0.0	
21			**100.0%**									0.0	
22			**100.0%**									0.0	
23			**100.0%**									0.0	
24			**100.0%**									0.0	
25			**100.0%**									0.0	
26			**100.0%**									0.0	
27			**100.0%**									0.0	
28			**100.0%**									0.0	
29			**100.0%**									0.0	
30			**100.0%**									0.0	
31			**100.0%**									0.0	
32			**100.0%**									0.0	
33			**100.0%**									0.0	
34			**100.0%**									0.0	
35			**100.0%**									0.0	
36			**100.0%**									0.0	
37			**100.0%**									0.0	
38			**100.0%**									0.0	
39			**100.0%**									0.0	
40			**100.0%**									0.0	

Natural Gas

#	Main End Use	Sub End Use/Equipment (If Applicable)	% of Main End-Use (Default)	Average Consumption (m3/yr.)									References/Notes
				Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
1	**Space Heating**		**100.0%**	105,870.6	89,549.6	89,549.6	63,283.0	56,053.6	56,053.6	70,102.0	70,102.0	87,903.3	
2	**Domestic Hot Water (DHW)**		**100.0%**	17,189.5	17,189.5	17,189.5	14,513.8	14,513.8	14,513.8	14,964.7	14,964.7	16,821.2	
3	Domestic Hot Water (DHW)	Clothes Washers	18.0%	3,094.1	3,094.1	3,094.1	2,612.5	2,612.5	2,612.5	2,693.6	2,693.6	3,027.8	DHW end-use breakdown based on several studies, as outlined in baseline report
4	Domestic Hot Water (DHW)	Showers	26.0%	4,469.3	4,469.3	4,469.3	3,773.6	3,773.6	3,773.6	3,890.8	3,890.8	4,373.5	DHW end-use breakdown based on several studies, as outlined in baseline report
5	Domestic Hot Water (DHW)	Faucets	19.0%	3,266.0	3,266.0	3,266.0	2,757.6	2,757.6	2,757.6	2,843.3	2,843.3	3,196.0	DHW end-use breakdown based on several studies, as outlined in baseline report
6	Domestic Hot Water (DHW)	Baths	4.0%	687.6	687.6	687.6	580.6	580.6	580.6	598.6	598.6	672.8	DHW end-use breakdown based on several studies, as outlined in baseline report
7	Domestic Hot Water (DHW)	Dishwashers	12.0%	2,062.7	2,062.7	2,062.7	1,741.7	1,741.7	1,741.7	1,795.8	1,795.8	2,018.5	DHW end-use breakdown based on several studies, as outlined in baseline report
8	Domestic Hot Water (DHW)	Leaks	6.0%	1,031.4	1,031.4	1,031.4	870.8	870.8	870.8	897.9	897.9	1,009.3	DHW end-use breakdown based on several studies, as outlined in baseline report
9	Domestic Hot Water (DHW)	Tank (Standby) Losses	7.5%	1,289.2	1,289.2	1,289.2	1,088.5	1,088.5	1,088.5	1,122.4	1,122.4	1,261.6	DHW end-use breakdown based on several studies, as outlined in baseline report
10	Domestic Hot Water (DHW)	Pipe Losses	7.5%	1,289.2	1,289.2	1,289.2	1,088.5	1,088.5	1,088.5	1,122.4	1,122.4	1,261.6	DHW end-use breakdown based on several studies, as outlined in baseline report
11	**Fireplaces**		**100.0%**	14,333.2	14,333.2	14,333.2	9,459.9	9,459.9	9,459.9	9,459.9	9,459.9	13,623.3	
12	**Cooking**		**100.0%**	5,110.6	5,110.6	5,110.6	4,321.6	4,321.6	4,321.6	4,462.2	4,462.2	5,002.4	
13	Cooking	Cooktops	40.0%	2,044.2	2,044.2	2,044.2	1,728.6	1,728.6	1,728.6	1,784.9	1,784.9	2,000.9	
14	Cooking	Ovens	55.0%	2,810.8	2,810.8	2,810.8	2,376.9	2,376.9	2,376.9	2,454.2	2,454.2	2,751.3	
15	**Clothes Dryers**		**55.0%**	4,111.4	4,111.4	4,111.4	3,669.4	3,669.4	3,669.4	3,868.6	3,868.6	4,056.5	
16	**Pool and Spa Heaters**		**100.0%**	27,693.2	27,693.2	27,693.2	27,693.2	27,693.2	27,693.2	27,693.2	27,693.2	27,693.2	
17	Pool and Spa Heaters	**Pool Heaters**	139.0%	38,493.5	38,493.5	38,493.5	38,493.5	38,493.5	38,493.5	38,493.5	38,493.5	38,493.5	
18	Pool and Spa Heaters	**Spa Heaters**	71.5%	19,800.6	19,800.6	19,800.6	19,800.6	19,800.6	19,800.6	19,800.6	19,800.6	19,800.6	
19	**Other**		**100.0%**									0.0	
20			**100.0%**									0.0	
21			**100.0%**									0.0	
22			**100.0%**									0.0	
23			**100.0%**									0.0	
24			**100.0%**									0.0	
25			**100.0%**									0.0	
26			**100.0%**									0.0	
27			**100.0%**									0.0	
28			**100.0%**									0.0	
29			**100.0%**									0.0	
30			**100.0%**									0.0	
31			**100.0%**									0.0	
32			**100.0%**									0.0	
33			**100.0%**									0.0	
34			**100.0%**									0.0	
35			**100.0%**									0.0	
36			**100.0%**									0.0	
37			**100.0%**									0.0	
38			**100.0%**									0.0	
39			**100.0%**									0.0	
40			**100.0%**									0.0	

Oil

#	Main End Use	Sub End Use/Equipment (If Applicable)	% of Main End-Use (Default)	Average Consumption (L/yr.)									References/Notes
				Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
1	**Space Heating**		**100.0%**									0.0	
2	**Domestic Hot Water (DHW)**		**100.0%**									0.0	
3	Domestic Hot Water (DHW)	Clothes Washer	18.0%									0.0	DHW end-use breakdown based on several studies, as outlined in baseline report
4	Domestic Hot Water (DHW)	Showers	26.0%									0.0	DHW end-use breakdown based on several studies, as outlined in baseline report
5	Domestic Hot Water (DHW)	Faucets	19.0%									0.0	DHW end-use breakdown based on several studies, as outlined in baseline report
6	Domestic Hot Water (DHW)	Baths	4.0%									0.0	DHW end-use breakdown based on several studies, as outlined in baseline report
7	Domestic Hot Water (DHW)	Dishwasher	12.0%									0.0	DHW end-use breakdown based on several studies, as outlined in baseline report
8	Domestic Hot Water (DHW)	Leaks	6.0%									0.0	DHW end-use breakdown based on several studies, as outlined in baseline report
9	Domestic Hot Water (DHW)	Tank (Standby) Losses	7.5%									0.0	DHW end-use breakdown based on several studies, as outlined in baseline report
10	Domestic Hot Water (DHW)	Pipe Losses	7.5%									0.0	DHW end-use breakdown based on several studies, as outlined in baseline report
11			**100.0%**									0.0	
12			**100.0%**									0.0	
13			**100.0%**									0.0	
14			**100.0%**									0.0	
15			**100.0%**									0.0	
16			**100.0%**									0.0	
17			**100.0%**									0.0	
18			**100.0%**									0.0	
19			**100.0%**									0.0	
20			**100.0%**									0.0	
21			**100.0%**									0.0	
22			**100.0%**									0.0	
23			**100.0%**									0.0	
24			**100.0%**									0.0	
25			**100.0%**									0.0	
26			**100.0%**									0.0	
27			**100.0%**									0.0	
28			**100.0%**									0.0	
29			**100.0%**									0.0	
30			**100.0%**									0.0	
31			**100.0%**									0.0	
32			**100.0%**									0.0	
33			**100.0%**									0.0	
34			**100.0%**									0.0	
35			**100.0%**									0.0	
36			**100.0%**									0.0	
37			**100.0%**									0.0	
38			**100.0%**									0.0	
39			**100.0%**									0.0	
40			**100.0%**									0.0	

Water

#	Main End Use	Sub End Use/Equipment (If Applicable)	Approx. DHW % (Default)	Average Consumption (L/yr.)									References/Notes
				Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
1	Water	Clothes Washer	40.0%									0.0	Based on averaging overall water consumption (per capita, per day) values from two studies: - Resource Management Strategies Inc., "Regional Municipality of York:
2	Water	Showers	70.0%									0.0	

3	Water	Faucets	40.0%									0.0	Water Efficiency Master Plan Update, Final Report", pg. 15, April 27, 2007 - Canadian sites in American Water Works Association (AWWA) Research Foundation, "Residential End Uses of Water", pg. 107, 1999.
4	Water	Baths	70.0%									0.0	
5	Water	Dishwasher	100.0%									0.0	
6	Water	Leaks	25.0%									0.0	
7	Water	Tank (Standby) Losses	100.0%									0.0	
8	Water	Pipe Losses	100.0%									0.0	
9			**100.0%**									0.0	
10			**100.0%**									0.0	
11			**100.0%**									0.0	
12			**100.0%**									0.0	
13			**100.0%**									0.0	
14			**100.0%**									0.0	
15			**100.0%**									0.0	
16			**100.0%**									0.0	
17			**100.0%**									0.0	
18			**100.0%**									0.0	
19			**100.0%**									0.0	
20			**100.0%**									0.0	

COMMON UNITS: **Note:** Used since it may be more convenient to enter values in their natural units and then convert using the conversion factors above

Electricity

#	Main End Use	% of Main End-Use (Default)	Average Consumption (MJ/yr.)									References/Notes
			Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
1	**Ventilation and Circulation**		2,160.0	2,880.0	2,766.0	1,440.0	1,440.0	1,383.0	746.6	717.1	2,474.2	
2	**Space Cooling**		889.3	889.3	854.1	474.3	474.3	455.5	557.2	535.2	816.7	
3	**Clothes Washers**		230.4	230.4	230.4	173.4	173.4	173.4	183.6	183.6	222.6	
4	**Dishwashers**		270.0	270.0	270.0	207.4	207.4	207.4	216.0	216.0	261.3	
5	**Other Electric Loads**		7,200.0	7,200.0	7,200.0	7,200.0	7,200.0	7,200.0	7,200.0	7,200.0	7,200.0	Value based on electricity generated by micro-CHP measure
6											0.0	
7											0.0	
8											0.0	
9											0.0	
10											0.0	
11											0.0	
12											0.0	
13											0.0	
14											0.0	
15											0.0	
16											0.0	
17											0.0	
18											0.0	
19											0.0	
20											0.0	

Natural Gas

#	Main End Use	% of Main End-Use (Default)	Average Consumption (MJ/yr.)									References/Notes
			Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
1	**Space Heating**		105,870.6	89,549.6	89,549.6	63,283.0	56,053.6	56,053.6	70,102.0	70,102.0	87,903.3	
2	**Domestic Hot Water (DHW)**		17,189.5	17,189.5	17,189.5	14,513.8	14,513.8	14,513.8	14,964.7	14,964.7	16,821.2	
3	**Fireplaces**		14,333.2	14,333.2	14,333.2	9,459.9	9,459.9	9,459.9	9,459.9	9,459.9	13,623.3	
4	**Cooking**		5,110.6	5,110.6	5,110.6	4,321.6	4,321.6	4,321.6	4,462.2	4,462.2	5,002.4	
5	**Clothes Dryers**		4,111.4	4,111.4	4,111.4	3,669.4	3,669.4	3,669.4	3,868.6	3,868.6	4,056.5	
6	**Pools and Spa Heaters**		27,693.2	27,693.2	27,693.2	27,693.2	27,693.2	27,693.2	27,693.2	27,693.2	27,693.2	
7	**Other**										0.0	
8											0.0	
9											0.0	
10											0.0	
11											0.0	
12											0.0	
13											0.0	
14											0.0	
15											0.0	
16											0.0	
17											0.0	
18											0.0	
19											0.0	
20											0.0	

Oil

#	Main End Use	% of Main End-Use (Default)	Average Consumption (MJ/yr.)									References/Notes
			Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
1	**Space Heating**										0.0	
2	**Domestic Hot Water (DHW)**										0.0	
3											0.0	
4											0.0	
5											0.0	
6											0.0	
7											0.0	
8											0.0	
9											0.0	
10											0.0	
11											0.0	
12											0.0	
13											0.0	
14											0.0	
15											0.0	
16											0.0	
17											0.0	
18											0.0	
19											0.0	
20											0.0	

Baseline Consumption (Case 2)

Back to Index

BASIS/TAG: 2. Annual consumption, equip.
DESCRIPTION: Annual energy consumption, at the equipment level
UNIT: /yr.

CONVERSION FACTORS:

Electricity (kWh to MJ):	3.60
Natural Gas (m^3 to MJ):	39.62
Fuel Oil (L to MJ):	36.74

U.S. Department of Energy (DOE) Energy Information Administration (EIA), *International Energy Annual 1997,* DOE/EIA-0219 (97), 1997

NATURAL UNITS:

Electricity

#	Main End Use	Sub End Use/Equipment (If Applicable)	% of Main End-Use (Default)	Average Consumption (kWh/yr.)									References/Notes
				Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
1			100.0%									0.0	
2			100.0%									0.0	
3			100.0%									0.0	
4			100.0%									0.0	
5			100.0%									0.0	
6			100.0%									0.0	
7			100.0%									0.0	
8			100.0%									0.0	
9			100.0%									0.0	
10			100.0%									0.0	
11			100.0%									0.0	
12			100.0%									0.0	
13			100.0%									0.0	
14			100.0%									0.0	
15			100.0%									0.0	
16			100.0%									0.0	
17			100.0%									0.0	
18			100.0%									0.0	
19			100.0%									0.0	
20			100.0%									0.0	
21			100.0%									0.0	
22			100.0%									0.0	
23			100.0%									0.0	
24			100.0%									0.0	
25			100.0%									0.0	
26			100.0%									0.0	
27			100.0%									0.0	
28			100.0%									0.0	
29			100.0%									0.0	
30			100.0%									0.0	
31			100.0%									0.0	
32			100.0%									0.0	
33			100.0%									0.0	
34			100.0%									0.0	
35			100.0%									0.0	
36			100.0%									0.0	
37			100.0%									0.0	
38			100.0%									0.0	
39			100.0%									0.0	
40			100.0%									0.0	

Natural Gas

#	Main End Use	Sub End Use/Equipment (If Applicable)	% of Main End-Use (Default)	Average Consumption (m3/yr.)									References/Notes
				Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
1			100.0%									0.0	
2			100.0%									0.0	
3			100.0%									0.0	
4			100.0%									0.0	
5			100.0%									0.0	
6			100.0%									0.0	
7			100.0%									0.0	
8			100.0%									0.0	
9			100.0%									0.0	
10			100.0%									0.0	
11			100.0%									0.0	
12			100.0%									0.0	
13			100.0%									0.0	
14			100.0%									0.0	
15			100.0%									0.0	
16			100.0%									0.0	
17			100.0%									0.0	
18			100.0%									0.0	
19			100.0%									0.0	
20			100.0%									0.0	
21			100.0%									0.0	
22			100.0%									0.0	
23			100.0%									0.0	
24			100.0%									0.0	
25			100.0%									0.0	
26			100.0%									0.0	
27			100.0%									0.0	
28			100.0%									0.0	
29			100.0%									0.0	
30			100.0%									0.0	
31			100.0%									0.0	
32			100.0%									0.0	
33			100.0%									0.0	
34			100.0%									0.0	
35			100.0%									0.0	
36			100.0%									0.0	
37			100.0%									0.0	
38			100.0%									0.0	
39			100.0%									0.0	
40			100.0%									0.0	

Oil

#	Main End Use	Sub End Use/Equipment (If Applicable)	% of Main End-Use (Default)	Average Consumption (L/yr.)									References/Notes
				Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
1			100.0%									0.0	
2			100.0%									0.0	
3			100.0%									0.0	
4			100.0%									0.0	
5			100.0%									0.0	
6			100.0%									0.0	
7			100.0%									0.0	
8			100.0%									0.0	
9			100.0%									0.0	
10			100.0%									0.0	
11			100.0%									0.0	
12			100.0%									0.0	
13			100.0%									0.0	
14			100.0%									0.0	
15			100.0%									0.0	
16			100.0%									0.0	
17			100.0%									0.0	
18			100.0%									0.0	
19			100.0%									0.0	
20			100.0%									0.0	
21			100.0%									0.0	
22			100.0%									0.0	
23			100.0%									0.0	
24			100.0%									0.0	
25			100.0%									0.0	
26			100.0%									0.0	
27			100.0%									0.0	
28			100.0%									0.0	
29			100.0%									0.0	
30			100.0%									0.0	
31			100.0%									0.0	
32			100.0%									0.0	
33			100.0%									0.0	
34			100.0%									0.0	
35			100.0%									0.0	
36			100.0%									0.0	
37			100.0%									0.0	
38			100.0%									0.0	
39			100.0%									0.0	
40			100.0%									0.0	

Water

#	Main End Use	Sub End Use/Equipment (If Applicable)	Approx. DHW % (Default)	Average Consumption (L/yr.)									References/Notes
				Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
1			100.0%									0.0	
2			100.0%									0.0	
3			100.0%									0.0	
4			100.0%									0.0	
5			100.0%									0.0	
6			100.0%									0.0	
7			100.0%									0.0	
8			100.0%									0.0	
9			100.0%									0.0	
10			100.0%									0.0	
11			100.0%									0.0	
12			100.0%									0.0	
13			100.0%									0.0	
14			100.0%									0.0	
15			100.0%									0.0	
16			100.0%									0.0	
17			100.0%									0.0	
18			100.0%									0.0	
19			100.0%									0.0	
20			100.0%									0.0	

COMMON UNITS: **Note:** Used since it may be more convenient to enter values in their natural units and then convert using the conversion factors above

Electricity

#	Main End Use	% of Main End-Use (Default)	Average Consumption (kWh/yr.)									References/Notes
			Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
1	0										0.0	
2	0										0.0	
3	0										0.0	
4	0										0.0	
5	0										0.0	
6	0										0.0	
7	0										0.0	
8	0										0.0	
9	0										0.0	
10	0										0.0	
11	0										0.0	
12	0										0.0	
13	0										0.0	
14	0										0.0	
15	0										0.0	
16	0										0.0	
17	0										0.0	
18	0										0.0	
19	0										0.0	
20	0										0.0	

Natural Gas

#	Main End Use	% of Main End-Use (Default)	Average Consumption (kWh/yr.)									References/Notes
			Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
1	0										0.0	
2	0										0.0	
3	0										0.0	
4	0										0.0	
5	0										0.0	
6											0.0	
7											0.0	
8											0.0	
9											0.0	
10											0.0	
11											0.0	
12											0.0	
13											0.0	
14											0.0	
15											0.0	
16											0.0	
17											0.0	
18											0.0	
19											0.0	
20											0.0	

Oil

#	Main End Use	% of Main End-Use (Default)	Average Consumption (kWh/yr.)									References/Notes
			Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
1	0										0.0	
2	0										0.0	
3											0.0	
4											0.0	
5											0.0	
6											0.0	
7											0.0	
8											0.0	
9											0.0	
10											0.0	
11											0.0	
12											0.0	
13											0.0	
14											0.0	
15											0.0	
16											0.0	
17											0.0	
18											0.0	
19											0.0	
20											0.0	

End Use Numbering	Baseline 1 End Use	Line Lookup for Baseline 1	Baseline 2 End Use	Line Lookup for Baseline 2
1	Space heating	1	Space heating	1
2	Space cooling	-1	Space cooling	-1
3	Ventilation and Circulation	-1	Ventilation and	-1
4	Domestic hot water (DHW)	2	Domestic hot water	2
5	Fireplace	3	Fireplace	3
6	Cooking	4	Cooking	4
7	Dishwasher	-1	Dishwasher	-1
8	Clothes washer	-1	Clothes washer	-1
9	Clothes dryer	5	Clothes dryer	5
10	Pool & spa heaters	6	Pool & spa heaters	6
11	Other gas uses	7	Other gas uses	7
12	Other electrical internal loads	-1	Other electrical	-1
13		-1		-1
14		-1		-1
15		-1		-1
16		-1		-1
17		-1		-1
18		-1		-1
19		-1		-1
20		-1		-1

End Use Numbering	Baseline 1 End Use	Line Lookup for Baseline 1	Baseline 2 End Use	Line Lookup for Baseline 2
1	Space heating	-1	Space heating	-1
2	Space cooling	2	Space cooling	2
3	Ventilation and Circulation	1	Ventilation and	1
4	Domestic hot water (DHW)	-1	Domestic hot water	-1
5	Fireplace	-1	Fireplace	-1
6	Cooking	-1	Cooking	-1
7	Dishwasher	4	Dishwasher	4
8	Clothes washer	3	Clothes washer	3
9	Clothes dryer	-1	Clothes dryer	-1
10	Pool & spa heaters	-1	Pool & spa heaters	-1
11	Other gas uses	-1	Other gas uses	-1
12	Other electrical internal loads	5	Other electrical	5
13		-1		-1
14		-1		-1
15		-1		-1
16		-1		-1
17		-1		-1
18		-1		-1
19		-1		-1
20		-1		-1

Measure Information		Applicability										Savings by End Use																				
Measure #	Technology	Climate Zone	Building Type(s)	Exist	Reno	New	Life	Cost	Benefit/Cost Ratio	Economic Screen	Basis	Space heating	Space cooling	Ventilation and Circulation	Domestic hot water (DHW)	Fireplace	Cooking	Dishwasher	Clothes washer	Clothes dryer	Pool & spa heaters	Other gas uses	Other electrical internal loads									
1	Attic Insulation	3	Detached (Pre-1976)	y	y		30.0	$675	1.40	Pass	Full	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2	Attic Insulation	3	Detached (Post-1976)	y	y		30.0	$713	0.97	Fail	Full	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3	Attic Insulation	3	Attached (Pre-1976)	y	y		30.0	$450	1.27	Pass	Full	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4	Attic Insulation	3	Attached (Post-1976)	y	y		30.0	$488	0.87	Fail	Full	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5	Attic Insulation	3	Mobile (Existing)	y	y		30.0	$525	1.06	Pass	Full	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6	Wall Insulation	3	Detached (Pre-1976)	y	y		30.0	$2,000	1.26	Pass	Incr.	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
7	Wall Insulation	3	Detached (Post-1976)	y	y		30.0	$2,000	1.10	Pass	Incr.	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
8	Wall Insulation	3	Attached (Pre-1976)	y	y		30.0	$1,500	1.01	Pass	Incr.	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
9	Wall Insulation	3	Attached (Post-1976)	y	y		30.0	$1,500	0.90	Fail	Incr.	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
10	Wall Insulation	3	Mobile (Existing)	y	y		30.0	$1,500	1.08	Pass	Incr.	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
11	Slab Insulation	3	Detached (Pre-1976)	y	y		30.0	$1,125	0.18	Fail	Incr.	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12	Slab Insulation	3	Detached (Post-1976)	y	y		30.0	$1,275	0.11	Fail	Incr.	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
13	Slab Insulation	3	Attached (Pre-1976)	y	y		30.0	$975	0.12	Fail	Incr.	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
14	Slab Insulation	3	Attached (Post-1976)	y	y		30.0	$1,050	0.08	Fail	Incr.	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
15	Basement Insulation	3	Detached (Pre-1976)	y	y		30.0	$1,400	1.34	Pass	Incr.	12%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
16	Basement Insulation	3	Detached (Post-1976)	y	y		30.0	$1,500	1.18	Pass	Incr.	13%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
17	Basement Insulation	3	Attached (Pre-1976)	y	y		30.0	$900	1.04	Pass	Incr.	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
18	Basement Insulation	3	Attached (Post-1976)	y	y		30.0	$1,000	0.87	Fail	Incr.	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
19	Crawl Space Insul.	3	Detached (Pre-1976)	y	y		30.0	$800	0.48	Fail	Full	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
20	Crawl Space Insul.	3	Detached (Post-1976)	y	y		30.0	$800	0.42	Fail	Full	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21	Crawl Space Insul.	3	Attached (Pre-1976)	y	y		30.0	$800	0.29	Fail	Full	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22	Crawl Space Insul.	3	Attached (Post-1976)	y	y		30.0	$800	0.26	Fail	Full	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23	Air Sealing	3	Detached (Pre-1976)	y	y		25.0	$1,800	0.74	Fail	Full	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
24	Air Sealing	3	Detached (Post-1976)	y	y		25.0	$1,800	0.56	Fail	Full	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
25	Air Sealing	3	Attached (Pre-1976)	y	y		25.0	$1,800	0.44	Fail	Full	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
26	Air Sealing	3	Attached (Post-1976)	y	y		25.0	$1,800	0.34	Fail	Full	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
27	Air Sealing	3	Mobile (Existing)	y	y		25.0	$1,800	0.43	Fail	Full	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
28	Homeowner Air Sealing	3	Detached (Pre-1976)	y	y		10.0	$200	1.35	Pass	Full	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
29	Homeowner Air Sealing	3	Detached (Post-1976)	y	y		10.0	$200	1.02	Pass	Full	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
30	Homeowner Air Sealing	3	Attached (Pre-1976)	y	y		10.0	$200	0.81	Fail	Full	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
31	Homeowner Air Sealing	3	Attached (Post-1976)	y	y		10.0	$200	0.62	Fail	Full	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
32	Homeowner Air Sealing	3	Mobile (Existing)	y	y		10.0	$200	0.78	Fail	Full	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
33	Sealing & Insul. - Old Homes	3	Detached (Pre-1976)	y	y		25.0	$3,000	0.73	Fail	Full	17%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
34	Sealing & Insul. - Old Homes	3	Attached (Pre-1976)	y	y		25.0	$2,500	0.52	Fail	Full	17%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
35	Zone Up Windows	3	Detached (Pre-1976)	y	y		25.0	$1,000	0.35	Fail	Incr.	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
36	Zone Up Windows	3	Detached (Post-1976)	y	y		25.0	$1,200	0.36	Fail	Incr.	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
37	Zone Up Windows	3	Detached (New)			y	25.0	$2,600	0.27	Fail	Incr.	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
38	Zone Up Windows	3	Attached (Pre-1976)	y	y		25.0	$800	0.26	Fail	Incr.	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
39	Zone Up Windows	3	Attached (Post-1976)	y	y		25.0	$960	0.28	Fail	Incr.	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
40	Zone Up Windows	3	Attached (New)			y	25.0	$2,080	0.21	Fail	Incr.	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
41	Zone Up Windows	3	Mobile (Existing)	y	y		25.0	$720	0.39	Fail	Incr.	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
42	Zone Up Windows	3	Mobile (New)			y	25.0	$1,600	0.33	Fail	Incr.	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
43	Super Windows	3	Detached (Pre-1976)	y	y		25.0	$1,500	0.83	Fail	Incr.	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
44	Super Windows	3	Detached (Post-1976)	y	y		25.0	$1,800	0.90	Fail	Incr.	13%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
45	Super Windows	3	Detached (New)			y	25.0	$3,900	0.61	Fail	Incr.	19%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
46	Super Windows	3	Attached (Pre-1976)	y	y		25.0	$1,200	0.63	Fail	Incr.	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
47	Super Windows	3	Attached (Post-1976)	y	y		25.0	$1,440	0.69	Fail	Incr.	13%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
48	Super Windows	3	Attached (New)			y	25.0	$3,120	0.47	Fail	Incr.	19%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
49	Super Windows	3	Mobile (Existing)	y	y		25.0	$1,080	0.87	Fail	Incr.	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
50	Super Windows	3	Mobile (New)			y	25.0	$2,400	0.73	Fail	Incr.	19%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
51	High-Perf. New Homes	3	Detached (New)			y	30.0	$6,000	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
52	High-Perf. New Homes	3	Attached (New)			y	30.0	$4,800	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
53	High-Perf. New Homes	3	Mobile (New)			y	30.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
54	Net Zero Ready Homes	3	Detached (New)			y	30.0	$14,000	0.35	Fail	Full	30%	0%	0%	30%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
55	Net Zero Ready Homes	3	Attached (New)			y	30.0	$9,800	0.32	Fail	Full	30%	0%	0%	30%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
56	Net Zero Ready Homes	3	Mobile (New)			y	30.0	$9,800	0.37	Fail	Full	30%	0%	0%	30%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
57	Condensing Gas Furnaces	3	Detached (Pre-1976)	y	y		18.0	$1,477	0.47	Fail	Incr.	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
58	Condensing Gas Furnaces	3	Detached (Post-1976)	y	y		18.0	$1,477	0.40	Fail	Incr.	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
59	Condensing Gas Furnaces	3	Detached (New)			y	18.0	$1,477	0.40	Fail	Incr.	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
60	Condensing Gas Furnaces	3	Attached (Pre-1976)	y	y		18.0	$1,477	0.28	Fail	Incr.	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
61	Condensing Gas Furnaces	3	Attached (Post-1976)	y	y		18.0	$1,477	0.25	Fail	Incr.	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
62	Condensing Gas Furnaces	3	Attached (New)			y	18.0	$1,477	0.25	Fail	Incr.	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
63	Condensing Gas Furnaces	3	Mobile (Existing)	y	y		18.0	$1,477	0.31	Fail	Incr.	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
64	Condensing Gas Furnaces	3	Mobile (New)			y	18.0	$1,477	0.31	Fail	Incr.	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
65	Early Retire Gas Furnaces	3	Detached (Pre-1976)	y	y		9.0	$1,864	0.50	Fail	Incr.	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
66	Early Retire Gas Furnaces	3	Detached (Post-1976)	y	y		9.0	$1,864	0.42	Fail	Incr.	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
67	Early Retire Gas Furnaces	3	Attached (Pre-1976)	y	y		9.0	$1,864	0.30	Fail	Incr.	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
68	Early Retire Gas Furnaces	3	Attached (Post-1976)	y	y		9.0	$1,864	0.27	Fail	Incr.	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
69	Early Retire Gas Furnaces	3	Mobile (Existing)	y	y		9.0	$1,864	0.33	Fail	Incr.	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
70	Condensing Gas Boilers	3	Detached (Pre-1976)	y	y		20.0	$3,200	0.40	Fail	Incr.	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
71	Condensing Gas Boilers	3	Detached (Post-1976)	y	y		20.0	$3,200	0.34	Fail	Incr.	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
72	Condensing Gas Boilers	3	Detached (New)			y	20.0	$3,200	0.34	Fail	Incr.	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
73	Condensing Gas Boilers	3	Attached (Pre-1976)	y	y		20.0	$3,200	0.24	Fail	Incr.	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
74	Condensing Gas Boilers	3	Attached (Post-1976)	y	y		20.0	$3,200	0.21	Fail	Incr.	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
75	Condensing Gas Boilers	3	Attached (New)			y	20.0	$3,200	0.21	Fail	Incr.	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
76	Condensing Gas Boilers	3	Mobile (Existing)	y	y		20.0	$3,200	0.27	Fail	Incr.	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
77	Condensing Gas Boilers	3	Mobile (New)			y	20.0	$3,200	0.27	Fail	Incr.	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
78	Gas Fireplaces	3	Detached (Pre-1976)	y	y		15.0	$150	2.20	Pass	Incr.	0%	0%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
79	Gas Fireplaces	3	Detached (Post-1976)	y	y		15.0	$150	2.20	Pass	Incr.	0%	0%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
80	Gas Fireplaces	3	Detached (New)			y	15.0	$150	2.20	Pass	Incr.	0%	0%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
81	Gas Fireplaces	3	Attached (Pre-1976)	y	y		15.0	$150	1.45	Pass	Incr.	0%	0%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
82	Gas Fireplaces	3	Attached (Post-1976)	y	y		15.0	$150	1.45	Pass	Incr.	0%	0%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
83	Gas Fireplaces	3	Attached (New)			y	15.0	$150	1.45	Pass	Incr.	0%	0%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
84	Gas Fireplaces	3	Mobile (Existing)	y	y		15.0	$150	1.45	Pass	Incr.	0%	0%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
85	Gas Fireplaces	3	Mobile (New)			y	15.0	$150	1.45	Pass	Incr.	0%	0%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
86	Prog. Thermostats	3	Detached (Pre-1976)	y	y		11.0	$50	10.23	Pass	Full	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
87	Prog. Thermostats	3	Detached (Post-1976)	y	y		11.0	$50	8.72	Pass	Full	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
88	Prog. Thermostats	3	Detached (New)			y	11.0	$50	8.71	Pass	Full	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
89	Prog. Thermostats	3	Attached (Pre-1976)	y	y		11.0	$50	6.11	Pass	Full	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
90	Prog. Thermostats	3	Attached (Post-1976)	y	y		11.0	$50	5.43	Pass	Full	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
91	Prog. Thermostats	3	Attached (New)			y	11.0	$50	5.43	Pass	Full	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
92	Prog. Thermostats	3	Mobile (Existing)	y	y		11.0	$50	6.74	Pass	Full	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
93	Prog. Thermostats	3	Mobile (New)			y	11.0	$50	6.73	Pass	Full	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
94	Solar Make-Up Air	3	Detached (Pre-1976)	y	y		40.0	$1,300	0.28	Fail	Full	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
95	Solar Make-Up Air	3	Detached (Post-1976)	y	y		40.0	$1,300	0.24	Fail	Full	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
96	Solar Make-Up Air	3	Detached (New)			y	40.0	$1,300	0.24	Fail	Full	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
97	Solar Make-Up Air	3	Attached (Pre-1976)	y	y		40.0	$1,300	0.17	Fail	Full	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
98	Solar Make-Up Air	3	Attached (Post-1976)	y	y		40.0	$1,300	0.15	Fail	Full	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
99	Solar Make-Up Air	3	Attached (New)			y	40.0	$1,300	0.15	Fail	Full	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
100	Solar Make-Up Air	3	Mobile (Existing)	y	y		40.0	$1,300	0.18	Fail	Full	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
101	Solar Make-Up Air	3	Mobile (New)			y	40.0	$1,300	0.18	Fail	Full	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
102	HRVs	3	Detached (Pre-1976)	y	y		15.0	$600	0.47	Fail	Incr.	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
103	HRVs	3	Detached (Post-1976)	y	y		15.0	$600	0.41	Fail	Incr.	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
104	HRVs	3	Detached (New)			y	15.0	$600	0.41	Fail	Incr.	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
105	HRVs	3	Attached (Pre-1976)	y	y		15.0	$600	0.28	Fail	Incr.	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
106	HRVs	3	Attached (Post-1976)	y	y		15.0	$600	0.25	Fail	Incr.	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
107	HRVs	3	Attached (New)			y	15.0	$600	0.25	Fail	Incr.	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
108	HRVs	3	Mobile (Existing)	y	y		15.0	$600	0.30	Fail	Incr.	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
109	HRVs	3	Mobile (New)			y	15.0	$600	0.30	Fail	Incr.	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
110	Air Heat Pumps	3	Detached (Pre-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
111	Air Heat Pumps	3	Detached (Post-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
112	Air Heat Pumps	3	Detached (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
113	Air Heat Pumps	3	Attached (Pre-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
114	Air Heat Pumps	3	Attached (Post-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
115	Air Heat Pumps	3	Attached (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
116	Air Heat Pumps	3	Mobile (Existing)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
117	Air Heat Pumps	3	Mobile (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
118	Ground Heat Pumps	3	Detached (Pre-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
119	Ground Heat Pumps	3	Detached (Post-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
120	Ground Heat Pumps	3	Detached (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
121	Ground Heat Pumps	3	Attached (Pre-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
122	Ground Heat Pumps	3	Attached (Post-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
123	Ground Heat Pumps	3	Attached (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
124	Ground Heat Pumps	3	Mobile (Existing)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
125	Ground Heat Pumps	3	Mobile (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
126	Heating & DHW	3	Detached (Pre-1976)	y	y		18.0	$8,506	0.11	Fail	Incr.	4%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
127	Heating & DHW	3	Detached (Post-1976)	y	y		18.0	$8,506	0.10	Fail	Incr.	4%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
128	Heating & DHW	3	Detached (New)			y	18.0	$3,506	0.25	Fail	Incr.	4%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
129	Heating & DHW	3	Attached (Pre-1976)	y	y		18.0	$8,506	0.08	Fail	Incr.	4%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
130	Heating & DHW	3	Attached (Post-1976)	y	y		18.0	$8,506	0.08	Fail	Incr.	4%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
131	Heating & DHW	3	Attached (New)			y	18.0	$3,506	0.19	Fail	Incr.	4%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
132	Heating & DHW	3	Mobile (Existing)	y	y		18.0	$8,506	0.08	Fail	Incr.	4%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
133	Heating & DHW	3	Mobile (New)			y	18.0	$3,506	0.20	Fail	Incr.	4%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
134	Heating & DHW (Hydronic)	3	Detached (Pre-1976)	y	y		20.0	$8,000	0.24	Fail	Incr.	12%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
135	Heating & DHW (Hydronic)	3	Detached (Post-1976)	y	y		20.0	$8,000	0.21	Fail	Incr.	12%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
136	Heating & DHW (Hydronic)	3	Detached (New)			y	20.0	$3,000	0.57	Fail	Incr.	12%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
137	Heating & DHW (Hydronic)	3	Attached (Pre-1976)	y	y		20.0	$8,000	0.16	Fail	Incr.	12%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
138	Heating & DHW (Hydronic)	3	Attached (Post-1976)	y	y		20.0	$8,000	0.15	Fail	Incr.	12%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
139	Heating & DHW (Hydronic)	3	Attached (New)			y	20.0	$3,000	0.40	Fail	Incr.	12%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
140	Heating & DHW (Hydronic)	3	Mobile (Existing)	y	y		20.0	$8,000	0.17	Fail	Incr.	12%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
141	Heating & DHW (Hydronic)	3	Mobile (New)			y	20.0	$3,000	0.45	Fail	Incr.	12%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
142	Condensing Gas DHW	3	Detached (Pre-1976)	y	y		13.0	$1,567	0.20	Fail	Incr.	0%	0%	0%	23%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
143	Condensing Gas DHW	3	Detached (Post-1976)	y	y		13.0	$1,567	0.20	Fail	Incr.	0%	0%	0%	23%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
144	Condensing Gas DHW	3	Detached (New)			y	13.0	$1,073	0.30	Fail	Incr.	0%	0%	0%	23%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
145	Condensing Gas DHW	3	Attached (Pre-1976)	y	y		13.0	$1,567	0.17	Fail	Incr.	0%	0%	0%	23%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
146	Condensing Gas DHW	3	Attached (Post-1976)	y	y		13.0	$1,567	0.17	Fail	Incr.	0%	0%	0%	23%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
147	Condensing Gas DHW	3	Attached (New)			y	13.0	$1,073	0.25	Fail	Incr.	0%	0%	0%	23%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
148	Condensing Gas DHW	3	Mobile (Existing)	y	y		13.0	$1,567	0.16	Fail	Incr.	0%	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
149	Condensing Gas DHW	3	Mobile (New)			y	13.0	$1,073	0.23	Fail	Incr.	0%	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
150	Tankless Gas DHW	3	Detached (Pre-1976)	y	y		20.0	$2,274	0.30	Fail	Incr.	0%	0%	0%	35%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
151	Tankless Gas DHW	3	Detached (Post-1976)	y	y		20.0	$2,274	0.30	Fail	Incr.	0%	0%	0%	35%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
152	Tankless Gas DHW	3	Detached (New)			y	20.0	$1,646	0.41	Fail	Incr.	0%	0%	0%	35%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
153	Tankless Gas DHW	3	Attached (Pre-1976)	y	y		20.0	$2,274	0.25	Fail	Incr.	0%	0%	0%	35%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
154	Tankless Gas DHW	3	Attached (Post-1976)	y	y		20.0	$2,274	0.25	Fail	Incr.	0%	0%	0%	35%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
155	Tankless Gas DHW	3	Attached (New)			y	20.0	$1,646	0.34	Fail	Incr.	0%	0%	0%	35%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
156	Tankless Gas DHW	3	Mobile (Existing)	y	y		20.0	$2,274	0.26	Fail	Incr.	0%	0%	0%	35%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
157	Tankless Gas DHW	3	Mobile (New)			y	20.0	$1,646	0.36	Fail	Incr.	0%	0%	0%	35%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
158	Solar DHW	3	Detached (Pre-1976)	y	y		25.0	$7,000	0.20	Fail	Full	0%	0%	0%	63%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
159	Solar DHW	3	Detached (Post-1976)	y	y		25.0	$7,000	0.20	Fail	Full	0%	0%	0%	63%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
160	Solar DHW	3	Detached (New)			y	25.0	$7,000	0.20	Fail	Full	0%	0%	0%	63%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
161	Solar DHW	3	Attached (Pre-1976)	y	y		25.0	$7,000	0.18	Fail	Full	0%	0%	0%	68%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
162	Solar DHW	3	Attached (Post-1976)	y	y		25.0	$7,000	0.18	Fail	Full	0%	0%	0%	68%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
163	Solar DHW	3	Attached (New)			y	25.0	$7,000	0.18	Fail	Full	0%	0%	0%	68%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
164	Solar DHW	3	Mobile (Existing)	y	y		25.0	$7,000	0.20	Fail	Full	0%	0%	0%	73%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%
165	Solar DHW	3	Mobile (New)			y	25.0	$7,000	0.20	Fail	Full	0%	0%	0%	73%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%
166	DHW Tank Insulation	3	Detached (Pre-1976)	y	y		13.0	$35	0.76	Fail	Full	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
167	DHW Tank Insulation	3	Detached (Post-1976)	y	y		13.0	$35	0.76	Fail	Full	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
168	DHW Tank Insulation	3	Detached (New)			y	13.0	$35	0.76	Fail	Full	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
169	DHW Tank Insulation	3	Attached (Pre-1976)	y	y		13.0	$25	0.90	Fail	Full	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
170	DHW Tank Insulation	3	Attached (Post-1976)	y	y		13.0	$25	0.90	Fail	Full	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
171	DHW Tank Insulation	3	Attached (New)			y	13.0	$25	0.90	Fail	Full	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
172	DHW Tank Insulation	3	Mobile (Existing)	y	y		13.0	$25	0.93	Fail	Full	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
173	DHW Tank Insulation	3	Mobile (New)			y	13.0	$25	0.93	Fail	Full	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
174	DHW Pipe Insulation	3	Detached (Pre-1976)	y	y		15.0	$1	15.29	Pass	Full	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
175	DHW Pipe Insulation	3	Detached (Post-1976)	y	y		15.0	$1	15.29	Pass	Full	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
176	DHW Pipe Insulation	3	Detached (New)			y	15.0	$1	15.29	Pass	Full	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
177	DHW Pipe Insulation	3	Attached (Pre-1976)	y	y		15.0	$1	12.91	Pass	Full	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
178	DHW Pipe Insulation	3	Attached (Post-1976)	y	y		15.0	$1	12.91	Pass	Full	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
179	DHW Pipe Insulation	3	Attached (New)			y	15.0	$1	12.91	Pass	Full	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
180	DHW Pipe Insulation	3	Mobile (Existing)	y	y		15.0	$1	13.31	Pass	Full	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
181	DHW Pipe Insulation	3	Mobile (New)			y	15.0	$1	13.31	Pass	Full	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
182	DHW Heat Traps	3	Detached (New)			y	13.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
183	DHW Heat Traps	3	Attached (New)			y	13.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
184	DHW Heat Traps	3	Mobile (New)			y	13.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
185	Showerheads	3	Detached (Pre-1976)	y	y		10.0	$13	8.63	Pass	Full	0%	0%	0%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
186	Showerheads	3	Detached (Post-1976)	y	y		10.0	$13	8.63	Pass	Full	0%	0%	0%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
187	Showerheads	3	Detached (New)			y	10.0	$13	8.63	Pass	Full	0%	0%	0%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
188	Showerheads	3	Attached (Pre-1976)	y	y		10.0	$13	7.29	Pass	Full	0%	0%	0%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
189	Showerheads	3	Attached (Post-1976)	y	y		10.0	$13	7.29	Pass	Full	0%	0%	0%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
190	Showerheads	3	Attached (New)			y	10.0	$13	7.29	Pass	Full	0%	0%	0%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
191	Showerheads	3	Mobile (Existing)	y	y		10.0	$13	7.52	Pass	Full	0%	0%	0%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
192	Showerheads	3	Mobile (New)			y	10.0	$13	7.52	Pass	Full	0%	0%	0%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
193	Faucet Aerators	3	Detached (Pre-1976)	y	y		10.0	$15	4.52	Pass	Full	0%	0%	0%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
194	Faucet Aerators	3	Detached (Post-1976)	y	y		10.0	$15	4.52	Pass	Full	0%	0%	0%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
195	Faucet Aerators	3	Detached (New)			y	10.0	$15	4.52	Pass	Full	0%	0%	0%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
196	Faucet Aerators	3	Attached (Pre-1976)	y	y		10.0	$15	3.82	Pass	Full	0%	0%	0%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
197	Faucet Aerators	3	Attached (Post-1976)	y	y		10.0	$15	3.82	Pass	Full	0%	0%	0%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
198	Faucet Aerators	3	Attached (New)			y	10.0	$15	3.82	Pass	Full	0%	0%	0%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
199	Faucet Aerators	3	Mobile (Existing)	y	y		10.0	$15	3.94	Pass	Full	0%	0%	0%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
200	Faucet Aerators	3	Mobile (New)			y	10.0	$15	3.94	Pass	Full	0%	0%	0%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
201	Wastewater Heat Recovery	3	Detached (Pre-1976)	y	y		30.0	$800	0.40	Fail	Full	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
202	Wastewater Heat Recovery	3	Detached (Post-1976)	y	y		30.0	$800	0.40	Fail	Full	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
203	Wastewater Heat Recovery	3	Detached (New)			y	30.0	$800	0.40	Fail	Full	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
204	Wastewater Heat Recovery	3	Attached (Pre-1976)	y	y		30.0	$731	0.37	Fail	Full	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
205	Wastewater Heat Recovery	3	Attached (Post-1976)	y	y		30.0	$731	0.37	Fail	Full	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
206	Wastewater Heat Recovery	3	Attached (New)			y	30.0	$731	0.37	Fail	Full	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
207	Wastewater Heat Recovery	3	Mobile (Existing)	y	y		30.0	$731	0.38	Fail	Full	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
208	Wastewater Heat Recovery	3	Mobile (New)			y	30.0	$731	0.38	Fail	Full	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
209	DHW Recirculation	3	Detached (Pre-1976)	y	y		18.0	$570	0.50	Fail	Full	0%	0%	0%	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%

210	DHW Recirculation	3	Detached (Post-1976)	y	y		18.0	$570	0.50	Fail	Full	0%	0%	0%	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
211	DHW Recirculation	3	Detached (New)			y	18.0	$570	0.50	Fail	Full	0%	0%	0%	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
212	DHW Recirculation	3	Attached (Pre-1976)	y	y		18.0	$470	0.52	Fail	Full	0%	0%	0%	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
213	DHW Recirculation	3	Attached (Post-1976)	y	y		18.0	$470	0.52	Fail	Full	0%	0%	0%	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
214	DHW Recirculation	3	Attached (New)			y	18.0	$470	0.52	Fail	Full	0%	0%	0%	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
215	DHW Recirculation	3	Mobile (Existing)	y	y		18.0	$470	0.53	Fail	Full	0%	0%	0%	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
216	DHW Recirculation	3	Mobile (New)			y	18.0	$470	0.53	Fail	Full	0%	0%	0%	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
217	ESTAR Dishwashers	3	Detached (Pre-1976)	y	y		11.0	$105	0.29	Fail	Incr.	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
218	ESTAR Dishwashers	3	Detached (Post-1976)	y	y		11.0	$105	0.29	Fail	Incr.	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
219	ESTAR Dishwashers	3	Detached (New)			y	11.0	$105	0.29	Fail	Incr.	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
220	ESTAR Dishwashers	3	Attached (Pre-1976)	y	y		11.0	$105	0.24	Fail	Incr.	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
221	ESTAR Dishwashers	3	Attached (Post-1976)	y	y		11.0	$105	0.24	Fail	Incr.	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
222	ESTAR Dishwashers	3	Attached (New)			y	11.0	$105	0.24	Fail	Incr.	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
223	ESTAR Dishwashers	3	Mobile (Existing)	y	y		11.0	$105	0.25	Fail	Incr.	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
224	ESTAR Dishwashers	3	Mobile (New)			y	11.0	$105	0.25	Fail	Incr.	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
225	ESTAR Clothes Washers	3	Detached (Pre-1976)	y	y		14.0	$300	0.87	Fail	Incr.	0%	0%	0%	7%	0%	0%	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
226	ESTAR Clothes Washers	3	Detached (Post-1976)	y	y		14.0	$300	0.87	Fail	Incr.	0%	0%	0%	7%	0%	0%	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
227	ESTAR Clothes Washers	3	Detached (New)			y	14.0	$300	0.87	Fail	Incr.	0%	0%	0%	7%	0%	0%	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
228	ESTAR Clothes Washers	3	Attached (Pre-1976)	y	y		14.0	$300	0.75	Fail	Incr.	0%	0%	0%	7%	0%	0%	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
229	ESTAR Clothes Washers	3	Attached (Post-1976)	y	y		14.0	$300	0.75	Fail	Incr.	0%	0%	0%	7%	0%	0%	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
230	ESTAR Clothes Washers	3	Attached (New)			y	14.0	$300	0.75	Fail	Incr.	0%	0%	0%	7%	0%	0%	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
231	ESTAR Clothes Washers	3	Mobile (Existing)	y	y		14.0	$300	0.78	Fail	Incr.	0%	0%	0%	7%	0%	0%	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
232	ESTAR Clothes Washers	3	Mobile (New)			y	14.0	$300	0.78	Fail	Incr.	0%	0%	0%	7%	0%	0%	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
233	Gas Clothes Dryers	3	Detached (Pre-1976)	y	y		18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
234	Gas Clothes Dryers	3	Detached (Post-1976)	y	y		18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
235	Gas Clothes Dryers	3	Detached (New)			y	18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
236	Gas Clothes Dryers	3	Attached (Pre-1976)	y	y		18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
237	Gas Clothes Dryers	3	Attached (Post-1976)	y	y		18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
238	Gas Clothes Dryers	3	Attached (New)			y	18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
239	Gas Clothes Dryers	3	Mobile (Existing)	y	y		18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
240	Gas Clothes Dryers	3	Mobile (New)			y	18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
241	Pool Covers	3	Detached (Pre-1976)	y	y		10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	26%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
242	Pool Covers	3	Detached (Post-1976)	y	y		10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	26%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
243	Pool Covers	3	Detached (New)			y	10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	26%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
244	Pool Covers	3	Attached (Pre-1976)	y	y		10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	26%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
245	Pool Covers	3	Attached (Post-1976)	y	y		10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	26%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
246	Pool Covers	3	Attached (New)			y	10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	26%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
247	Pool Covers	3	Mobile (Existing)	y	y		10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	26%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
248	Pool Covers	3	Mobile (New)			y	10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	26%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
249	Heat Pump Pool Heaters	3	Detached (Pre-1976)	y	y		10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
250	Heat Pump Pool Heaters	3	Detached (Post-1976)	y	y		10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
251	Heat Pump Pool Heaters	3	Detached (New)			y	10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
252	Heat Pump Pool Heaters	3	Attached (Pre-1976)	y	y		10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
253	Heat Pump Pool Heaters	3	Attached (Post-1976)	y	y		10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
254	Heat Pump Pool Heaters	3	Attached (New)			y	10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
255	Heat Pump Pool Heaters	3	Mobile (Existing)	y	y		10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
256	Heat Pump Pool Heaters	3	Mobile (New)			y	10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
257	Efficient Pool Heaters	3	Detached (Pre-1976)	y	y		7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
258	Efficient Pool Heaters	3	Detached (Post-1976)	y	y		7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
259	Efficient Pool Heaters	3	Detached (New)			y	7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
260	Efficient Pool Heaters	3	Attached (Pre-1976)	y	y		7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
261	Efficient Pool Heaters	3	Attached (Post-1976)	y	y		7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
262	Efficient Pool Heaters	3	Attached (New)			y	7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
263	Efficient Pool Heaters	3	Mobile (Existing)	y	y		7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
264	Efficient Pool Heaters	3	Mobile (New)			y	7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
265	Solar Pool Heaters	3	Detached (Pre-1976)	y	y		20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
266	Solar Pool Heaters	3	Detached (Post-1976)	y	y		20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
267	Solar Pool Heaters	3	Detached (New)			y	20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
268	Solar Pool Heaters	3	Attached (Pre-1976)	y	y		20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
269	Solar Pool Heaters	3	Attached (Post-1976)	y	y		20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
270	Solar Pool Heaters	3	Attached (New)			y	20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
271	Solar Pool Heaters	3	Mobile (Existing)	y	y		20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
272	Solar Pool Heaters	3	Mobile (New)			y	20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
273	Micro-CHP	3	Detached (Pre-1976)	y	y		20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
274	Micro-CHP	3	Detached (Post-1976)	y	y		20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
275	Micro-CHP	3	Detached (New)			y	20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
276	Micro-CHP	3	Attached (Pre-1976)	y	y		20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
277	Micro-CHP	3	Attached (Post-1976)	y	y		20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
278	Micro-CHP	3	Attached (New)			y	20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
279	Micro-CHP	3	Mobile (Existing)	y	y		20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
280	Micro-CHP	3	Mobile (New)			y	20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Measure Information		Applicability										Savings by End Use																				
Measure #	Technology	Climate Zone	Building Type(s)	Exist	Reno	New	Life	Cost	Benefit/Cost Ratio	Economic Screen	Basis	Space heating	Space cooling	Ventilation and Circulation	Domestic hot water (DHW)	Fireplace	Cooking	Dishwasher	Clothes washer	Clothes dryer	Pool & spa heaters	Other gas uses	Other electrical internal loads									
1	Attic Insulation	3	Detached (Pre-1976)	y	y		30.0	$675	1.40	Pass	Full	0%	3%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2	Attic Insulation	3	Detached (Post-1976)	y	y		30.0	$713	0.97	Fail	Full	0%	2%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3	Attic Insulation	3	Attached (Pre-1976)	y	y		30.0	$450	1.27	Pass	Full	0%	3%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4	Attic Insulation	3	Attached (Post-1976)	y	y		30.0	$488	0.87	Fail	Full	0%	2%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5	Attic Insulation	3	Mobile (Existing)	y	y		30.0	$525	1.06	Pass	Full	0%	2%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6	Wall Insulation	3	Detached (Pre-1976)	y	y		30.0	$2,000	1.26	Pass	Incr.	0%	3%	15%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
7	Wall Insulation	3	Detached (Post-1976)	y	y		30.0	$2,000	1.10	Pass	Incr.	0%	3%	15%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
8	Wall Insulation	3	Attached (Pre-1976)	y	y		30.0	$1,500	1.01	Pass	Incr.	0%	3%	15%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
9	Wall Insulation	3	Attached (Post-1976)	y	y		30.0	$1,500	0.90	Fail	Incr.	0%	3%	15%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
10	Wall Insulation	3	Mobile (Existing)	y	y		30.0	$1,500	1.08	Pass	Incr.	0%	3%	15%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
11	Slab Insulation	3	Detached (Pre-1976)	y	y		30.0	$1,125	0.18	Fail	Incr.	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12	Slab Insulation	3	Detached (Post-1976)	y	y		30.0	$1,275	0.11	Fail	Incr.	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
13	Slab Insulation	3	Attached (Pre-1976)	y	y		30.0	$975	0.12	Fail	Incr.	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
14	Slab Insulation	3	Attached (Post-1976)	y	y		30.0	$1,050	0.08	Fail	Incr.	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
15	Basement Insulation	3	Detached (Pre-1976)	y	y		30.0	$1,400	1.34	Pass	Incr.	0%	0%	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
16	Basement Insulation	3	Detached (Post-1976)	y	y		30.0	$1,500	1.18	Pass	Incr.	0%	0%	12%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
17	Basement Insulation	3	Attached (Pre-1976)	y	y		30.0	$900	1.04	Pass	Incr.	0%	0%	8%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
18	Basement Insulation	3	Attached (Post-1976)	y	y		30.0	$1,000	0.87	Fail	Incr.	0%	0%	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
19	Crawl Space Insul.	3	Detached (Pre-1976)	y	y		30.0	$800	0.48	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
20	Crawl Space Insul.	3	Detached (Post-1976)	y	y		30.0	$800	0.42	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21	Crawl Space Insul.	3	Attached (Pre-1976)	y	y		30.0	$800	0.29	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22	Crawl Space Insul.	3	Attached (Post-1976)	y	y		30.0	$800	0.26	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23	Air Sealing	3	Detached (Pre-1976)	y	y		25.0	$1,800	0.74	Fail	Full	0%	1%	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
24	Air Sealing	3	Detached (Post-1976)	y	y		25.0	$1,800	0.56	Fail	Full	0%	1%	8%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
25	Air Sealing	3	Attached (Pre-1976)	y	y		25.0	$1,800	0.44	Fail	Full	0%	1%	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
26	Air Sealing	3	Attached (Post-1976)	y	y		25.0	$1,800	0.34	Fail	Full	0%	1%	8%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
27	Air Sealing	3	Mobile (Existing)	y	y		25.0	$1,800	0.43	Fail	Full	0%	1%	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
28	Homeowner Air Sealing	3	Detached (Pre-1976)	y	y		10.0	$200	1.35	Pass	Full	0%	0%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
29	Homeowner Air Sealing	3	Detached (Post-1976)	y	y		10.0	$200	1.02	Pass	Full	0%	1%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
30	Homeowner Air Sealing	3	Attached (Pre-1976)	y	y		10.0	$200	0.81	Fail	Full	0%	0%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
31	Homeowner Air Sealing	3	Attached (Post-1976)	y	y		10.0	$200	0.62	Fail	Full	0%	1%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
32	Homeowner Air Sealing	3	Mobile (Existing)	y	y		10.0	$200	0.78	Fail	Full	0%	0%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
33	Sealing & Insul. - Old Homes	3	Detached (Pre-1976)	y	y		25.0	$3,000	0.73	Fail	Full	0%	3%	15%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
34	Sealing & Insul. - Old Homes	3	Attached (Pre-1976)	y	y		25.0	$2,500	0.52	Fail	Full	0%	3%	15%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
35	Zone Up Windows	3	Detached (Pre-1976)	y	y		25.0	$1,000	0.35	Fail	Incr.	0%	1%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
36	Zone Up Windows	3	Detached (Post-1976)	y	y		25.0	$1,200	0.36	Fail	Incr.	0%	1%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
37	Zone Up Windows	3	Detached (New)			y	25.0	$2,600	0.27	Fail	Incr.	0%	2%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
38	Zone Up Windows	3	Attached (Pre-1976)	y	y		25.0	$800	0.26	Fail	Incr.	0%	1%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
39	Zone Up Windows	3	Attached (Post-1976)	y	y		25.0	$960	0.28	Fail	Incr.	0%	1%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
40	Zone Up Windows	3	Attached (New)			y	25.0	$2,080	0.21	Fail	Incr.	0%	2%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
41	Zone Up Windows	3	Mobile (Existing)	y	y		25.0	$720	0.39	Fail	Incr.	0%	1%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
42	Zone Up Windows	3	Mobile (New)			y	25.0	$1,600	0.33	Fail	Incr.	0%	2%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
43	Super Windows	3	Detached (Pre-1976)	y	y		25.0	$1,500	0.83	Fail	Incr.	0%	8%	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
44	Super Windows	3	Detached (Post-1976)	y	y		25.0	$1,800	0.90	Fail	Incr.	0%	10%	13%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
45	Super Windows	3	Detached (New)			y	25.0	$3,900	0.61	Fail	Incr.	0%	17%	19%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
46	Super Windows	3	Attached (Pre-1976)	y	y		25.0	$1,200	0.63	Fail	Incr.	0%	8%	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
47	Super Windows	3	Attached (Post-1976)	y	y		25.0	$1,440	0.69	Fail	Incr.	0%	10%	13%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
48	Super Windows	3	Attached (New)			y	25.0	$3,120	0.47	Fail	Incr.	0%	17%	19%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
49	Super Windows	3	Mobile (Existing)	y	y		25.0	$1,080	0.87	Fail	Incr.	0%	9%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
50	Super Windows	3	Mobile (New)			y	25.0	$2,400	0.73	Fail	Incr.	0%	17%	19%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
51	High-Perf. New Homes	3	Detached (New)			y	30.0	$6,000	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
52	High-Perf. New Homes	3	Attached (New)			y	30.0	$4,800	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
53	High-Perf. New Homes	3	Mobile (New)			y	30.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
54	Net Zero Ready Homes	3	Detached (New)			y	30.0	$14,000	0.35	Fail	Full	0%	0%	30%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
55	Net Zero Ready Homes	3	Attached (New)			y	30.0	$9,800	0.32	Fail	Full	0%	0%	30%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
56	Net Zero Ready Homes	3	Mobile (New)			y	30.0	$9,800	0.37	Fail	Full	0%	0%	30%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
57	Condensing Gas Furnaces	3	Detached (Pre-1976)	y	y		18.0	$1,477	0.47	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
58	Condensing Gas Furnaces	3	Detached (Post-1976)	y	y		18.0	$1,477	0.40	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
59	Condensing Gas Furnaces	3	Detached (New)			y	18.0	$1,477	0.40	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
60	Condensing Gas Furnaces	3	Attached (Pre-1976)	y	y		18.0	$1,477	0.28	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
61	Condensing Gas Furnaces	3	Attached (Post-1976)	y	y		18.0	$1,477	0.25	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
62	Condensing Gas Furnaces	3	Attached (New)			y	18.0	$1,477	0.25	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
63	Condensing Gas Furnaces	3	Mobile (Existing)	y	y		18.0	$1,477	0.31	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
64	Condensing Gas Furnaces	3	Mobile (New)			y	18.0	$1,477	0.31	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
65	Early Retire Gas Furnaces	3	Detached (Pre-1976)	y	y		9.0	$1,864	0.39	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
66	Early Retire Gas Furnaces	3	Detached (Post-1976)	y	y		9.0	$1,864	0.33	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
67	Early Retire Gas Furnaces	3	Attached (Pre-1976)	y	y		9.0	$1,864	0.23	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
68	Early Retire Gas Furnaces	3	Attached (Post-1976)	y	y		9.0	$1,864	0.20	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
69	Early Retire Gas Furnaces	3	Mobile (Existing)	y	y		9.0	$1,864	0.26	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
70	Condensing Gas Boilers	3	Detached (Pre-1976)	y	y		20.0	$3,200	0.40	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
71	Condensing Gas Boilers	3	Detached (Post-1976)	y	y		20.0	$3,200	0.34	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
72	Condensing Gas Boilers	3	Detached (New)			y	20.0	$3,200	0.34	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
73	Condensing Gas Boilers	3	Attached (Pre-1976)	y	y		20.0	$3,200	0.24	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
74	Condensing Gas Boilers	3	Attached (Post-1976)	y	y		20.0	$3,200	0.21	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
75	Condensing Gas Boilers	3	Attached (New)			y	20.0	$3,200	0.21	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
76	Condensing Gas Boilers	3	Mobile (Existing)	y	y		20.0	$3,200	0.27	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
77	Condensing Gas Boilers	3	Mobile (New)			y	20.0	$3,200	0.27	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
78	Gas Fireplaces	3	Detached (Pre-1976)	y	y		15.0	$150	2.20	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
79	Gas Fireplaces	3	Detached (Post-1976)	y	y		15.0	$150	2.20	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
80	Gas Fireplaces	3	Detached (New)			y	15.0	$150	2.20	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
81	Gas Fireplaces	3	Attached (Pre-1976)	y	y		15.0	$150	1.45	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
82	Gas Fireplaces	3	Attached (Post-1976)	y	y		15.0	$150	1.45	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
83	Gas Fireplaces	3	Attached (New)			y	15.0	$150	1.45	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
84	Gas Fireplaces	3	Mobile (Existing)	y	y		15.0	$150	1.45	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
85	Gas Fireplaces	3	Mobile (New)			y	15.0	$150	1.45	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
86	Prog. Thermostats	3	Detached (Pre-1976)	y	y		11.0	$50	10.23	Pass	Full	0%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
87	Prog. Thermostats	3	Detached (Post-1976)	y	y		11.0	$50	8.72	Pass	Full	0%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
88	Prog. Thermostats	3	Detached (New)			y	11.0	$50	8.71	Pass	Full	0%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
89	Prog. Thermostats	3	Attached (Pre-1976)	y	y		11.0	$50	6.11	Pass	Full	0%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
90	Prog. Thermostats	3	Attached (Post-1976)	y	y		11.0	$50	5.43	Pass	Full	0%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
91	Prog. Thermostats	3	Attached (New)			y	11.0	$50	5.43	Pass	Full	0%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
92	Prog. Thermostats	3	Mobile (Existing)	y	y		11.0	$50	6.74	Pass	Full	0%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
93	Prog. Thermostats	3	Mobile (New)			y	11.0	$50	6.73	Pass	Full	0%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
94	Solar Make-Up Air	3	Detached (Pre-1976)	y	y		40.0	$1,300	0.28	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
95	Solar Make-Up Air	3	Detached (Post-1976)	y	y		40.0	$1,300	0.24	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
96	Solar Make-Up Air	3	Detached (New)			y	40.0	$1,300	0.24	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
97	Solar Make-Up Air	3	Attached (Pre-1976)	y	y		40.0	$1,300	0.17	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
98	Solar Make-Up Air	3	Attached (Post-1976)	y	y		40.0	$1,300	0.15	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
99	Solar Make-Up Air	3	Attached (New)			y	40.0	$1,300	0.15	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
100	Solar Make-Up Air	3	Mobile (Existing)	y	y		40.0	$1,300	0.18	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
101	Solar Make-Up Air	3	Mobile (New)			y	40.0	$1,300	0.18	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
102	HRVs	3	Detached (Pre-1976)	y	y		15.0	$600	0.47	Fail	Incr.	0%	3%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
103	HRVs	3	Detached (Post-1976)	y	y		15.0	$600	0.41	Fail	Incr.	0%	3%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
104	HRVs	3	Detached (New)			y	15.0	$600	0.41	Fail	Incr.	0%	3%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
105	HRVs	3	Attached (Pre-1976)	y	y		15.0	$600	0.28	Fail	Incr.	0%	3%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
106	HRVs	3	Attached (Post-1976)	y	y		15.0	$600	0.25	Fail	Incr.	0%	3%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
107	HRVs	3	Attached (New)			y	15.0	$600	0.25	Fail	Incr.	0%	3%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
108	HRVs	3	Mobile (Existing)	y	y		15.0	$600	0.30	Fail	Incr.	0%	3%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
109	HRVs	3	Mobile (New)			y	15.0	$600	0.30	Fail	Incr.	0%	3%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
110	Air Heat Pumps	3	Detached (Pre-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
111	Air Heat Pumps	3	Detached (Post-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
112	Air Heat Pumps	3	Detached (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
113	Air Heat Pumps	3	Attached (Pre-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
114	Air Heat Pumps	3	Attached (Post-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
115	Air Heat Pumps	3	Attached (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
116	Air Heat Pumps	3	Mobile (Existing)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
117	Air Heat Pumps	3	Mobile (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
118	Ground Heat Pumps	3	Detached (Pre-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
119	Ground Heat Pumps	3	Detached (Post-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
120	Ground Heat Pumps	3	Detached (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
121	Ground Heat Pumps	3	Attached (Pre-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
122	Ground Heat Pumps	3	Attached (Post-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
123	Ground Heat Pumps	3	Attached (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
124	Ground Heat Pumps	3	Mobile (Existing)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
125	Ground Heat Pumps	3	Mobile (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
126	Heating & DHW	3	Detached (Pre-1976)	y	y		18.0	$8,506	0.11	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
127	Heating & DHW	3	Detached (Post-1976)	y	y		18.0	$8,506	0.10	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
128	Heating & DHW	3	Detached (New)			y	18.0	$3,506	0.25	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
129	Heating & DHW	3	Attached (Pre-1976)	y	y		18.0	$8,506	0.08	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
130	Heating & DHW	3	Attached (Post-1976)	y	y		18.0	$8,506	0.08	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
131	Heating & DHW	3	Attached (New)			y	18.0	$3,506	0.19	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
132	Heating & DHW	3	Mobile (Existing)	y	y		18.0	$8,506	0.08	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
133	Heating & DHW	3	Mobile (New)			y	18.0	$3,506	0.20	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
134	Heating & DHW (Hydronic)	3	Detached (Pre-1976)	y	y		20.0	$8,000	0.24	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
135	Heating & DHW (Hydronic)	3	Detached (Post-1976)	y	y		20.0	$8,000	0.21	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
136	Heating & DHW (Hydronic)	3	Detached (New)			y	20.0	$3,000	0.57	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
137	Heating & DHW (Hydronic)	3	Attached (Pre-1976)	y	y		20.0	$8,000	0.16	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
138	Heating & DHW (Hydronic)	3	Attached (Post-1976)	y	y		20.0	$8,000	0.15	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
139	Heating & DHW (Hydronic)	3	Attached (New)			y	20.0	$3,000	0.40	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
140	Heating & DHW (Hydronic)	3	Mobile (Existing)	y	y		20.0	$8,000	0.17	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
141	Heating & DHW (Hydronic)	3	Mobile (New)			y	20.0	$3,000	0.45	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
142	Condensing Gas DHW	3	Detached (Pre-1976)	y	y		13.0	$1,567	0.20	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
143	Condensing Gas DHW	3	Detached (Post-1976)	y	y		13.0	$1,567	0.20	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
144	Condensing Gas DHW	3	Detached (New)			y	13.0	$1,073	0.30	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
145	Condensing Gas DHW	3	Attached (Pre-1976)	y	y		13.0	$1,567	0.17	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
146	Condensing Gas DHW	3	Attached (Post-1976)	y	y		13.0	$1,567	0.17	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
147	Condensing Gas DHW	3	Attached (New)			y	13.0	$1,073	0.25	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
148	Condensing Gas DHW	3	Mobile (Existing)	y	y		13.0	$1,567	0.16	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
149	Condensing Gas DHW	3	Mobile (New)			y	13.0	$1,073	0.23	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
150	Tankless Gas DHW	3	Detached (Pre-1976)	y	y		20.0	$2,274	0.30	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
151	Tankless Gas DHW	3	Detached (Post-1976)	y	y		20.0	$2,274	0.30	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
152	Tankless Gas DHW	3	Detached (New)			y	20.0	$1,646	0.41	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
153	Tankless Gas DHW	3	Attached (Pre-1976)	y	y		20.0	$2,274	0.25	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
154	Tankless Gas DHW	3	Attached (Post-1976)	y	y		20.0	$2,274	0.25	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
155	Tankless Gas DHW	3	Attached (New)			y	20.0	$1,646	0.34	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
156	Tankless Gas DHW	3	Mobile (Existing)	y	y		20.0	$2,274	0.26	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
157	Tankless Gas DHW	3	Mobile (New)			y	20.0	$1,646	0.36	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
158	Solar DHW	3	Detached (Pre-1976)	y	y		25.0	$7,000	0.20	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
159	Solar DHW	3	Detached (Post-1976)	y	y		25.0	$7,000	0.20	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
160	Solar DHW	3	Detached (New)			y	25.0	$7,000	0.20	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
161	Solar DHW	3	Attached (Pre-1976)	y	y		25.0	$7,000	0.18	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
162	Solar DHW	3	Attached (Post-1976)	y	y		25.0	$7,000	0.18	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
163	Solar DHW	3	Attached (New)			y	25.0	$7,000	0.18	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
164	Solar DHW	3	Mobile (Existing)	y	y		25.0	$7,000	0.20	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
165	Solar DHW	3	Mobile (New)			y	25.0	$7,000	0.20	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
166	DHW Tank Insulation	3	Detached (Pre-1976)	y	y		13.0	$35	0.76	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
167	DHW Tank Insulation	3	Detached (Post-1976)	y	y		13.0	$35	0.76	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
168	DHW Tank Insulation	3	Detached (New)			y	13.0	$35	0.76	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
169	DHW Tank Insulation	3	Attached (Pre-1976)	y	y		13.0	$25	0.90	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
170	DHW Tank Insulation	3	Attached (Post-1976)	y	y		13.0	$25	0.90	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
171	DHW Tank Insulation	3	Attached (New)			y	13.0	$25	0.90	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
172	DHW Tank Insulation	3	Mobile (Existing)	y	y		13.0	$25	0.93	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
173	DHW Tank Insulation	3	Mobile (New)			y	13.0	$25	0.93	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
174	DHW Pipe Insulation	3	Detached (Pre-1976)	y	y		15.0	$1	15.29	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
175	DHW Pipe Insulation	3	Detached (Post-1976)	y	y		15.0	$1	15.29	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
176	DHW Pipe Insulation	3	Detached (New)			y	15.0	$1	15.29	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
177	DHW Pipe Insulation	3	Attached (Pre-1976)	y	y		15.0	$1	12.91	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
178	DHW Pipe Insulation	3	Attached (Post-1976)	y	y		15.0	$1	12.91	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
179	DHW Pipe Insulation	3	Attached (New)			y	15.0	$1	12.91	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
180	DHW Pipe Insulation	3	Mobile (Existing)	y	y		15.0	$1	13.31	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
181	DHW Pipe Insulation	3	Mobile (New)			y	15.0	$1	13.31	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
182	DHW Heat Traps	3	Detached (New)			y	13.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
183	DHW Heat Traps	3	Attached (New)			y	13.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
184	DHW Heat Traps	3	Mobile (New)			y	13.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
185	Showerheads	3	Detached (Pre-1976)	y	y		10.0	$13	8.63	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
186	Showerheads	3	Detached (Post-1976)	y	y		10.0	$13	8.63	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
187	Showerheads	3	Detached (New)			y	10.0	$13	8.63	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
188	Showerheads	3	Attached (Pre-1976)	y	y		10.0	$13	7.29	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
189	Showerheads	3	Attached (Post-1976)	y	y		10.0	$13	7.29	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
190	Showerheads	3	Attached (New)			y	10.0	$13	7.29	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
191	Showerheads	3	Mobile (Existing)	y	y		10.0	$13	7.52	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
192	Showerheads	3	Mobile (New)			y	10.0	$13	7.52	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
193	Faucet Aerators	3	Detached (Pre-1976)	y	y		10.0	$15	4.52	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
194	Faucet Aerators	3	Detached (Post-1976)	y	y		10.0	$15	4.52	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
195	Faucet Aerators	3	Detached (New)			y	10.0	$15	4.52	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
196	Faucet Aerators	3	Attached (Pre-1976)	y	y		10.0	$15	3.82	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
197	Faucet Aerators	3	Attached (Post-1976)	y	y		10.0	$15	3.82	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
198	Faucet Aerators	3	Attached (New)			y	10.0	$15	3.82	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
199	Faucet Aerators	3	Mobile (Existing)	y	y		10.0	$15	3.94	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
200	Faucet Aerators	3	Mobile (New)			y	10.0	$15	3.94	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
201	Wastewater Heat Recovery	3	Detached (Pre-1976)	y	y		30.0	$800	0.40	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
202	Wastewater Heat Recovery	3	Detached (Post-1976)	y	y		30.0	$800	0.40	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
203	Wastewater Heat Recovery	3	Detached (New)			y	30.0	$800	0.40	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
204	Wastewater Heat Recovery	3	Attached (Pre-1976)	y	y		30.0	$731	0.37	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
205	Wastewater Heat Recovery	3	Attached (Post-1976)	y	y		30.0	$731	0.37	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
206	Wastewater Heat Recovery	3	Attached (New)			y	30.0	$731	0.37	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
207	Wastewater Heat Recovery	3	Mobile (Existing)	y	y		30.0	$731	0.38	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
208	Wastewater Heat Recovery	3	Mobile (New)			y	30.0	$731	0.38	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
209	DHW Recirculation	3	Detached (Pre-1976)	y	y		18.0	$570	0.50	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

210	DHW Recirculation	3	Detached (Post-1976)	y	y		18.0	$570	0.50	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
211	DHW Recirculation	3	Detached (New)			y	18.0	$570	0.50	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
212	DHW Recirculation	3	Attached (Pre-1976)	y	y		18.0	$470	0.52	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
213	DHW Recirculation	3	Attached (Post-1976)	y	y		18.0	$470	0.52	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
214	DHW Recirculation	3	Attached (New)			y	18.0	$470	0.52	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
215	DHW Recirculation	3	Mobile (Existing)	y	y		18.0	$470	0.53	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
216	DHW Recirculation	3	Mobile (New)			y	18.0	$470	0.53	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
217	ESTAR Dishwashers	3	Detached (Pre-1976)	y	y		11.0	$105	0.29	Fail	Incr.	0%	0%	0%	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
218	ESTAR Dishwashers	3	Detached (Post-1976)	y	y		11.0	$105	0.29	Fail	Incr.	0%	0%	0%	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
219	ESTAR Dishwashers	3	Detached (New)			y	11.0	$105	0.29	Fail	Incr.	0%	0%	0%	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
220	ESTAR Dishwashers	3	Attached (Pre-1976)	y	y		11.0	$105	0.24	Fail	Incr.	0%	0%	0%	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
221	ESTAR Dishwashers	3	Attached (Post-1976)	y	y		11.0	$105	0.24	Fail	Incr.	0%	0%	0%	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
222	ESTAR Dishwashers	3	Attached (New)			y	11.0	$105	0.24	Fail	Incr.	0%	0%	0%	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
223	ESTAR Dishwashers	3	Mobile (Existing)	y	y		11.0	$105	0.25	Fail	Incr.	0%	0%	0%	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
224	ESTAR Dishwashers	3	Mobile (New)			y	11.0	$105	0.25	Fail	Incr.	0%	0%	0%	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
225	ESTAR Clothes Washers	3	Detached (Pre-1976)	y	y		14.0	$300	0.87	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	37%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
226	ESTAR Clothes Washers	3	Detached (Post-1976)	y	y		14.0	$300	0.87	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	37%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
227	ESTAR Clothes Washers	3	Detached (New)			y	14.0	$300	0.87	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	37%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
228	ESTAR Clothes Washers	3	Attached (Pre-1976)	y	y		14.0	$300	0.75	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	37%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
229	ESTAR Clothes Washers	3	Attached (Post-1976)	y	y		14.0	$300	0.75	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	37%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
230	ESTAR Clothes Washers	3	Attached (New)			y	14.0	$300	0.75	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	37%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
231	ESTAR Clothes Washers	3	Mobile (Existing)	y	y		14.0	$300	0.78	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	37%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
232	ESTAR Clothes Washers	3	Mobile (New)			y	14.0	$300	0.78	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	37%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
233	Gas Clothes Dryers	3	Detached (Pre-1976)	y	y		18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
234	Gas Clothes Dryers	3	Detached (Post-1976)	y	y		18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
235	Gas Clothes Dryers	3	Detached (New)			y	18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
236	Gas Clothes Dryers	3	Attached (Pre-1976)	y	y		18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
237	Gas Clothes Dryers	3	Attached (Post-1976)	y	y		18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
238	Gas Clothes Dryers	3	Attached (New)			y	18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
239	Gas Clothes Dryers	3	Mobile (Existing)	y	y		18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
240	Gas Clothes Dryers	3	Mobile (New)			y	18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
241	Pool Covers	3	Detached (Pre-1976)	y	y		10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
242	Pool Covers	3	Detached (Post-1976)	y	y		10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
243	Pool Covers	3	Detached (New)			y	10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
244	Pool Covers	3	Attached (Pre-1976)	y	y		10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
245	Pool Covers	3	Attached (Post-1976)	y	y		10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
246	Pool Covers	3	Attached (New)			y	10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
247	Pool Covers	3	Mobile (Existing)	y	y		10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
248	Pool Covers	3	Mobile (New)			y	10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
249	Heat Pump Pool Heaters	3	Detached (Pre-1976)	y	y		10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
250	Heat Pump Pool Heaters	3	Detached (Post-1976)	y	y		10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
251	Heat Pump Pool Heaters	3	Detached (New)			y	10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
252	Heat Pump Pool Heaters	3	Attached (Pre-1976)	y	y		10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
253	Heat Pump Pool Heaters	3	Attached (Post-1976)	y	y		10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
254	Heat Pump Pool Heaters	3	Attached (New)			y	10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
255	Heat Pump Pool Heaters	3	Mobile (Existing)	y	y		10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
256	Heat Pump Pool Heaters	3	Mobile (New)			y	10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
257	Efficient Pool Heaters	3	Detached (Pre-1976)	y	y		7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
258	Efficient Pool Heaters	3	Detached (Post-1976)	y	y		7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
259	Efficient Pool Heaters	3	Detached (New)			y	7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
260	Efficient Pool Heaters	3	Attached (Pre-1976)	y	y		7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
261	Efficient Pool Heaters	3	Attached (Post-1976)	y	y		7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
262	Efficient Pool Heaters	3	Attached (New)			y	7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
263	Efficient Pool Heaters	3	Mobile (Existing)	y	y		7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
264	Efficient Pool Heaters	3	Mobile (New)			y	7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
265	Solar Pool Heaters	3	Detached (Pre-1976)	y	y		20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
266	Solar Pool Heaters	3	Detached (Post-1976)	y	y		20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
267	Solar Pool Heaters	3	Detached (New)			y	20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
268	Solar Pool Heaters	3	Attached (Pre-1976)	y	y		20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
269	Solar Pool Heaters	3	Attached (Post-1976)	y	y		20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
270	Solar Pool Heaters	3	Attached (New)			y	20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
271	Solar Pool Heaters	3	Mobile (Existing)	y	y		20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
272	Solar Pool Heaters	3	Mobile (New)			y	20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
273	Micro-CHP	3	Detached (Pre-1976)	y	y		20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
274	Micro-CHP	3	Detached (Post-1976)	y	y		20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
275	Micro-CHP	3	Detached (New)			y	20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
276	Micro-CHP	3	Attached (Pre-1976)	y	y		20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
277	Micro-CHP	3	Attached (Post-1976)	y	y		20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
278	Micro-CHP	3	Attached (New)			y	20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
279	Micro-CHP	3	Mobile (Existing)	y	y		20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
280	Micro-CHP	3	Mobile (New)			y	20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Back to Index

Attic Insulation

		References/Notes
Description:	Insulation levels can be increased in attics by blowing insulation into the attic spaces to fill and cover the space within the roof frame. One technique is to make sure loose-fill or batt insulation fills the attic floor joists fully and then add an additional layer of unfaced fibreglass batt insulation across the joists. To reduce cost, it is also possible to blow in cellulose insulation on top of the existing insulation instead.	
Baseline:	A home with average insulation in the attic	
Upgrade:	Improving the attic insulation in an average home by RSI-3.5 (R-20), through the addition of cellulose insulation	

Baseline Reference:	1. Annual consumption, end use
Heating Fuel Type:	All Fuels (Average Fuel Mix)
Main End Use:	Space Heating
Discount Rate:	7.38%
GHG Adder Incl.?	No
Resource Costs:	Baseload

= User Input
= Calculation

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.648	$1.648		$1.648	$1.648		$1.648	
Electricity ($/kW)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	
Natural Gas ($/MJ)	$0.010	$0.139	$0.139		$0.139	$0.139		$0.139	
Oil ($/L)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	
Water ($/1000L)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☐	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☐	Mobile (Existing) ☑	Mobile (New) ☐	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	847	1,047		532	532		362		926	
	Natural Gas (MJ/yr.)	105,871	89,550		63,283	56,054		70,102		92,080	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Upgrade Consumption	Electricity (kWh/yr.)	808	1,007		506	512		349		889	
	Natural Gas (MJ/yr.)	99,518	85,072		59,486	53,251		66,246		87,126	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%		0%	0%		0%		0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%		0%	0%		0%		0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-		-	-		-		-	
	Electricity, Cooling (kWh/yr.)	-	-		-	-		-		-	
	Electricity, Total (kWh/yr.)	-	-		-	-		-		-	
	Natural Gas (MJ/yr.)	-	-		-	-		-		-	
	Oil (L/yr.)	-	-		-	-		-		-	
Winter Peak Hours-Use Factor		-	-		-	-		-		-	
Resource Savings	Electricity (kWh/yr.)	39	40		25	20		13		37	
	Electricity (kW peak)	-	-		-	-		-		-	
	Natural Gas (MJ/yr.)	6,352	4,477		3,797	2,803		3,856		4,954	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Cost Parameters	Upgrade, Material ($)	$675.00	$712.50		$450.00	$487.50		$525.00		$680.47	Consultations with utilities and contractors have suggested that an average cost of $0.75/ft^2 (material and installation) is reasonable. Average ceiling areas based on ecoENERGY database data for BC and HOT2000 modelling.
	Upgrade, Installation ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	Installation costs included above
	Baseline, Material ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	
	Baseline, Installation ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	
	Total Measure Cost ($)	$675.00	$712.50		$450.00	$487.50		$525.00		$680.47	
	Basis (Full/Incremental)	Full	Full		Full	Full		Full		Full	
Incremental O&M ($/yr.)		$0	$0		$0	$0		$0		$0	
Lifetimes	Upgrade (yrs.)	30	30		30	30		30		30	Approximate lifetime, based on previous Marbek energy efficiency potential studies
	Baseline (yrs.)	-	-		-	-		-		-	
Cost Savings ($/yr.)		$65	$47		$39	$29		$39		$52	
Simple Payback (yrs.)		10.3	15.1		11.4	16.7		13.5		13.59	
NPV of O&M Costs ($)		$0	$0		$0	$0		$0		$0	
Total Benefits ($)	Electric Energy	$65	$65		$42	$33		$22		$62	
	Electric Demand	$0	$0		$0	$0		$0		$0	
	Natural Gas	$884	$623		$528	$390		$536		$689	
	Oil	$0	$0		$0	$0		$0		$0	
	Water	$0	$0		$0	$0		$0		$0	
Measure TRC ($)		$273	-$24		$120	-$65		$33		$70	
Benefit/Cost Ratio		1.40	0.97		1.27	0.87		1.06		1.10	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1		1	1		1		
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental		Incremental	Incremental		Incremental		
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	5.5%	4.5%		5.5%	4.5%		5.0%		4.8%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes.
Space Cooling	-	1	1	2.5%	1.5%		2.5%	1.5%		2.0%		1.8%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes.
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	6.0%	5.0%		6.0%	5.0%		5.5%		5.3%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes.
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heater	-	0	0									-	
Pool and Spa Heater	Pool Heaters	0	0									-	
Pool and Spa Heater	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	

Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	5.5%	4.5%		5.5%	4.5%		5.0%		4.8%	
Space Cooling	1	1	2.5%	1.5%		2.5%	1.5%		2.0%		1.8%	
Clothes Washers	0	0	-	-		-	-		-		-	
Dishwashers	0	0	-	-		-	-		-		-	
Other Electric Loads	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	6.0%	5.0%		6.0%	5.0%		5.5%		5.3%	
Domestic Hot Water (DHW)	0	0	-	-		-	-		-		-	
Fireplaces	0	0	-	-		-	-		-		-	
Cooking	0	0	-	-		-	-		-		-	
Clothes Dryers	0	0	-	-		-	-		-		-	
Pool and Spa Heaters	0	0	-	-		-	-		-		-	
Other	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-		-	-		-		-	
Domestic Hot Water (DHW)	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Wall Insulation

		References/Notes
Description:	It can be challenging to retrofit wall insulation in existing homes since the inside surfaces of the exterior walls are already finished. It is sometimes possible to add insulation to a wall by blowing insulating materials into the wall cavity, if sufficient space exists. Alternatively, if the siding is old and due for replacement, rigid foam insulation can be added before the new siding is installed. In this situation, it would also be quite cost-effective to install a more effective vapour and air barrier (e.g., Dupont Tyvek®) to reduce the amount of air leakage through the walls.	
Baseline:	A home with average wall insulation	
Upgrade:	Improving the wall insulation in an average home by RSI-1.76 (R-10) to RSI-4.2 (R-24)	Assumed that the homeowner is replacing the home's siding and improving the wall insulation on an incremental basis.

Baseline Reference:	1. Annual consumption, end use							
Heating Fuel Type:	All Fuels (Average Fuel Mix)							
Main End Use:	Space Heating							
Discount Rate:	7.38%							
GHG Adder Incl.?	No							
Resource Costs:	Baseload							
	Customer Cost	**Avoided Costs (NPV)**						
Electricity ($/kWh)	$0.083	$1.648	$1.648		$1.648	$1.648		$1.648
Electricity ($/kW)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000
Natural Gas ($/MJ)	$0.010	$0.139	$0.139		$0.139	$0.139		$0.139
Oil ($/L)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000
Water ($/1000L)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000

		= User Input
		= Calculation

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☐	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☐	Mobile (Existing) ☑	Mobile (New) ☐	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	847	1,047		532	532		362		926	
	Natural Gas (MJ/yr.)	105,871	89,550		63,283	56,054		70,102		92,080	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Upgrade Consumption	Electricity (kWh/yr.)	750	921		468	468		327		817	
	Natural Gas (MJ/yr.)	88,931	75,222		53,158	47,085		58,886		77,347	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%		0%	0%		0%		0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%		0%	0%		0%		0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-		-	-		-		-	
	Electricity, Cooling (kWh/yr.)	-	-		-	-		-		-	
	Electricity, Total (kWh/yr.)	-	-		-	-		-		-	
	Natural Gas (MJ/yr.)	-	-		-	-		-		-	
	Oil (L/yr.)	-	-		-	-		-		-	
Winter Peak Hours-Use Factor		-	-		-	-		-		-	
Resource Savings	Electricity (kWh/yr.)	97	126		64	63		35		110	
	Electricity (kW peak)	-	-		-	-		-		-	
	Natural Gas (MJ/yr.)	16,939	14,328		10,125	8,969		11,216		14,733	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Cost Parameters	Upgrade, Material ($)	$2,000.00	$2,000.00		$1,500.00	$1,500.00		$1,500.00		$1,951.27	Approx. material and installation costs, based on private communication with Tony Woods, CanAm Building Envelope Specialists (2009)
	Upgrade, Installation ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	Installation costs included above
	Baseline, Material ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	
	Baseline, Installation ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	
	Total Measure Cost ($)	$2,000.00	$2,000.00		$1,500.00	$1,500.00		$1,500.00		$1,951.27	
	Basis (Full/Incremental)	Incr.	Incr.		Incr.	Incr.		Incr.		Incr.	Forced to incremental because it would be done as part of siding replacement
Incremental O&M ($/yr.)		$0	$0		$0	$0		$0		$0	
Lifetimes	Upgrade (yrs.)	30	30		30	30		30		30	Approximate lifetime, based on previous Marbek energy efficiency potential studies
	Baseline (yrs.)	30	30		30	30		30		30	
Cost Savings ($/yr.)		$174	$151		$105	$93		$113		$153	
Simple Payback (yrs.)		11.5	13.3		14.4	16.1		13.3		12.84	
NPV of O&M Costs ($)		$0	$0		$0	$0		$0		$0	
Total Benefits ($)	Electric Energy	$160	$208		$105	$104		$58		$181	
	Electric Demand	$0	$0		$0	$0		$0		$0	
	Natural Gas	$2,356	$1,993		$1,408	$1,247		$1,560		$2,049	
	Oil	$0	$0		$0	$0		$0		$0	
	Water	$0	$0		$0	$0		$0		$0	
Measure TRC ($)		$517	$201		$14	-$148		$118		$279	
Benefit/Cost Ratio		1.26	1.10		1.01	0.90		1.08		1.14	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1		1	1		1		
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental		Incremental	Incremental		Incremental		
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	15.0%	15.0%		15.0%	15.0%		15.0%		15.0%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes.
Space Cooling	-	1	1	3.0%	2.5%		3.0%	2.5%		2.5%		2.7%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes.
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	16.0%	16.0%		16.0%	16.0%		16.0%		16.0%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes.
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heater	-	0	0									-	
Pool and Spa Heater	Pool Heaters	0	0									-	
Pool and Spa Heater	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	

Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	**Sub End Use/Equipment (If Applicable)**	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
		Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Ventilation and Circulation	1	1	15.0%	15.0%		15.0%	15.0%		15.0%		15.0%	
Space Cooling	1	1	3.0%	2.5%		3.0%	2.5%		2.5%		2.7%	
Clothes Washers	0	0	-	-		-	-		-		-	
Dishwashers	0	0	-	-		-	-		-		-	
Other Electric Loads	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Space Heating	1	1	16.0%	16.0%		16.0%	16.0%		16.0%		16.0%	
Domestic Hot Water (DHW)	0	0	-	-		-	-		-		-	
Fireplaces	0	0	-	-		-	-		-		-	
Cooking	0	0	-	-		-	-		-		-	
Clothes Dryers	0	0	-	-		-	-		-		-	
Pool and Spa Heaters	0	0	-	-		-	-		-		-	
Other	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Space Heating	0	0	-	-		-	-		-		-	
Domestic Hot Water (DHW)	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Water	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Slab Insulation (Unfinished Basements)

		References/Notes
Description:	Insulation can be added both under and on top of basement slab floors. However, in existing homes, only the latter is practical. It is assumed that additional insulation is added to the slab floor while the basement is being finished. This can be done by purchasing insulated subfloor panels or laying down extruded polystyrene rigid foam insulation.	
Baseline:	Homes with unfinished basements	
Upgrade:	The addition of slab (basement floor) insulation in homes with unfinished basements. It is assumed that 2" polystyrene rigid foam insulation (RSI-1.76 (R-10)) is being added.	Assumed that the homeowner is finishing their basement and improving the slab/floor insulation on an incremental basis.

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.648	$1.648		$1.648	$1.648			
Electricity ($/kW)	$0.000	$0.000	$0.000		$0.000	$0.000			
Natural Gas ($/MJ)	$0.010	$0.139	$0.139		$0.139	$0.139			
Oil ($/L)	$0.000	$0.000	$0.000		$0.000	$0.000			
Water ($/1000L)	$0.000	$0.000	$0.000		$0.000	$0.000			

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☐	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☐	Mobile (Existing) ☐	Mobile (New) ☐	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	600	800		400	400				714	
	Natural Gas (MJ/yr.)	105,871	89,550		63,283	56,054				93,181	
	Oil (L/yr.)	-	-		-	-				-	
	Water (L/yr.)	-	-		-	-				-	
Upgrade Consumption	Electricity (kWh/yr.)	594	792		396	396				707	
	Natural Gas (MJ/yr.)	104,494	88,654		62,460	55,493				92,145	
	Oil (L/yr.)	-	-		-	-				-	
	Water (L/yr.)	-	-		-	-				-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%		0%	0%				0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%		0%	0%				0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-		-	-				-	
	Electricity, Cooling (kWh/yr.)	-	-		-	-				-	
	Electricity, Total (kWh/yr.)	-	-		-	-				-	
	Natural Gas (MJ/yr.)	-	-		-	-				-	
	Oil (L/yr.)	-	-		-	-				-	
Winter Peak Hours-Use Factor		-	-		-	-				-	
Resource Savings	Electricity (kWh/yr.)	6	8		4	4				7	
	Electricity (kW peak)	-	-		-	-				-	
	Natural Gas (MJ/yr.)	1,376	895		823	561				1,037	
	Oil (L/yr.)	-	-		-	-				-	
	Water (L/yr.)	-	-		-	-				-	
Cost Parameters	Upgrade, Material ($)	$1,125.00	$1,275.00		$975.00	$1,050.00				$1,213.74	Based on a retail scan (Home Depot), the cost of this type of insulation is ~$1.50/ft^2 ($16/m^2) (2010). Average basement areas based on ecoENERGY database data for BC and HOT2000 modelling.
	Upgrade, Installation ($)	$0.00	$0.00		$0.00	$0.00				$0.00	Assuming that additional labour costs are minimal since the basement is being finished
	Baseline, Material ($)	$0.00	$0.00		$0.00	$0.00				$0.00	
	Baseline, Installation ($)	$0.00	$0.00		$0.00	$0.00				$0.00	
	Total Measure Cost ($)	$1,125.00	$1,275.00		$975.00	$1,050.00				$1,213.74	
	Basis (Full/Incremental)	Incr.	Incr.		Incr.	Incr.				Incr.	Forced to incremental because it would be done as part of basement reno.
Incremental O&M ($/yr.)		$0	$0		$0	$0				$0	
Lifetimes	Upgrade (yrs.)	30	30		30	30				30	Approximate lifetime, based on previous Marbek energy efficiency potential studies
	Baseline (yrs.)	30	30		30	30				30	
Cost Savings ($/yr.)		$14	$9		$8	$6				$11	
Simple Payback (yrs.)		80.4	135.1		116.2	180.3				119.20	
NPV of O&M Costs ($)		$0	$0		$0	$0				$0	
Total Benefits ($)	Electric Energy	$10	$13		$7	$7				$12	
	Electric Demand	$0	$0		$0	$0				$0	
	Natural Gas	$191	$125		$114	$78				$144	
	Oil	$0	$0		$0	$0				$0	
	Water	$0	$0		$0	$0				$0	
Measure TRC ($)		-$924	-$1,137		-$854	-$965				-$1,058	
Benefit/Cost Ratio		0.18	0.11		0.12	0.08				0.13	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1		1	1				
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental		Incremental	Incremental				
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	1.0%	1.0%		1.0%	1.0%				1.0%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached homes.
Space Cooling	-	0	0									-	Space cooling savings are negligible, based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC.
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	1.3%	1.0%		1.3%	1.0%				1.1%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached homes.
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	

Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	1.0%	1.0%		1.0%	1.0%				1.0%	
Space Cooling	0	0	-	-		-	-				-	
Clothes Washers	0	0	-	-		-	-				-	
Dishwashers	0	0	-	-		-	-				-	
Other Electric Loads	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	1.3%	1.0%		1.3%	1.0%				1.1%	
Domestic Hot Water (DHW)	0	0	-	-		-	-				-	
Fireplaces	0	0	-	-		-	-				-	
Cooking	0	0	-	-		-	-				-	
Clothes Dryers	0	0	-	-		-	-				-	
Pool and Spa Heaters	0	0	-	-		-	-				-	
Other	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-		-	-				-	
Domestic Hot Water (DHW)	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Basement (Foundation) Insulation

		References/Notes
Description:	In many homes, the basement is often under-insulated or even left uninsulated. Increasing the insulation level in basements can be achieved in a number of ways, including constructing a new insulated frame wall, moving the existing frame wall to increase the insulation level, adding extra insulation to the existing frame wall, adding rigid board insulation to the exterior of the foundation, or using a combination of interior and exterior rigid board insulation. As a lower cost alternative, it is also possible to use polyurethane foam.	
Baseline:	A home with average insulation in the basement (foundation) walls	
Upgrade:	In average homes with basements, improving the foundation wall insulation by RSI-2.12 (R-12)	Assumed that the homeowner is finishing or refinishing the basement and improving the foundation insulation on an incremental basis.

Baseline Reference:	1. Annual consumption, end use								
Heating Fuel Type:	All Fuels (Average Fuel Mix)								
Main End Use:	Space Heating								
Discount Rate:	7.38%								
GHG Adder Incl.?	No								
Resource Costs:	Baseload								
	Customer Cost	**Avoided Costs (NPV)**							
Electricity ($/kWh)	$0.083	$1.648	$1.648		$1.648	$1.648			
Electricity ($/kW)	$0.000	$0.000	$0.000		$0.000	$0.000			
Natural Gas ($/MJ)	$0.010	$0.139	$0.139		$0.139	$0.139			
Oil ($/L)	$0.000	$0.000	$0.000		$0.000	$0.000			
Water ($/1000L)	$0.000	$0.000	$0.000		$0.000	$0.000			

= User Input
= Calculation

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☐	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☐	Mobile (Existing) ☐	Mobile (New) ☐	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	847	1,047		532	532				955	
	Natural Gas (MJ/yr.)	105,871	89,550		63,283	56,054				93,181	
	Oil (L/yr.)	-	-		-	-				-	
	Water (L/yr.)	-	-		-	-				-	
Upgrade Consumption	Electricity (kWh/yr.)	781	955		500	498				874	
	Natural Gas (MJ/yr.)	93,166	77,908		56,955	50,168				81,490	
	Oil (L/yr.)	-	-		-	-				-	
	Water (L/yr.)	-	-		-	-				-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%		0%	0%				0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%		0%	0%				0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-		-	-				-	
	Electricity, Cooling (kWh/yr.)	-	-		-	-				-	
	Electricity, Total (kWh/yr.)	-	-		-	-				-	
	Natural Gas (MJ/yr.)	-	-		-	-				-	
	Oil (L/yr.)	-	-		-	-				-	
Winter Peak Hours-Use Factor		-	-		-	-				-	
Resource Savings	Electricity (kWh/yr.)	66	92		32	34				80	
	Electricity (kW peak)	-	-		-	-				-	
	Natural Gas (MJ/yr.)	12,704	11,641		6,328	5,886				11,691	
	Oil (L/yr.)	-	-		-	-				-	
	Water (L/yr.)	-	-		-	-				-	
Cost Parameters	Upgrade, Material ($)	$1,400.00	$1,500.00		$900.00	$1,000.00				$1,440.58	~$2.00/ft^2 (material and installation) for addition of R-12 to foundation insulation, based on private communication with Tony Woods, CanAm Building Envelope Specialists (2009), and assuming average foundation wall areas as per HOT2000 models and the ecoENERGY database.
	Upgrade, Installation ($)	$0.00	$0.00		$0.00	$0.00				$0.00	
	Baseline, Material ($)	$0.00	$0.00		$0.00	$0.00				$0.00	
	Baseline, Installation ($)	$0.00	$0.00		$0.00	$0.00				$0.00	
	Total Measure Cost ($)	$1,400.00	$1,500.00		$900.00	$1,000.00				$1,440.58	
	Basis (Full/Incremental)	Incr.	Incr.		Incr.	Incr.				Incr.	Forced to incremental because it would be done as part of basement reno.
Incremental O&M ($/yr.)		$0	$0		$0	$0				$0	
Lifetimes	Upgrade (yrs.)	30	30		30	30				30	Approximate lifetime, based on previous Marbek energy efficiency potential studies
	Baseline (yrs.)	30	30		30	30				30	
Cost Savings ($/yr.)		$130	$122		$65	$60				$121	
Simple Payback (yrs.)		10.8	12.3		13.9	16.5				12.02	
NPV of O&M Costs ($)		$0	$0		$0	$0				$0	
Total Benefits ($)	Electric Energy	$109	$152		$53	$56				$133	
	Electric Demand	$0	$0		$0	$0				$0	
	Natural Gas	$1,767	$1,619		$880	$819				$1,626	
	Oil	$0	$0		$0	$0				$0	
	Water	$0	$0		$0	$0				$0	
Measure TRC ($)		$476	$271		$33	-$125				$318	
Benefit/Cost Ratio		1.34	1.18		1.04	0.87				1.22	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1		1	1				
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental		Incremental	Incremental				
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No) Baseline	Applies? (1=Yes; 0=No) Upgrade	Measure Resource Savings (%) Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Ventilation and Circulation	-	1	1	11.0%	11.5%		8.0%	8.5%				11.2%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings in attached homes are slightly lower since a smaller percentage of their wall areas is exposed to the outdoors.
Space Cooling	-	1	1									-	Space cooling savings are negligible, based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC.
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No) Baseline	Applies? (1=Yes; 0=No) Upgrade	Measure Resource Savings (%) Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Space Heating	-	1	1	12.0%	13.0%		10.0%	10.5%				12.5%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings in attached homes are slightly lower since a smaller percentage of their wall areas is exposed to the outdoors.
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No) Baseline	Applies? (1=Yes; 0=No) Upgrade	Measure Resource Savings (%) Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	

Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	11.0%	11.5%		8.0%	8.5%				11.2%	
Space Cooling	1	1	-	-		-	-				-	
Clothes Washers	0	0	-	-		-	-				-	
Dishwashers	0	0	-	-		-	-				-	
Other Electric Loads	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	12.0%	13.0%		10.0%	10.5%				12.5%	
Domestic Hot Water (DHW)	0	0	-	-		-	-				-	
Fireplaces	0	0	-	-		-	-				-	
Cooking	0	0	-	-		-	-				-	
Clothes Dryers	0	0	-	-		-	-				-	
Pool and Spa Heaters	0	0	-	-		-	-				-	
Other	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-		-	-				-	
Domestic Hot Water (DHW)	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Crawl Space Insulation

		References/Notes
Description:	Insulation levels remain below code in many homes that include crawlspaces as part of the basement design. If the floor is exposed, it would first be necessary to install a vapour barrier (e.g., 6 mil (600 gauge/0.15 mm) polyurethane barrier). Polyurethane foam could then be applied to the ceiling of the crawlspace (or the outer walls if there are pipes running below the floor). In addition to increasing the insulation of the crawlspace, this would help to eliminate any air leaks. Co-benefits of improved crawlspace insulation include improved thermal comfort, fewer drafts, and less condensation.	
Baseline:	Minimal crawlspace insulation in homes with crawlspaces	
Upgrade:	In homes with crawlspaces, the addition of crawlspace insulation to bring the thermal resistance values up to RSI-2.1 (R-12)	

Baseline Reference:	1. Annual consumption, end use
Heating Fuel Type:	All Fuels (Average Fuel Mix)
Main End Use:	Space Heating
Discount Rate:	7.38%
GHG Adder Incl.?	No
Resource Costs:	Baseload

= User Input
= Calculation

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.648	$1.648		$1.648	$1.648			
Electricity ($/kW)	$0.000	$0.000	$0.000		$0.000	$0.000			
Natural Gas ($/MJ)	$0.010	$0.139	$0.139		$0.139	$0.139			
Oil ($/L)	$0.000	$0.000	$0.000		$0.000	$0.000			
Water ($/1000L)	$0.000	$0.000	$0.000		$0.000	$0.000			

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☐	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☐	Mobile (Existing) ☐	Mobile (New) ☐	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	600	800		400	400				714	
	Natural Gas (MJ/yr.)	105,871	89,550		63,283	56,054				93,181	
	Oil (L/yr.)	-	-		-	-				-	
	Water (L/yr.)	-	-		-	-				-	
Upgrade Consumption	Electricity (kWh/yr.)	588	784		392	392				699	
	Natural Gas (MJ/yr.)	103,224	87,311		61,701	54,652				90,852	
	Oil (L/yr.)	-	-		-	-				-	
	Water (L/yr.)	-	-		-	-				-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%		0%	0%				0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%		0%	0%				0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-		-	-				-	
	Electricity, Cooling (kWh/yr.)	-	-		-	-				-	
	Electricity, Total (kWh/yr.)	-	-		-	-				-	
	Natural Gas (MJ/yr.)	-	-		-	-				-	
	Oil (L/yr.)	-	-		-	-				-	
Winter Peak Hours-Use Factor		-	-		-	-				-	
Resource Savings	Electricity (kWh/yr.)	12	16		8	8				14	
	Electricity (kW peak)	-	-		-	-				-	
	Natural Gas (MJ/yr.)	2,647	2,239		1,582	1,401				2,330	
	Oil (L/yr.)	-	-		-	-				-	
	Water (L/yr.)	-	-		-	-				-	
Cost Parameters	Upgrade, Material ($)	$800.00	$800.00		$800.00	$800.00				$800.00	Approx. material and installation costs, based on cost estimates from recent studies (i.e. 40 ft of walls x 4 ft high assumed) (2009)
	Upgrade, Installation ($)	$0.00	$0.00		$0.00	$0.00				$0.00	Installation costs included above
	Baseline, Material ($)	$0.00	$0.00		$0.00	$0.00				$0.00	
	Baseline, Installation ($)	$0.00	$0.00		$0.00	$0.00				$0.00	
	Total Measure Cost ($)	$800.00	$800.00		$800.00	$800.00				$800.00	
	Basis (Full/Incremental)	Full	Full		Full	Full				Full	
Incremental O&M ($/yr.)		$0	$0		$0	$0				$0	
Lifetimes	Upgrade (yrs.)	30	30		30	30				30	
	Baseline (yrs.)	-	-		-	-				-	
Cost Savings ($/yr.)		$27	$23		$16	$14				$24	
Simple Payback (yrs.)		29.7	34.4		49.5	55.6				33.93	
NPV of O&M Costs ($)		$0	$0		$0	$0				$0	
Total Benefits ($)	Electric Energy	$20	$26		$13	$13				$24	
	Electric Demand	$0	$0		$0	$0				$0	
	Natural Gas	$368	$311		$220	$195				$324	
	Oil	$0	$0		$0	$0				$0	
	Water	$0	$0		$0	$0				$0	
Measure TRC ($)		-$412	-$462		-$567	-$592				-$452	
Benefit/Cost Ratio		0.48	0.42		0.29	0.26				0.43	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1		1	1				
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental		Incremental	Incremental				
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	2.0%	2.0%		2.0%	2.0%				2.0%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached homes.
Space Cooling	-	0	0									-	Space cooling savings are negligible, based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC.
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	2.5%	2.5%		2.5%	2.5%				2.5%	Based on HOT2000 modeling results of average single detached homes with crawl spaces (different vintages) in BC. Assuming savings are similar in attached homes.
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heater	-	0	0									-	
Pool and Spa Heater	Pool Heaters	0	0									-	
Pool and Spa Heater	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	

Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	2.0%	2.0%		2.0%	2.0%				2.0%	
Space Cooling	0	0	-	-		-	-				-	
Clothes Washers	0	0	-	-		-	-				-	
Dishwashers	0	0	-	-		-	-				-	
Other Electric Loads	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	2.5%	2.5%		2.5%	2.5%				2.5%	
Domestic Hot Water (DHW)	0	0	-	-		-	-				-	
Fireplaces	0	0	-	-		-	-				-	
Cooking	0	0	-	-		-	-				-	
Clothes Dryers	0	0	-	-		-	-				-	
Pool and Spa Heaters	0	0	-	-		-	-				-	
Other	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-		-	-				-	
Domestic Hot Water (DHW)	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, NORTHERN INTERIOR - NATURAL GAS EFFICIENCY

Back to Index

Professional Air Sealing/Weather Stripping/Caulking

		References/Notes
Description:	Air leakage sealing of building envelopes includes completion of a blower door test to quantify leakage levels and to identify the location of air leaks. Generally, major leakage occurs at window-to-wall interfaces, around doors (especially patio doors), through electrical and plumbing penetrations and at the top of foundation walls. Installation of sealant and gaskets are generally accepted methods for reducing air leakage in buildings. Other sources of air leaks include pot lights, wall-to-floor interfaces (i.e., top and bottom of baseboards) and bathroom and kitchen exhaust piping.	
Baseline:	No action taken	
Upgrade:	A comprehensive air sealing job, which results in an air tightness (ACH @ 50 Pa) improvement of 30%	

Baseline Reference:	1. Annual consumption, end use
Heating Fuel Type:	All Fuels (Average Fuel Mix)
Main End Use:	Space Heating
Discount Rate:	7.38%
GHG Adder Incl.?	No
Resource Costs:	Baseload

= User Input
= Calculation

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.553	$1.553		$1.553	$1.553		$1.553	
Electricity ($/kW)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	
Natural Gas ($/MJ)	$0.010	$0.127	$0.127		$0.127	$0.127		$0.127	
]	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	
Water ($/1000L)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☐	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☐	Mobile (Existing) ☑	Mobile (New) ☐	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	847	1,047		532	532		362		926	
	Natural Gas (MJ/yr.)	105,871	89,550		63,283	56,054		70,102		92,080	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Upgrade Consumption	Electricity (kWh/yr.)	792	981		495	498		344		867	
	Natural Gas (MJ/yr.)	94,754	81,490		56,638	51,009		63,442		83,276	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%		0%	0%		0%		0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%		0%	0%		0%		0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-		-	-		-		-	
	Electricity, Cooling (kWh/yr.)	-	-		-	-		-		-	
	Electricity, Total (kWh/yr.)	-	-		-	-		-		-	
	Natural Gas (MJ/yr.)	-	-		-	-		-		-	
	Oil (L/yr.)	-	-		-	-		-		-	
Winter Peak Hours-Use Factor		-	-		-	-		-		-	
Resource Savings	Electricity (kWh/yr.)	55	66		37	33		18		59	
	Electricity (kW peak)	-	-		-	-		-		-	
	Natural Gas (MJ/yr.)	11,116	8,059		6,645	5,045		6,660		8,804	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Cost Parameters	Upgrade, Material ($)	$1,800.00	$1,800.00		$1,800.00	$1,800.00		$1,800.00		$1,800.00	Approx. mateial and installation costs, based on personal communication with Tony Woods, CanAm Building Envelope Specialists (material & installation) (2009). Assuming similar cost for all housing types.
	Upgrade, Installation ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	Installation costs included above
	Baseline, Material ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	
	Baseline, Installation ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	
	Total Measure Cost ($)	$1,800.00	$1,800.00		$1,800.00	$1,800.00		$1,800.00		$1,800.00	
	Basis (Full/Incremental)	Full	Full		Full	Full		Full		Full	
Incremental O&M ($/yr.)		$20	$20		$20	$20		$20		$20	Approximate annual cost to maintain weatherstripping, caulking, etc.
Lifetimes	Upgrade (yrs.)	25	25		25	25		25		25	Approximate lifetime, based on previous Marbek energy efficiency potential studies
	Baseline (yrs.)	-	-		-	-		-		-	
Cost Savings ($/yr.)		$94	$64		$48	$32		$47		$71	
Simple Payback (yrs.)		19.2	27.9		37.4	55.9		38.5		27.01	
NPV of O&M Costs ($)		$225	$225		$225	$225		$225		$225	
Total Benefits ($)	Electric Energy	$86	$103		$57	$52		$29		$92	
	Electric Demand	$0	$0		$0	$0		$0		$0	
	Natural Gas	$1,412	$1,024		$844	$641		$846		$1,118	
	Oil	$0	$0		$0	$0		$0		$0	
	Water	$0	$0		$0	$0		$0		$0	
Measure TRC ($)		-$528	-$898		-$1,124	-$1,333		-$1,151		-$815	
Benefit/Cost Ratio		0.74	0.56		0.44	0.34		0.43		0.60	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1		1	1		1		
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental		Incremental	Incremental		Incremental		
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	9.0%	8.0%		9.0%	8.0%		8.5%		8.3%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached homes.
Space Cooling	-	1	1	0.5%	1.0%		0.5%	1.0%		0.5%		0.8%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached homes.
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	10.5%	9.0%		10.5%	9.0%		9.5%		9.5%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached homes.
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	

Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	9.0%	8.0%		9.0%	8.0%		8.5%		8.3%	
Space Cooling	1	1	0.5%	1.0%		0.5%	1.0%		0.5%		0.8%	
Clothes Washers	0	0	-	-		-	-		-		-	
Dishwashers	0	0	-	-		-	-		-		-	
Other Electric Loads	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	10.5%	9.0%		10.5%	9.0%		9.5%		9.5%	
Domestic Hot Water (DHW)	0	0	-	-		-	-		-		-	
Fireplaces	0	0	-	-		-	-		-		-	
Cooking	0	0	-	-		-	-		-		-	
Clothes Dryers	0	0	-	-		-	-		-		-	
Pool and Spa Heaters	0	0	-	-		-	-		-		-	
Other	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-		-	-		-		-	
Domestic Hot Water (DHW)	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, NORTHERN INTERIOR - NATURAL GAS EFFICIENCY

Back to Index

Homeowner Air Sealing/Weather Stripping/Caulking

		References/Notes
Description:	Homeowner air leakage sealing does not include a blower door test to quantify leakage levels and to identify the location of air leaks. Homeowners are likely to identify leakage primarily in more visible areas of the envelope, for example, the major leakage at window-to-wall interfaces, around doors (especially patio doors), through electrical and plumbing penetrations and perhaps at the top of foundation walls. Installation of weather stripping, sealant and gaskets are the most likely methods to be used. Less visible sources of air leaks such as pot lights, wall-to-floor interfaces (i.e., top and bottom of baseboards), bathroom and kitchen exhaust piping, and leaks from the top of walls into the attic are less likely to be addressed by the homeowner.	
Baseline:	No action taken	
Upgrade:	A homeowner air sealing job, which results in an air tightness (ACH @ 50 Pa) improvement of 15-20%	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$0.952	$0.952		$0.952	$0.952		$0.952	
Electricity ($/kW)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	
Natural Gas ($/MJ)	$0.010	$0.067	$0.067		$0.067	$0.067		$0.067	
]	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	
Water ($/1000L)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	

Sub-sector		Detached ☑ (Pre-1976)	Detached ☑ (Post-1976)	Detached ☐ (New)	Attached ☑ (Pre-1976)	Attached ☑ (Post-1976)	Attached ☐ (New)	Mobile ☑ (Existing)	Mobile ☐ (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	847	1,047		532	532		362		926	
	Natural Gas (MJ/yr.)	105,871	89,550		63,283	56,054		70,102		92,080	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Upgrade Consumption	Electricity (kWh/yr.)	815	1,009		511	513		352		893	
	Natural Gas (MJ/yr.)	99,518	84,944		59,486	53,171		66,296		87,049	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%		0%	0%		0%		0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%		0%	0%		0%		0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-		-	-		-		-	
	Electricity, Cooling (kWh/yr.)	-	-		-	-		-		-	
	Electricity, Total (kWh/yr.)	-	-		-	-		-		-	
	Natural Gas (MJ/yr.)	-	-		-	-		-		-	
	Oil (L/yr.)	-	-		-	-		-		-	
Winter Peak Hours-Use Factor		-	-		-	-		-		-	
Resource Savings	Electricity (kWh/yr.)	32	38		21	19		11		34	
	Electricity (kW peak)	-	-		-	-		-		-	
	Natural Gas (MJ/yr.)	6,352	4,605		3,797	2,883		3,806		5,031	3800 MJ from Innes Hood report for LiveSmartBC 2010 business case, March 2010
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Cost Parameters	Upgrade, Material ($)	$200.00	$200.00		$200.00	$200.00		$200.00		$200.00	Innes Hood report for LiveSmartBC 2010 business case, March 2010
	Upgrade, Installation ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	Installation costs included above
	Baseline, Material ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	
	Baseline, Installation ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	
	Total Measure Cost ($)	$200.00	$200.00		$200.00	$200.00		$200.00		$200.00	
	Basis (Full/Incremental)	Full	Full		Full	Full		Full		Full	
Incremental O&M ($/yr.)		$20	$20		$20	$20		$20		$20	Approximate annual cost to maintain weatherstripping, caulking, etc.
Lifetimes	Upgrade (yrs.)	10	10		10	10		10		10	Innes Hood report for LiveSmartBC 2010 business case, March 2010
	Baseline (yrs.)	-	-		-	-		-		-	
Cost Savings ($/yr.)		$45	$28		$19	$10		$18		$32	
Simple Payback (yrs.)		4.5	7.1		10.6	20.4		11.0		7.05	
NPV of O&M Costs ($)		$138	$138		$138	$138		$138		$138	
Total Benefits ($)	Electric Energy	$30	$36		$20	$18		$10		$32	
	Electric Demand	$0	$0		$0	$0		$0		$0	
	Natural Gas	$425	$308		$254	$193		$255		$337	
	Oil	$0	$0		$0	$0		$0		$0	
	Water	$0	$0		$0	$0		$0		$0	
Measure TRC ($)		$117	$7		-$64	-$127		-$73		$31	
Benefit/Cost Ratio		1.35	1.02		0.81	0.62		0.78		1.09	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1		1	1		1		
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental		Incremental	Incremental		Incremental		
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	5.1%	4.6%		5.1%	4.6%		4.9%		4.8%	Based on ratio of heating savings below to heating savings on Air Sealing tab, times electric savings on Air Sealing tab
Space Cooling	-	1	1	0.3%	0.6%		0.3%	0.6%		0.3%		0.5%	Based on ratio of heating savings below to heating savings on Air Sealing tab, times electric savings on Air Sealing tab
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	6.0%	5.1%		6.0%	5.1%		5.4%		5.4%	3800 MJ from Innes Hood report for LiveSmartBC 2010 business case, March 2010
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	

Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	5.1%	4.6%		5.1%	4.6%		4.9%		4.8%	
Space Cooling	1	1	0.3%	0.6%		0.3%	0.6%		0.3%		0.5%	
Clothes Washers	0	0	-	-		-	-		-		-	
Dishwashers	0	0	-	-		-	-		-		-	
Other Electric Loads	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	6.0%	5.1%		6.0%	5.1%		5.4%		5.4%	
Domestic Hot Water (DHW)	0	0	-	-		-	-		-		-	
Fireplaces	0	0	-	-		-	-		-		-	
Cooking	0	0	-	-		-	-		-		-	
Clothes Dryers	0	0	-	-		-	-		-		-	
Pool and Spa Heaters	0	0	-	-		-	-		-		-	
Other	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-		-	-		-		-	
Domestic Hot Water (DHW)	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, NORTHERN INTERIOR - NATURAL GAS EFFICIENCY

Back to Index

Air Leakage Sealing and Insulation (Old Homes)

		References/Notes
Description:	This measure is targeted at homes that are at least 30 years old, since many of these homes haven't had any work done to improve insulation and air-sealing deficiencies and it is generally most cost-effective to upgrade the insulation and the air sealing at the same time. This includes wall, attic, foundation, and crawlspace retrofits of older homes but, for the purposes of this analysis, it is assumed that a retrofit is being conducted on the attic. The air-sealing portion of the work could be accomplished by segmenting the attic. In each segment, the existing insulation could be moved to one side and polyurethane foam could be sprayed in (serves as an air sealant in addition to its insulating properties). It may also be necessary to install or refurbish top plates to prevent airflow into the attic through exterior wall cavities. Other considerations that would increase the cost of the air-sealing portion of the work and may be present in some homes include sealing pot lights and kitchen or bathroom exhaust piping. When completed, these measures would dramatically improve the air tightness of an older home. The attic insulation could subsequently be cost-effectively improved with cellulose insulation.	
Baseline:	An older home with average air tightness and attic insulation (for that particular vintage)	
Upgrade:	Improve both the attic insulation and the air tightness (ACH@50 Pa) in an old home. It is assumed that the air tightness is improved by 30% and that RSI-3.52 (R-20) of attic insulation is added.	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.553			$1.553				
Electricity ($/kW)	$0.000	$0.000			$0.000				
Natural Gas ($/MJ)	$0.010	$0.127			$0.127				
Oil ($/L)	$0.000	$0.000			$0.000				
Water ($/1000L)	$0.000	$0.000			$0.000				

Sub-sector		Detached (Pre-1976) ✓	Detached (Post-1976)	Detached (New)	Attached (Pre-1976) ✓	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	847			532					841	
	Natural Gas (MJ/yr.)	105,871			63,283					105,122	
	Oil (L/yr.)	-			-					-	
	Water (L/yr.)	-			-					-	
Upgrade Consumption	Electricity (kWh/yr.)	751			468					746	
	Natural Gas (MJ/yr.)	88,402			52,841					87,777	
	Oil (L/yr.)	-			-					-	
	Water (L/yr.)	-			-					-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%			0%					0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%			0%					0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-			-					-	
	Electricity, Cooling (kWh/yr.)	-			-					-	
	Electricity, Total (kWh/yr.)	-			-					-	
	Natural Gas (MJ/yr.)	-			-					-	
	Oil (L/yr.)	-			-					-	
Winter Peak Hours-Use Factor		-			-					-	
Resource Savings	Electricity (kWh/yr.)	96			63					96	
	Electricity (kW peak)	-			-					-	
	Natural Gas (MJ/yr.)	17,469			10,442					17,345	
	Oil (L/yr.)	-			-					-	
	Water (L/yr.)	-			-					-	
Cost Parameters	Upgrade, Material ($)	$3,000.00			$2,500.00					$2,991.21	Cost is variable depending on the approach that is used. Estimate is based on recent communication with air sealing and insulation contractors (2010).
	Upgrade, Installation ($)	$0.00			$0.00					$0.00	
	Baseline, Material ($)	$0.00			$0.00					$0.00	
	Baseline, Installation ($)	$0.00			$0.00					$0.00	
	Total Measure Cost ($)	$3,000.00			$2,500.00					$2,991.21	
	Basis (Full/Incremental)	Full			Full					Full	
Incremental O&M ($/yr.)		$20			$20					$20	Approximate annual cost to maintain weather-stripping, caulking, etc.
Lifetimes	Upgrade (yrs.)	25			25					25	Approximate lifetime, based on previous Marbek energy efficiency potential studies
	Baseline (yrs.)	-			-					-	
Cost Savings ($/yr.)		$159			$88					$158	
Simple Payback (yrs.)		18.8			28.5					19.02	
NPV of O&M Costs ($)		$225			$225					$225	
Total Benefits ($)	Electric Energy	$149			$98					$148	
	Electric Demand	$0			$0					$0	
	Natural Gas	$2,219			$1,326					$2,203	
	Oil	$0			$0					$0	
	Water	$0			$0					$0	
Measure TRC ($)		-$857			-$1,301					-$865	
Benefit/Cost Ratio		0.73			0.52					0.73	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1			1					
Cost Flag (i.e. way measure is typically applied)	Incremental			Incremental					
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	15.0%			15.0%					15.0%	Based on HOT2000 modeling results of average pre-1976 single detached homes. Assuming savings are similar in attached homes.
Space Cooling	-	1	1	2.5%			2.5%					2.5%	Based on HOT2000 modeling results of average pre-1976 single detached homes. Assuming savings are similar in attached homes.
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	16.5%			16.5%					16.5%	Based on HOT2000 modeling results of average pre-1976 single detached homes. Assuming savings are similar in attached homes.
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment	Applies? (1=Yes; 0=No)	Measure Resource Savings (%)	References/Notes

Main End Use	Use/Equipment (If Applicable)	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	15.0%			15.0%					15.0%	
Space Cooling	1	1	2.5%			2.5%					2.5%	
Clothes Washers	0	0	-			-					-	
Dishwashers	0	0	-			-					-	
Other Electric Loads	0	0	-			-					-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	16.5%			16.5%					16.5%	
Domestic Hot Water (DHW)	0	0	-			-					-	
Fireplaces	0	0	-			-					-	
Cooking	0	0	-			-					-	
Clothes Dryers	0	0	-			-					-	
Pool and Spa Heaters	0	0	-			-					-	
Other	0	0	-			-					-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-			-					-	
Domestic Hot Water (DHW)	0	0	-			-					-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-			-					-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Zoned-Up Windows: (ENERGY STAR®) Rating for a Colder Zone

		References/Notes
Description:	High-performance windows incorporate a number of additional energy-saving features, including low-E (soft coating), insulating spacers, argon fill and low conductivity frames (which can be sliders, hinged or picture). These windows are certified based on their energy rating (ER), which is based on their tested energy performance, rather than on their specific combination of features. In this case, however, the Energy Star windows for a colder zone are specified instead of the Energy Star windows for the zone where the house is located - for example, Zone C Energy Star windows would be chosen for a house in Zone A. High-performance windows also provide occupant co-benefits, such as reduced interior noise, reduced air leakage, greater thermal comfort, and fewer condensation problems.	
Baseline:	ENERGY STAR windows for Zone B (double glazed, argon fill, low-e coating, insulating spacer, vinyl frame, hinged)	Assuming U-value of at least 1.8 W/m2 K (RSI of 0.56)
Upgrade:	In existing homes, replacing 50% of windows with ENERGY STAR windows from Zone D (double-glazed, argon fill, low-e coating, insulating spacer, vinyl frame, hinged). In hew homes, replacing 100% of windows.	Assuming windows with an approximate U-value of 1.4 W/m2 K (RSI of ~0.71), based on ENERGY STAR requirements for windows.

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.553	$1.553	$1.553	$1.553	$1.553	$1.553	$1.553	$1.553
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.127	$0.127	$0.127	$0.127	$0.127	$0.127	$0.127	$0.127
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	847	1,047	1,006	532	532	511	362	348	914	
	Natural Gas (MJ/yr.)	105,871	89,550	89,550	63,283	56,054	56,054	70,102	70,102	87,903	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	830	1,017	957	521	517	486	354	333	880	
	Natural Gas (MJ/yr.)	103,330	86,505	84,535	61,764	54,148	52,915	67,999	66,176	84,167	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	17	30	48	11	15	24	8	14	34	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	2,541	3,045	5,015	1,519	1,906	3,139	2,103	3,926	3,736	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$8,000.00	$9,600.00	$20,800.00	$6,400.00	$7,680.00	$16,640.00	$5,760.00	$12,800.00	$14,313.00	BCH program cost estimates are $1000 to $2000 per house, depending on number of windows done and number of Zones up. To match these numbers, we used $64/ft^2.
	Upgrade, Installation ($)	$1,875.00	$2,250.00	$4,875.00	$1,500.00	$1,800.00	$3,900.00	$1,350.00	$3,000.00	$3,354.61	Based on personal communication with SAWDAC (Siding and Window Dealers Association of Canada) in 2010, the installation cost of ENERGY STAR windows is about $15/ft^2
	Baseline, Material ($)	$7,000.00	$8,400.00	$18,200.00	$5,600.00	$6,720.00	$14,560.00	$5,040.00	$11,200.00	$12,523.87	Based on personal communication with SAWDAC (Siding and Window Dealers Association of Canada) in 2010, the material cost of ENERGY STAR windows is about $56/ft^2
	Baseline, Installation ($)	$1,875.00	$2,250.00	$4,875.00	$1,500.00	$1,800.00	$3,900.00	$1,350.00	$3,000.00	$3,354.61	Based on personal communication with SAWDAC (Siding and Window Dealers Association of Canada) in 2010, the installation cost of ENERGY STAR windows is about $15/ft^2
	Total Measure Cost ($)	$1,000.00	$1,200.00	$2,600.00	$800.00	$960.00	$2,080.00	$720.00	$1,600.00	$1,789.12	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	25	25	25	25	25	25	25	25	25	Approximate lifetime, based on previous Marbek energy efficiency potential studies and consistent with the market rate of window replacement
	Baseline (yrs.)	25	25	25	25	25	25	25	25	25	Approximate lifetime, based on previous Marbek energy efficiency potential studies
Cost Savings ($/yr.)		$26	$32	$53	$16	$20	$33	$21	$40	$39	
Simple Payback (yrs.)		38.0	37.1	48.9	50.6	48.2	63.5	33.8	40.3	44.21	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$27	$47	$75	$17	$24	$38	$13	$22	$52	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$323	$387	$637	$193	$242	$399	$267	$499	$475	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$650	-$766	-$1,888	-$590	-$694	-$1,644	-$440	-$1,079	-$1,262	
Benefit/Cost Ratio		0.35	0.36	0.27	0.26	0.28	0.21	0.39	0.33	0.31	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	2.4%	3.4%	5.6%	2.4%	3.4%	5.6%	3.0%	5.6%	4.3%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes. Further assuming that savings would scale with new homes (i.e. 100% of windows being replaced versus 50%). Then scaled down the savings: original figures were based on U-value improvement from 4.2 to 2.0, or 52% lower. This improvement from 2 to 1.6 is 20% lower. Therefore, savings percentage 40% of the original percentage is used.
Space Cooling	-	1	1	1.2%	1.2%	2.2%	1.2%	1.2%	2.2%	1.2%	2.2%	1.7%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes. Further assuming that savings would scale with new homes (i.e. 100% of windows being replaced versus 50%). Then scaled down the savings: original figures were based on U-value improvement from 4.2 to 2.0, or 52% lower. This improvement from 2 to 1.6 is 20% lower. Therefore, savings percentage 40% of the original percentage is used.
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	2.4%	3.4%	5.6%	2.4%	3.4%	5.6%	3.0%	5.6%	4.3%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes. Further assuming that savings would scale with new homes (i.e. 100% of windows being replaced versus 50%). Then scaled down the savings: original figures were based on U-value improvement from 4.2 to 2.0, or 52% lower. This improvement from 2 to 1.6 is 20% lower. Therefore, savings percentage 40% of the original percentage is used.
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	

Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	2.4%	3.4%	5.6%	2.4%	3.4%	5.6%	3.0%	5.6%	4.3%	
Space Cooling	1	1	1.2%	1.2%	2.2%	1.2%	1.2%	2.2%	1.2%	2.2%	1.7%	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	2.4%	3.4%	5.6%	2.4%	3.4%	5.6%	3.0%	5.6%	4.3%	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, NORTHERN INTERIOR - NATURAL GAS EFFICIENCY

Back to Index

Super High-Performance Windows

		References/Notes
Description:	In addition to low-E coating, argon fill and insulating spacers, super-high performance windows incorporate features such as triple glazing, transparent insulating films, and fibreglass frames.	
Baseline:	Standard windows (double glazed, air fill, no coating, metal spacer, vinyl frame, slider with sash)	
Upgrade:	In existing homes, replacing 50% of windows with super high-performance windows (triple-glazed, krypton fill, low-e and insulating coatings, insulating spacer, fiberglass frame, hinged). In new homes, replacing all of the windows with super high-performance windows.	

Baseline Reference:	1. Annual consumption, end use
Heating Fuel Type:	All Fuels (Average Fuel Mix)
Main End Use:	Space Heating
Discount Rate:	7.38%
GHG Adder Incl.?	No
Resource Costs:	Baseload

= User Input
= Calculation

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.553	$1.553	$1.553	$1.553	$1.553	$1.553	$1.553	$1.553
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.127	$0.127	$0.127	$0.127	$0.127	$0.127	$0.127	$0.127
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	847	1,047	1,006	532	532	511	362	348	914	
	Natural Gas (MJ/yr.)	105,871	89,550	89,550	63,283	56,054	56,054	70,102	70,102	87,903	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	777	922	824	488	469	419	328	286	783	
	Natural Gas (MJ/yr.)	96,872	78,356	72,983	57,904	49,047	45,684	63,092	57,133	75,112	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	70	125	181	44	63	92	34	61	131	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	8,999	11,194	16,567	5,379	7,007	10,370	7,010	12,969	12,791	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$8,250.00	$9,900.00	$21,450.00	$6,600.00	$7,920.00	$17,160.00	$5,940.00	$13,200.00	$14,760.28	Based on personal communication with SAWDAC (Siding and Window Dealers Association of Canada) in 2010, the material cost of super high-performance windows is about $66/ft^2
	Upgrade, Installation ($)	$1,875.00	$2,250.00	$4,875.00	$1,500.00	$1,800.00	$3,900.00	$1,350.00	$3,000.00	$3,354.61	Based on personal communication with SAWDAC (Siding and Window Dealers Association of Canada) in 2010, the installation cost of super high-performance windows is about $15/ft^2
	Baseline, Material ($)	$6,875.00	$8,250.00	$17,875.00	$5,500.00	$6,600.00	$14,300.00	$4,950.00	$11,000.00	$12,300.23	Based on personal communication with SAWDAC (Siding and Window Dealers Association of Canada) in 2010, the material cost of std performance windows is about $55/ft^2
	Baseline, Installation ($)	$1,750.00	$2,100.00	$4,550.00	$1,400.00	$1,680.00	$3,640.00	$1,260.00	$2,800.00	$3,130.97	Based on personal communication with SAWDAC (Siding and Window Dealers Association of Canada) in 2010, the installation cost of std performance windows is about $14/ft^2
	Total Measure Cost ($)	$1,500.00	$1,800.00	$3,900.00	$1,200.00	$1,440.00	$3,120.00	$1,080.00	$2,400.00	$2,683.69	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	25	25	25	25	25	25	25	25	25	Approximate lifetime, based on previous Marbek energy efficiency potential studies
	Baseline (yrs.)	25	25	25	25	25	25	25	25	25	Approximate lifetime, based on previous Marbek energy efficiency potential studies
Cost Savings ($/yr.)		$94	$120	$177	$56	$74	$109	$72	$132	$136	
Simple Payback (yrs.)		16.0	15.0	22.0	21.3	19.5	28.6	15.1	18.2	19.15	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$108	$194	$282	$68	$98	$143	$53	$95	$204	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$1,143	$1,422	$2,104	$683	$890	$1,317	$890	$1,647	$1,625	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$249	-$185	-$1,514	-$449	-$452	-$1,660	-$137	-$657	-$855	
Benefit/Cost Ratio		0.83	0.90	0.61	0.63	0.69	0.47	0.87	0.73	0.73	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	8.5%	12.5%	18.5%	8.5%	12.5%	18.5%	10.0%	18.5%	14.8%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes. Further assuming that savings would scale with new homes (i.e. 100% of windows being replaced versus 50%)
Space Cooling	-	1	1	7.5%	10.0%	16.5%	7.5%	10.0%	16.5%	8.5%	16.5%	12.8%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes. Further assuming that savings would scale with new homes (i.e. 100% of windows being replaced versus 50%)
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	8.5%	12.5%	18.5%	8.5%	12.5%	18.5%	10.0%	18.5%	14.8%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes. Further assuming that savings would scale with new homes (i.e. 100% of windows being replaced versus 50%)
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	8.5%	12.5%	18.5%	8.5%	12.5%	18.5%	10.0%	18.5%	14.8%	
Space Cooling	1	1	7.5%	10.0%	16.5%	7.5%	10.0%	16.5%	8.5%	16.5%	12.8%	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	8.5%	12.5%	18.5%	8.5%	12.5%	18.5%	10.0%	18.5%	14.8%	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, NORTHERN INTERIOR - NATURAL GAS EFFICIENCY

Back to Index

High-Performance Homes (EGH 80/R2000/ENERGY STAR®)

Not used--EGH 80 is now the minimum

		References/Notes
Description:	There are several certification schemes for energy-efficient new homes that incorporate integrated design and multiple envelope measures. An EnerGuide for Houses (EGH) rating is a standard measure of a home's energy performance, calculated by a professional EGH advisor. The rating is based on information on the construction of the home and the results of a blower door test performed once the house has been built. The R2000 standard is one method of achieving an EGH 80 rating. However, R2000 homes are required to achieve an air tightness level of 1.5 ACH@50Pa, install a heat recovery ventilator (HRV), and meet other environmental requirements. This substantially increases the cost of the measure. The ENERGY STAR® for New Homes program has similar requirements and also requires that homes be rated EGH 80. Since these three high performance home standards all result in essentially the same energy performance, the costs assumed for the measure are those of the least expensive of the three. EGH 80 is the lowest cost, since it allows the builder the most flexibitility for achieving the energy performance.	
Baseline:	An average new home (EGH rating of 76 assumed)	
Upgrade:	A high-performance new home (EGH rating of 80 assumed). This option no longer applies as EGH of 80 is now the minimum.	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083			$1.648			$1.648		$1.648
Electricity ($/kW)	$0.000			$0.000			$0.000		$0.000
Natural Gas ($/MJ)	$0.010			$0.139			$0.139		$0.139
Oil ($/L)	$0.000			$0.000			$0.000		$0.000
Water ($/1000L)	$0.000			$0.000			$0.000		$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New) ☑	Attached (Pre-1976)	Attached (Post-1976)	Attached (New) ☑	Mobile (Existing)	Mobile (New) ☑	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)			-			-		-	-	
	Natural Gas (MJ/yr.)			-			-		-	-	
	Oil (L/yr.)			-			-		-	-	
	Water (L/yr.)			-			-		-	-	
Upgrade Consumption	Electricity (kWh/yr.)			-			-		-	-	
	Natural Gas (MJ/yr.)			-			-		-	-	
	Oil (L/yr.)			-			-		-	-	
	Water (L/yr.)			-			-		-	-	
Interactive Effects (Inputs)	Heating Penalty ☐			0%			0%		0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐			0%			0%		0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)			-			-		-	-	
	Electricity, Cooling (kWh/yr.)			-			-		-	-	
	Electricity, Total (kWh/yr.)			-			-		-	-	
	Natural Gas (MJ/yr.)			-			-		-	-	
	Oil (L/yr.)			-			-		-	-	
Winter Peak Hours-Use Factor				-			-		-	-	
Resource Savings	Electricity (kWh/yr.)			-			-		-	-	
	Electricity (kW peak)			-			-		-	-	
	Natural Gas (MJ/yr.)			-			-		-	-	
	Oil (L/yr.)			-			-		-	-	
	Water (L/yr.)			-			-		-	-	
Cost Parameters	Upgrade, Material ($)			$6,000.00			$4,800.00		$0.00	$5,538.34	Based on cost estimates for Saskatchewan homes from Rob Dumont (Dumont and Associates) and Dave Fetsch (Sun Ridge Group). Assuming cost scales to 80% for attached homes. Need value for mobile homes.
	Upgrade, Installation ($)			$0.00			$0.00		$0.00	$0.00	
	Baseline, Material ($)			$0.00			$0.00		$0.00	$0.00	
	Baseline, Installation ($)			$0.00			$0.00		$0.00	$0.00	
	Total Measure Cost ($)			$6,000.00			$4,800.00		$0.00	$5,538.34	
	Basis (Full/Incremental)			Full			Full		Full	Full	
Incremental O&M ($/yr.)				$0			$0		$0	$0	
Lifetimes	Upgrade (yrs.)			30			30		30	30	Approximate lifetime, based on previous Marbek energy efficiency potential studies
	Baseline (yrs.)			30			30		30	30	
Cost Savings ($/yr.)				$0			$0		$0	$0	
Simple Payback (yrs.)				N/A			N/A		N/A	0.00	
NPV of O&M Costs ($)				$0			$0		$0	$0	
Total Benefits ($)	Electric Energy			$0			$0		$0	$0	
	Electric Demand			$0			$0		$0	$0	
	Natural Gas			$0			$0		$0	$0	
	Oil			$0			$0		$0	$0	
	Water			$0			$0		$0	$0	
Measure TRC ($)				-$6,000			-$4,800		$0	-$5,538	
Benefit/Cost Ratio				0.00			0.00		0.00	0.00	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed			1			1		1	
Cost Flag (i.e. way measure is typically applied)			Incremental			Incremental		Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No) Baseline	Upgrade	Measure Resource Savings (%) Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	Standard EGH rating assumes no space cooling
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No) Baseline	Upgrade	Measure Resource Savings (%) Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No) Baseline	Upgrade	Measure Resource Savings (%) Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	

Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	**Sub End Use/Equipment (If Applicable)**	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
		Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Ventilation and Circulation	0	0			-			-		-	-	
Space Cooling	0	0			-			-		-	-	
Clothes Washers	0	0			-			-		-	-	
Dishwashers	0	0			-			-		-	-	
Other Electric Loads	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Space Heating	0	0			-			-		-	-	
Domestic Hot Water (DHW)	0	0			-			-		-	-	
Fireplaces	0	0			-			-		-	-	
Cooking	0	0			-			-		-	-	
Clothes Dryers	0	0			-			-		-	-	
Pool and Spa Heaters	0	0			-			-		-	-	
Other	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Space Heating	0	0			-			-		-	-	
Domestic Hot Water (DHW)	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Water	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, NORTHERN INTERIOR - NATURAL GAS EFFICIENCY

Back to Index

Net-Zero Ready Energy Homes

		References/Notes
Description:	Net-zero energy homes (NZEH) produce at least as much energy as they consume. This is accomplished by incorporating on-site power generation, such as solar PV panels or small wind turbines, to offset electrical loads. However, the energy consumption of a NZEH is significantly lower, due to the addition of a wide array of energy efficiency features. Measures that are typically considered include increased insulation, super high-performance windows, ENERGY STAR® appliances, solar thermal space and/or water heating, heat pumps, and passive solar designs. This measure is designed to produce a highly efficient house that is ready to be turned into a NZEH with the addition of on-site renewable energy generation.	
Baseline:	An average new home (Minimum EGH rating of 80 required)	
Upgrade:	A net-zero energy ready home (EGH rating of 86 assumed)	

Baseline Reference:	1. Annual consumption, end use
Heating Fuel Type:	All Fuels (Average Fuel Mix)
Main End Use:	Space Heating
Discount Rate:	7.38%
GHG Adder Incl.?	No
Resource Costs:	Baseload

= User Input
= Calculation

	Customer Cost	Avoided Costs (NPV)						
Electricity ($/kWh)	$0.083			$1.648			$1.648		$1.648
Electricity ($/kW)	$0.000			$0.000			$0.000		$0.000
Natural Gas ($/MJ)	$0.010			$0.139			$0.139		$0.139
Oil ($/L)	$0.000			$0.000			$0.000		$0.000
Water ($/1000L)	$0.000			$0.000			$0.000		$0.000

Sub-sector		Detached (Pre-1976) ☐	Detached (Post-1976) ☐	Detached (New) ☑	Attached (Pre-1976) ☐	Attached (Post-1976) ☐	Attached (New) ☑	Mobile (Existing) ☐	Mobile (New) ☑	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)			768			384		199	685	
	Natural Gas (MJ/yr.)			106,739			70,567		85,067	100,419	
	Oil (L/yr.)			-			-		-	-	
	Water (L/yr.)			-			-		-	-	
Upgrade Consumption	Electricity (kWh/yr.)			538			269		139	480	
	Natural Gas (MJ/yr.)			74,717			49,397		59,547	70,293	
	Oil (L/yr.)			-			-		-	-	
	Water (L/yr.)			-			-		-	-	
Interactive Effects (Inputs)	Heating Penalty ☐			0%			0%		0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐			0%			0%		0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)			-			-		-	-	
	Electricity, Cooling (kWh/yr.)			-			-		-	-	
	Electricity, Total (kWh/yr.)			-			-		-	-	
	Natural Gas (MJ/yr.)			-			-		-	-	
	Oil (L/yr.)			-			-		-	-	
Winter Peak Hours-Use Factor				-			-		-	-	
Resource Savings	Electricity (kWh/yr.)			230			115		60	206	
	Electricity (kW peak)			-			-		-	-	
	Natural Gas (MJ/yr.)			32,022			21,170		25,520	30,126	
	Oil (L/yr.)			-			-		-	-	
	Water (L/yr.)			-			-		-	-	
Cost Parameters	Upgrade, Material ($)			$14,000.00			$9,800.00		$9,800.00	$13,185.80	Working value of $14,000 based on NRCan's R-2000 renewal work (personal communication with Anil Parekh, Nov. 25, 2010). Assumed that cost scales by 75% for detached and mobile homes.
	Upgrade, Installation ($)			$0.00			$0.00		$0.00	$0.00	
	Baseline, Material ($)			$0.00			$0.00		$0.00	$0.00	
	Baseline, Installation ($)			$0.00			$0.00		$0.00	$0.00	
	Total Measure Cost ($)			$14,000.00			$9,800.00		$9,800.00	$13,185.80	
	Basis (Full/Incremental)			Full			Full		Full	Full	
Incremental O&M ($/yr.)				$0			$0		$0	$0	
Lifetimes	Upgrade (yrs.)			30			30		30	30	Maximum lifetime used in study.
	Baseline (yrs.)			30			30		30	30	
Cost Savings ($/yr.)				$333			$217		$255	$312	
Simple Payback (yrs.)				42.1			45.2		38.4	42.34	
NPV of O&M Costs ($)				$0			$0		$0	$0	
Total Benefits ($)	Electric Energy			$380			$190		$98	$339	
	Electric Demand			$0			$0		$0	$0	
	Natural Gas			$4,454			$2,945		$3,550	$4,190	
	Oil			$0			$0		$0	$0	
	Water			$0			$0		$0	$0	
Measure TRC ($)				-$9,166			-$6,666		-$6,152	-$8,657	
Benefit/Cost Ratio				0.35			0.32		0.37	0.34	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed			1			1		1	
Cost Flag (i.e. way measure is typically applied)			Incremental			Incremental		Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1			30.0%			30.0%		30.0%	30.0%	Going from EGH 80 to EGH 86 represents a savings of 30%. It is assumed that all major end uses are affected equally.
Space Cooling	-	0	0									-	Standard EGH rating assumes no space cooling
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1			30.0%			30.0%		30.0%	30.0%	Going from EGH 80 to EGH 86 represents a savings of 30%. It is assumed that all major end uses are affected equally.
Domestic Hot Water (DHW)	-	1	1			30.0%			30.0%		30.0%	30.0%	Going from EGH 80 to EGH 86 represents a savings of 30%. It is assumed that all major end uses are affected equally.
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	

Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1			30.0%			30.0%		30.0%	30.0%	
Space Cooling	0	0			-			-		-	-	
Clothes Washers	0	0			-			-		-	-	
Dishwashers	0	0			-			-		-	-	
Other Electric Loads	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1			30.0%			30.0%		30.0%	30.0%	
Domestic Hot Water (DHW)	1	1			30.0%			30.0%		30.0%	30.0%	
Fireplaces	0	0			-			-		-	-	
Cooking	0	0			-			-		-	-	
Clothes Dryers	0	0			-			-		-	-	
Pool and Spa Heaters	0	0			-			-		-	-	
Other	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0			-			-		-	-	
Domestic Hot Water (DHW)	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

High Efficiency Condensing Gas Furnaces

		References/Notes
Description:	Federal legislation now requires that all residential furnaces meet the minimum performance standard of 90% AFUE . However, higher efficiency condensing furnaces are available. These furnaces include more advanced heat exchanger designs that extract more heat from the flue gases before they are exhausted.	
Baseline:	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 90%	BC minimum
Upgrade:	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 96%	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	105,871	89,550	89,550	63,283	56,054	56,054	70,102	70,102	87,903	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	99,201	83,908	83,908	59,296	52,522	52,522	65,686	65,686	82,365	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	6,670	5,642	5,642	3,987	3,531	3,531	4,416	4,416	5,538	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$4,667.00	$4,667.00	$4,667.00	$4,667.00	$4,667.00	$4,667.00	$4,667.00	$4,667.00	$4,667.00	Cost of a 96% AFUE gas furnace, based on Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-41, April 16, 2009.
	Upgrade, Installation ($)	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	Approximate installation cost
	Baseline, Material ($)	$3,190.00	$3,190.00	$3,190.00	$3,190.00	$3,190.00	$3,190.00	$3,190.00	$3,190.00	$3,190.00	Cost of a 90% AFUE gas furnace, based on Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-41, April 16, 2009.
	Baseline, Installation ($)	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	Approximate installation cost
	Total Measure Cost ($)	$1,477.00	$1,477.00	$1,477.00	$1,477.00	$1,477.00	$1,477.00	$1,477.00	$1,477.00	$1,477.00	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	18	18	18	18	18	18	18	18	18	Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-41, April 16, 2009.
	Baseline (yrs.)	18	18	18	18	18	18	18	18	18	Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-41, April 16, 2009.
Cost Savings ($/yr.)		$65	$55	$55	$39	$35	$35	$43	$43	$54	
Simple Payback (yrs.)		22.6	26.7	26.7	37.8	42.7	42.7	34.1	34.1	27.98	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$697	$590	$590	$417	$369	$369	$462	$462	$579	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$780	-$887	-$887	-$1,060	-$1,108	-$1,108	-$1,015	-$1,015	-$898	
Benefit/Cost Ratio		0.47	0.40	0.40	0.28	0.25	0.25	0.31	0.31	0.39	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	96% AFUE versus 90% AFUE
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	

Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, NORTHERN INTERIOR - NATURAL GAS EFFICIENCY

Back to Index

Early Retirement of Existing Gas Furnaces

		References/Notes
Description:	Federal legislation now requires that all residential furnaces meet the minimum performance standard of 90% AFUE . However, consumers with less efficient furnaces that still work may wait years before replacing them. Early retirement of existing furnaces that are still functional is an option. Energy savings only last until the old furnace would have been replaced, because after that the energy consumption of the base case and upgrade is the same. The consumer has the added peace of mind of having a new furnace that is less likely to break down in winter.	
Baseline:	Keep existing 80% efficient furnace until failure, assumed to be in 9 years; then replace with the same furnace as the upgrade	Calculation of average existing efficiency from the REUS
Upgrade:	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 90%	BC minimum

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$0.884	$0.884		$0.884	$0.884		$0.884	
Electricity ($/kW)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	
Natural Gas ($/MJ)	$0.010	$0.061	$0.061		$0.061	$0.061		$0.061	
Oil ($/L)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	
Water ($/1000L)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☐	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☐	Mobile (Existing) ☑	Mobile (New) ☐	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-		-	-		-		-	
	Natural Gas (MJ/yr.)	105,871	89,550		63,283	56,054		70,102		92,080	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-		-	-		-		-	
	Natural Gas (MJ/yr.)	94,107	79,600		56,252	49,825		62,313		81,849	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%		0%	0%		0%		0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%		0%	0%		0%		0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-		-	-		-		-	
	Electricity, Cooling (kWh/yr.)	-	-		-	-		-		-	
	Electricity, Total (kWh/yr.)	-	-		-	-		-		-	
	Natural Gas (MJ/yr.)	-	-		-	-		-		-	
	Oil (L/yr.)	-	-		-	-		-		-	
Winter Peak Hours-Use Factor		-	-		-	-		-		-	
Resource Savings	Electricity (kWh/yr.)	-	-		-	-		-		-	
	Electricity (kW peak)	-	-		-	-		-		-	
	Natural Gas (MJ/yr.)	11,763	9,950		7,031	6,228		7,789		10,231	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Cost Parameters	Upgrade, Material ($)	$3,190.00	$3,190.00		$3,190.00	$3,190.00		$3,190.00		$3,190.00	Cost of a 90% AFUE gas furnace, based on Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-41, April 16, 2009.
	Upgrade, Installation ($)	$750.00	$750.00		$750.00	$750.00		$750.00		$750.00	Approximate installation cost
	Baseline, Material ($)	$1,680.66	$1,680.66		$1,680.66	$1,680.66		$1,680.66		$1,680.66	Cost of a 90% AFUE gas furnace, based on Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-41, April 16, 2009. Discounted by remaining life.
	Baseline, Installation ($)	$395.14	$395.14		$395.14	$395.14		$395.14		$395.14	Approximate installation cost
	Total Measure Cost ($)	$1,864.20	$1,864.20		$1,864.20	$1,864.20		$1,864.20		$1,864.20	
	Basis (Full/Incremental)	Incr.	Incr.		Incr.	Incr.		Incr.		Incr.	
Incremental O&M ($/yr.)		$0	$0		$0	$0		$0		$0	
Lifetimes	Upgrade (yrs.)	9	9		9	9		9		9	Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-41, April 16, 2009. See calculation at top right. Assumed age of present furnace is subtracted from Navigant's lifetime assumption
	Baseline (yrs.)	9	9		9	9		9		9	Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-41, April 16, 2009. See calculation at top right. Assumed age of present furnace is subtracted from Navigant's lifetime assumption
Cost Savings ($/yr.)		$115	$98		$69	$61		$76		$100	
Simple Payback (yrs.)		16.2	19.1		27.1	30.5		24.4		19.00	
NPV of O&M Costs ($)		$0	$0		$0	$0		$0		$0	
Total Benefits ($)	Electric Energy	$0	$0		$0	$0		$0		$0	
	Electric Demand	$0	$0		$0	$0		$0		$0	
	Natural Gas	$718	$608		$429	$380		$476		$625	
	Oil	$0	$0		$0	$0		$0		$0	
	Water	$0	$0		$0	$0		$0		$0	
Measure TRC ($)		-$1,146	-$1,257		-$1,435	-$1,484		-$1,389		-$1,239	
Benefit/Cost Ratio		0.39	0.33		0.23	0.20		0.26		0.34	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1		1	1		1		
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental		Incremental	Incremental		Incremental		
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	11.1%	11.1%		11.1%	11.1%		11.1%		11.1%	90% AFUE versus 80% AFUE
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	

Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	**Sub End Use/Equipment (If Applicable)**	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
		Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Ventilation and Circulation	0	0	-	-		-	-		-		-	
Space Cooling	0	0	-	-		-	-		-		-	
Clothes Washers	0	0	-	-		-	-		-		-	
Dishwashers	0	0	-	-		-	-		-		-	
Other Electric Loads	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Space Heating	1	1	11.1%	11.1%		11.1%	11.1%		11.1%		11.1%	
Domestic Hot Water (DHW)	0	0	-	-		-	-		-		-	
Fireplaces	0	0	-	-		-	-		-		-	
Cooking	0	0	-	-		-	-		-		-	
Clothes Dryers	0	0	-	-		-	-		-		-	
Pool and Spa Heaters	0	0	-	-		-	-		-		-	
Other	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Space Heating	0	0	-	-		-	-		-		-	
Domestic Hot Water (DHW)	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Water	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, NORTHERN INTERIOR - NATURAL GAS EFFICIENCY

Back to Index

Condensing Gas Boilers

		References/Notes
Description:	High-efficiency condensing boilers feature advanced heat exchanger designs that extract more heat from the flue gases before they are exhausted. So much heat is extracted that the flue gases condense and must be discharged as a condensate rather than a gas. In retrofit applications where condensing boilers are replacing non-condensing units, it may be necessary to modify the radiating system. Otherwise, the units may not actually condense the flue gas and realize their full efficiency potential.	
Baseline:	A non-condensing mid-efficiency natural gas boiler (82% AFUE assumed)	Minimum proposed standard for gas boilers, to take effect on Sept. 1, 2010 - Link.
Upgrade:	A condensing natural gas boiler (92% AFUE assumed)	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	105,871	89,550	89,550	63,283	56,054	56,054	70,102	70,102	87,903	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	94,331	79,789	79,789	56,385	49,944	49,944	62,461	62,461	78,322	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	11,540	9,761	9,761	6,898	6,110	6,110	7,641	7,641	9,581	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$8,200.00	$8,200.00	$8,200.00	$8,200.00	$8,200.00	$8,200.00	$8,200.00	$8,200.00	$8,200.00	Needs to be updated
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Installation costs included above
	Baseline, Material ($)	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	Needs to be updated
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Installation costs included above
	Total Measure Cost ($)	$3,200.00	$3,200.00	$3,200.00	$3,200.00	$3,200.00	$3,200.00	$3,200.00	$3,200.00	$3,200.00	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	20	20	20	20	20	20	20	20	20	Needs to be updated
	Baseline (yrs.)	20	20	20	20	20	20	20	20	20	Needs to be updated
Cost Savings ($/yr.)		$113	$96	$96	$68	$60	$60	$75	$75	$94	
Simple Payback (yrs.)		28.3	33.5	33.5	47.3	53.4	53.4	42.7	42.7	35.03	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$1,289	$1,091	$1,091	$771	$683	$683	$854	$854	$1,070	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$1,911	-$2,109	-$2,109	-$2,429	-$2,517	-$2,517	-$2,346	-$2,346	-$2,130	
Benefit/Cost Ratio		0.40	0.34	0.34	0.24	0.21	0.21	0.27	0.27	0.33	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	10.9%	10.9%	10.9%	10.9%	10.9%	10.9%	10.9%	10.9%	10.9%	92% AFUE versus 82% AFUE
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	

Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	10.9%	10.9%	10.9%	10.9%	10.9%	10.9%	10.9%	10.9%	10.9%	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

High Efficiency Gas Fireplaces

		References/Notes
Description:	All vented gas fireplaces sold in Canada must now be tested for their energy efficiency using the Canadian Standards Association CSA-P.4.1-02 standard if they are shipped across provincial lines. The energy-efficiency rating of the fireplace is printed on the EnerGuide label. EnerGuide does not set a minimum efficiency level, so savings are possible by using the EnerGuide label to choose the more efficient unit.	
Baseline:	An average efficiency natural gas fireplace (60% assumed)	NRCan data, obtained via personal communication, 2008
Upgrade:	A high efficiency natural gas fireplace (80% assumed)	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.226	$1.226	$1.226	$1.226	$1.226	$1.226	$1.226	$1.226
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.092	$0.092	$0.092	$0.092	$0.092	$0.092	$0.092	$0.092
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	14,333	14,333	14,333	9,460	9,460	9,460	9,460	9,460	13,623	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	10,750	10,750	10,750	7,095	7,095	7,095	7,095	7,095	10,218	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	3,583	3,583	3,583	2,365	2,365	2,365	2,365	2,365	3,406	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$150.00	$150.00	$150.00	$150.00	$150.00	$150.00	$150.00	$150.00	$150.00	Previous analyses have suggested that the cost of gas fireplaces has more to do with "add-ons" (e.g., mantles, etched glass, etc.) than with efficiency. An incremental cost of $150 is assumed for higher-efficiency models, based on a discussion 22 Nov 2010 with Paul Miles of Miles Industries.
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$150.00	$150.00	$150.00	$150.00	$150.00	$150.00	$150.00	$150.00	$150.00	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Set to incremental
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	15	15	15	15	15	15	15	15	15	Lifetime based on previous energy efficiency potential studies conducted by Marbek
	Baseline (yrs.)	15	15	15	15	15	15	15	15	15	Lifetime based on previous energy efficiency potential studies conducted by Marbek
Cost Savings ($/yr.)		$35	$35	$35	$23	$23	$23	$23	$23	$33	
Simple Payback (yrs.)		4.3	4.3	4.3	6.5	6.5	6.5	6.5	6.5	4.59	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$331	$331	$331	$218	$218	$218	$218	$218	$314	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		$181	$181	$181	$68	$68	$68	$68	$68	$164	
Benefit/Cost Ratio		2.20	2.20	2.20	1.45	1.45	1.45	1.45	1.45	2.10	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	1	1	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	Improvement from average efficiency of 60% to 80%.
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	

Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	1	1	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Programmable Thermostats (Central Heating and Cooling)

		References/Notes
Description:	Digital programmable thermostats provide improved temperature setting accuracy and allow occupants to preset temperatures for various time periods. A 4ºC temperature setback is often assumed during night and unoccupied periods. However, utility studies have indicated that a lower average setback value should be used to reflect the fact that the thermostat's setback capabilities do not completely reflect how they are used. For example, some home occupants reliably set back manual thermostats while others do not use the setback features on their electronic thermostats.	
Baseline:	Non-programmable thermostat installed on central forced-air natural gas furnace and electric space cooling system	
Upgrade:	Programmable thermostat installed on central forced-air natural gas furnace and electric space cooling system	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.015	$1.015	$1.015	$1.015	$1.015	$1.015	$1.015	$1.015
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.073	$0.073	$0.073	$0.073	$0.073	$0.073	$0.073	$0.073
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☑	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☑	Mobile (Existing) ☑	Mobile (New) ☑	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	847	1,047	1,006	532	532	511	362	348	914	
	Natural Gas (MJ/yr.)	105,871	89,550	89,550	63,283	56,054	56,054	70,102	70,102	87,903	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	835	1,033	993	525	525	504	356	342	902	
	Natural Gas (MJ/yr.)	98,989	83,729	83,729	59,170	52,410	52,410	65,545	65,545	82,190	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	12	14	13	7	7	7	6	6	12	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	6,882	5,821	5,821	4,113	3,643	3,643	4,557	4,557	5,714	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	Based on a retail scan of p-stats designed for central space heating and cooling (Home Depot, 2010)
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Assume that homeowners are able to install programmable thermostats on their own
	Baseline, Material ($)	$25.00	$25.00	$25.00	$25.00	$25.00	$25.00	$25.00	$25.00	$25.00	Based on a retail scan of manual thermostats designed for central space heating and cooling (Home Depot, 2010)
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Assume that homeowners are able to install thermostats on their own
	Total Measure Cost ($)	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	11	11	11	11	11	11	11	11	11	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 327, January 2010.
	Baseline (yrs.)	11	11	11	11	11	11	11	11	11	Assume similar lifetime for non-programmable thermostats
Cost Savings ($/yr.)		$68	$58	$58	$41	$36	$36	$45	$45	$57	
Simple Payback (yrs.)		0.7	0.9	0.9	1.2	1.4	1.4	1.1	1.1	0.90	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$12	$14	$13	$7	$7	$7	$6	$6	$12	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$499	$422	$422	$299	$264	$264	$331	$331	$415	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		$462	$386	$386	$256	$222	$221	$287	$287	$377	
Benefit/Cost Ratio		10.23	8.72	8.71	6.11	5.43	5.43	6.74	6.73	8.54	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	Assuming only night setback to 18°C (conservative estimate). Savings based on NRC, "The effects of thermostat set-back and set-up on seasonal energy consumption, surface temperatures and recovery times at the CCHT Twin House Facility", ASHRAE Transactions, v. 113, pt. 1, p. 5, 2007. Savings are conservative because testing was in R-2000 homes.
Space Cooling	-	1	1	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	Assuming day set-up to 25°C and low solar gains (conservative). Savings based on NRC, "The effects of thermostat set-back and set-up on seasonal energy consumption, surface temperatures and recovery times at the CCHT Twin House Facility", ASHRAE Transactions, v. 113, pt. 1, p. 8, 2007.
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	Assuming only night setback to 18°C (conservative estimate). Savings based on NRC, "The effects of thermostat set-back and set-up on seasonal energy consumption, surface temperatures and recovery times at the CCHT Twin House Facility", ASHRAE Transactions, v. 113, pt. 1, p. 5, 2007. Savings are conservative because testing was in R-2000 homes.
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment	Applies? (1=Yes; 0=No)	Measure Resource Savings (%)	References/Notes

Main End Use	Use/Equipment (If Applicable)	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	
Space Cooling	1	1	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Water

											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, NORTHERN INTERIOR - NATURAL GAS EFFICIENCY

Back to Index

Solar Pre-Heated Make-Up Air Systems (e.g., SolarWall®)

		References/Notes
Description:	Solar preheated ventilation systems preheat incoming ventilation air and reduce heat loss through the portion of the building shell covered by them. They consist of perforated steel or aluminum absorber sheets that are mounted vertically on a building's exterior surface and are ideally mounted on southerly facing walls, plus or minus 20 degrees. The dark coloured metal sheets that make up the system are mounted a small distance away from the building's surface, creating an air cavity. A negative pressure is created within the cavity by ventilation fans and air is drawn through small holes in the metal panels. On sunny winter days, these systems can raise incoming air temperatures by 25°C to 35°C. In summer months, ventilation air can be drawn directly from the outside through a bypass damper, while heated air is rejected through vents at the top of the air cavity. These systems are generally used in commercial and industrial applications but they have seen some limited residential use.	
Baseline:	Homes with ducting and heat recovery ventilators (HRVs)	
Upgrade:	A 10 m2 solar pre-heated make-up air system, located on the south side of a home	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)								
Electricity ($/kWh)	$0.083	$1.648	$1.648	$1.648	$1.648	$1.648	$1.648	$1.648	$1.648	
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	
Natural Gas ($/MJ)	$0.010	$0.139	$0.139	$0.139	$0.139	$0.139	$0.139	$0.139	$0.139	
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	600	800	768	400	400	384	207	199	687	
	Natural Gas (MJ/yr.)	105,871	89,550	89,550	63,283	56,054	56,054	70,102	70,102	87,903	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	586	782	751	391	391	375	203	195	671	
	Natural Gas (MJ/yr.)	103,436	87,490	87,490	61,828	54,764	54,764	68,490	68,490	85,882	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	14	18	18	9	9	9	5	5	16	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	2,435	2,060	2,060	1,456	1,289	1,289	1,612	1,612	2,022	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$845.00	$845.00	$845.00	$845.00	$845.00	$845.00	$845.00	$845.00	$845.00	Based on private communication with Conserval, installed cost is about $130/m^2 - asumming 65% for material.
	Upgrade, Installation ($)	$455.00	$455.00	$455.00	$455.00	$455.00	$455.00	$455.00	$455.00	$455.00	Based on private communication with Conserval, installed cost is about $130/m^2 - asumming 35% for labour.
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$1,300.00	$1,300.00	$1,300.00	$1,300.00	$1,300.00	$1,300.00	$1,300.00	$1,300.00	$1,300.00	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	40	40	40	40	40	40	40	40	40	Personal communication, D McClenahan, NRCan, #### (year?)
	Baseline (yrs.)	-	-	-	-	-	-	-	-	-	
Cost Savings ($/yr.)		$25	$22	$22	$15	$13	$13	$16	$16	$21	
Simple Payback (yrs.)		52.0	59.9	60.1	86.5	97.0	97.3	80.3	80.3	63.32	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$23	$30	$29	$15	$15	$15	$8	$8	$26	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$339	$286	$286	$202	$179	$179	$224	$224	$281	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$939	-$983	-$984	-$1,082	-$1,106	-$1,106	-$1,068	-$1,068	-$993	
Benefit/Cost Ratio		0.28	0.24	0.24	0.17	0.15	0.15	0.18	0.18	0.24	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	Past Marbek work indicates approximately a 13% savings due to an HRV. An Enermodal paper indicates that a combined Solar Wall and HRV together would have a savings of 15%. This is a 2.3% savings.
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	See note above.
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	

Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

High Efficiency Heat Recovery Ventilators (HRVs)

		References/Notes
Description:	Heat recovery ventilators (HRVs) are heat exchangers that are integrated into the centralized ventilation and exhaust systems of many newer homes. In the winter, they allow for incoming fresh air to be heated by outgoing stale air. Conversely, in homes with central air conditioning systems, they allow incoming fresh air to be cooled by outgoing stale air in the summer. High efficiency HRVs incorporate more effective heat exchangers. Some models also include desiccant wheels so that latent heat (i.e. humidity) can be transferred between the two air streams.	
Baseline:	A standard-efficiency (sensible efficiency of approximately 70%) heat recovery ventilator (HRV), in a home with central heating and cooling	
Upgrade:	A high-efficiency heat recovery ventilator (HRV) (sensible efficiency of approximately 85%), in a home with central heating and cooling	

Baseline Reference:	1. Annual consumption, end use
Heating Fuel Type:	All Fuels (Average Fuel Mix)
Main End Use:	Space Heating
Discount Rate:	7.38%
GHG Adder Incl.?	No
Resource Costs:	Baseload

= User Input
= Calculation

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.226	$1.226	$1.226	$1.226	$1.226	$1.226	$1.226	$1.226
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/m^3)	$0.010	$0.092	$0.092	$0.092	$0.092	$0.092	$0.092	$0.092	$0.092
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☑	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☑	Mobile (Existing) ☑	Mobile (New) ☑	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	847	1,047	1,006	532	532	511	362	348	914	
	Natural Gas (m3/yr.)	105,871	89,550	89,550	63,283	56,054	56,054	70,102	70,102	87,903	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	825	1,020	979	518	518	497	353	339	890	
	Natural Gas (m3/yr.)	103,118	87,221	87,221	61,638	54,596	54,596	68,279	68,279	85,618	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	22	27	26	14	14	13	9	9	24	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Nat. Gas (m3/yr.)	2,753	2,328	2,328	1,645	1,457	1,457	1,823	1,823	2,285	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$1,600.00	$1,600.00	$1,600.00	$1,600.00	$1,600.00	$1,600.00	$1,600.00	$1,600.00	$1,600.00	Based on 2010 cost estimates for Saskatchewan homes from Rob Dumont (Dumont and Associates) and Dave Fetsch (Sun Ridge Group).
	Upgrade, Installation ($)	$800.00	$800.00	$800.00	$800.00	$800.00	$800.00	$800.00	$800.00	$800.00	Based on 2010 cost estimates for Saskatchewan homes from Rob Dumont (Dumont and Associates) and Dave Fetsch (Sun Ridge Group). Installation cost is very dependant on the home and accessibility within it.
	Baseline, Material ($)	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	Based on 2010 cost estimates for Saskatchewan homes from Rob Dumont (Dumont and Associates) and Dave Fetsch (Sun Ridge Group).
	Baseline, Installation ($)	$800.00	$800.00	$800.00	$800.00	$800.00	$800.00	$800.00	$800.00	$800.00	Based on 2010 cost estimates for Saskatchewan homes from Rob Dumont (Dumont and Associates) and Dave Fetsch (Sun Ridge Group). Installation cost is very dependant on the home and accessibility within it.
	Total Measure Cost ($)	$600.00	$600.00	$600.00	$600.00	$600.00	$600.00	$600.00	$600.00	$600.00	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	15	15	15	15	15	15	15	15	15	E Source Heating Technology Atlas. Also used in previous energy efficiency potential studies by Marbek. Most manufacturers provide limited lifetime warranties on HRV cores.
	Baseline (yrs.)	15	15	15	15	15	15	15	15	15	E Source Heating Technology Atlas. Also used in previous energy efficiency potential studies by Marbek. Most manufacturers provide limited lifetime warranties on HRV cores.
Cost Savings ($/yr.)		$29	$25	$25	$17	$15	$15	$19	$19	$24	
Simple Payback (yrs.)		20.8	23.9	24.0	34.7	38.9	39.0	32.2	32.2	25.34	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$27	$33	$32	$17	$17	$16	$12	$11	$29	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$254	$215	$215	$152	$134	$134	$168	$168	$211	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$319	-$352	-$353	-$431	-$449	-$449	-$420	-$421	-$360	
Benefit/Cost Ratio		0.47	0.41	0.41	0.28	0.25	0.25	0.30	0.30	0.40	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	Based on previous Marbek analyses, standard (~70% efficient) reduce space heating energy use by about 13% (i.e. for a similar ventilation rate). High efficiency models are about 20% more efficient.
Space Cooling	-	1	1	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	See comment for space heating. Similar savings are assumed for this end use.
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	See comment for space heating. Similar savings are assumed for this end use.
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment	Applies? (1=Yes; 0=No)	Measure Resource Savings (%)	References/Notes

Main End Use	Use/Equipment (If Applicable)	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	
Space Cooling	1	1	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, NORTHERN INTERIOR - NATURAL GAS EFFICIENCY

Back to Index

Gas-Fired Air-Source Heat Pumps

Not used--not commercially available in residential sizes.

		References/Notes
Description:	Early gas-fired heat pumps, such as the York Triathlon, were unsuccessful due to their bulky size and poor quality design. A new generation of gas absorption heat pumps (GAHPs) is currently available through Robur, an Italian manufacturer. These systems can either be ground-source or air-source (i.e., the heat sink may be either an underground fluid loop or an above ground heat exchanger coil). Air-source systems are substantially less expensive since they don't require drilling to install underground fluid loops. However, they can also be much less efficient than ground-source versions since their efficiency is a function of outside air temperature. Commercial-sized GAHP systems have been available in Canada since mid-2007 but residential-sized systems are rare in North America. It is hoped that residential-sized units will become more available in Canada within the study period, but the current manufacturers do not have specific plans at this time. It is estimated that air-source systems can operate at temperatures as low as -29°C and have annual efficiencies of 105% in cold winter locations. In more moderate winter climates, an efficiency of up to 129% is advertised. Unlike electric heat pump systems, GAHPs do not require any auxiliary heating equipment. In addition, the lack of a mechanical compressor extends their lifetime and allows air-source systems to withstand more extreme temperatures.	
Baseline:	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 90%	
Upgrade:	A gas-fired air-source heat pump. This option is not valid because these units are not available in residential sizes.	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☑	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☑	Mobile (Existing) ☑	Mobile (New) ☑	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	-	-	-	-	-	-	-	-	0	
	Baseline (yrs.)	-	-	-	-	-	-	-	-	-	
Cost Savings ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Simple Payback (yrs.)		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Benefit/Cost Ratio		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	

Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Gas-Fired Ground-Source Heat Pumps

Not used--not yet commercially available in residential sizes.

		References/Notes
Description:	Early gas-fired heat pumps, such as the York Triathlon, were unsuccessful due to their bulky size and poor quality design. A new generation of gas absorption heat pumps (GAHPs) is currently available through Robur, an Italian manufacturer. These systems can either be ground-source or air-source (i.e., the heat sink may be either an underground fluid loop or an above ground heat exchanger coil). Air-source systems are substantially less expensive since they don't require drilling to install underground fluid loops. However, they can also be much less efficient than ground-source versions since their efficiency is a function of outside air temperature. Commercial-sized GAHP systems have been available in Canada since mid-2007 but residential-sized systems are not currently available outside of Europe. It is hoped that residential-sized units will become more available in Canada within the study period, but the current manufacturers do not have specific plans at this time. Ground-source GAHPs have efficiencies (COPs) ranging from 120% to 130% Unlike electric heat pump systems, GAHPs do not require any auxiliary heating equipment. In addition, the lack of a mechanical compressor extends their lifetime.	Need--Installed cost, maintenance costs/year, lifetime, savings (heating, cooling, HVAC)
Baseline:	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 90%	
Upgrade:	A gas-fired ground-source heat pump. This option is not valid because these units are not available in residential sizes.	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/m^3)	$0.010	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	-	-	-	-	-	-	-	-	0	
	Baseline (yrs.)	-	-	-	-	-	-	-	-	-	
Cost Savings ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Simple Payback (yrs.)		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Benefit/Cost Ratio		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	

Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, NORTHERN INTERIOR - NATURAL GAS EFFICIENCY

Back to Index

Integrated Heating and DHW (Forced Air Heating)

		References/Notes
Description:	Integrated mechanical systems combine the most efficient technologies for residential space heating and domestic water heating into one package. For example, the Matrix system by NTI NY Thermal incorporates a condensing furnace, condensing boiler, condensing water heater and HRV all in one unit. Primary benefits of the integrated units include compact construction, lower cost of installation (only one set of gas, water and circulation connections are required), and lower installation and maintenance costs (once the technology is mature). Since the minimum performance standards for furnaces was brought up to 90% efficiency at the end of 2009, the base case system is a 90% efficient forced-air furnace and a standard efficiency natural gas tank-style water heater. With this baseline, the integrated system would offer little in the way of space heating savings, but it does still offer DHW savings because the integrated system would heat domestic water with its high-efficiency, condensing combustion.	
Baseline:	A 90% AFUE efficient forced-air condensing furnace, a standard efficiency natural gas tank-style water heater (EF of 0.62 or 0.64 assumed) and a standard efficiency HRV	
Upgrade:	An integrated heating and DHW system, with a condensing furnace (AFUE of 94), a condensing natural gas water heater (EF of 0.80 assumed), and an HRV with an efficiency similar to that in the base case (72%).	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	123,060	106,739	106,739	77,797	70,567	70,567	85,067	85,067	104,725	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	113,866	98,247	98,247	71,157	64,238	64,238	78,311	78,311	96,417	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	9,194	8,492	8,492	6,640	6,329	6,329	6,756	6,756	8,307	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$15,000.00	$15,000.00	$10,000.00	$15,000.00	$15,000.00	$10,000.00	$15,000.00	$10,000.00	$12,500.00	Clifford Paite of Matrix estimates installed cost of $10,000 to $20,000, with the lowest cost in new homes. (2010 estimate)
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Included in cost above
	Baseline, Material ($)	$5,900.00	$5,900.00	$5,900.00	$5,900.00	$5,900.00	$5,900.00	$5,900.00	$5,900.00	$5,900.00	Installed costs of base furnace plus water heater. (Update if base costs are updated.)
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Included in cost above
	Total Measure Cost ($)	$8,505.78	$8,505.78	$3,505.78	$8,505.78	$8,505.78	$3,505.78	$8,505.78	$3,505.78	$6,005.78	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	18	18	18	18	18	18	18	18	18	Lifetime of high efficiency furnace--based on Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-41, April 16, 2009.
	Baseline (yrs.)	15	15	15	15	15	15	15	15	15	Lifetime of base efficiency furnace--based on Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-41, April 16, 2009.
Cost Savings ($/yr.)		$90	$83	$83	$65	$62	$62	$66	$66	$81	
Simple Payback (yrs.)		94.4	102.2	42.1	130.7	137.1	56.5	128.5	53.0	73.74	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$961	$888	$888	$694	$662	$662	$706	$706	$869	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$7,545	-$7,618	-$2,618	-$7,812	-$7,844	-$2,844	-$7,799	-$2,799	-$5,137	
Benefit/Cost Ratio		0.11	0.10	0.25	0.08	0.08	0.19	0.08	0.20	0.17	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	No savings as HRVs in base and proposed case are similar.
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	Difference between AFUE 94 and AFUE 90
Domestic Hot Water (DHW)	-	1	1	27.0%	27.0%	27.0%	27.0%	27.0%	27.0%	25.0%	25.0%	26.9%	Difference between Efs of .85 and .64 or .62.
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	

Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	
Domestic Hot Water (DHW)	1	1	27.0%	27.0%	27.0%	27.0%	27.0%	27.0%	25.0%	25.0%	26.9%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, NORTHERN INTERIOR - NATURAL GAS EFFICIENCY

Back to Index

Integrated Heating and DHW (Hydronic Heating)

		References/Notes
Description:	Integrated mechanical systems combine the most efficient technologies for residential space heating and domestic water heating into one package. For example, the Matrix system by NTI NY Thermal incorporates a condensing furnace, condensing boiler, condensing water heater and HRV all in one unit. Primary benefits of the integrated units include compact construction, lower cost of installation (only one set of gas, water and circulation connections are required), and lower installation and maintenance costs (once the technology is mature). Water heating in the base case is assumed to be provided by a standard efficiency natural gas tank-style water heater (EF of 0.62 or 0.64), while space heating is provided by a non-condensing boiler, assumed to have an AFUE of 82% . The HRV in the base case is assumed to be of similar efficiency to the HRV in the integrated unit.	
Baseline:	A non-condensing boiler with an AFUE of 82% and a standard efficiency natural gas tank-style water heater (EF of 0.62 or 0.64). An HRV of similar efficiency to the integrated unit (72%) is assumed.	
Upgrade:	An integrated heating and DHW system, with a condensing boiler (AFUE 92.7), a condensing natural gas water heater (EF of .85) and an HRV with an efficiency similar to that in the base case (72%).	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/m^3)	$0.010	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	123,060	106,739	106,739	77,797	70,567	70,567	85,067	85,067	104,725	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	105,714	91,352	91,352	66,284	59,922	59,922	72,913	72,913	89,649	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Nat. Gas (m3/yr.)	17,346	15,387	15,387	11,513	10,645	10,645	12,153	12,153	15,076	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$15,000.00	$15,000.00	$10,000.00	$15,000.00	$15,000.00	$10,000.00	$15,000.00	$10,000.00	$12,500.00	Clifford Paite of Matrix estimates installed cost of $10,000 to $20,000, with the lowest cost in new homes. (2010 estimate)
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Included in cost above.
	Baseline, Material ($)	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	Cost of base case boiler and water heater. (Update if base case costs are updated)
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$8,000.00	$8,000.00	$3,000.00	$8,000.00	$8,000.00	$3,000.00	$8,000.00	$3,000.00	$5,500.00	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	20	20	20	20	20	20	20	20	20	lifetime of high-efficiency condensing furnace. (Updated if condensing boiler option updated.)
	Baseline (yrs.)	20	20	20	20	20	20	20	20	20	lifetime of standard efficiency condensing furnace. (Updated if condensing boiler option updated.)
Cost Savings ($/yr.)		$170	$151	$151	$113	$104	$104	$119	$119	$148	
Simple Payback (yrs.)		47.1	53.1	19.9	70.9	76.7	28.8	67.2	25.2	37.22	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$1,938	$1,719	$1,719	$1,286	$1,189	$1,189	$1,358	$1,358	$1,684	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$6,062	-$6,281	-$1,281	-$6,714	-$6,811	-$1,811	-$6,642	-$1,642	-$3,816	
Benefit/Cost Ratio		0.24	0.21	0.57	0.16	0.15	0.40	0.17	0.45	0.38	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	No savings as HRVs in base and proposed case are similar.
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	Difference between AFUE 92.7 and AFUE 82
Domestic Hot Water (DHW)	-	1	1	27.0%	27.0%	27.0%	27.0%	27.0%	27.0%	25.0%	25.0%	26.9%	Difference between Efs of .85 and .64 or .62.
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	

Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	
Domestic Hot Water (DHW)	1	1	27.0%	27.0%	27.0%	27.0%	27.0%	27.0%	25.0%	25.0%	26.9%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Condensing Gas Water Heaters

		References/Notes
Description:	Condensing water heaters feature advanced heat exchanger designs that extract more heat from the flue gases before they are exhausted. So much heat is extracted that the flue gases condense and must be discharged as a condensate rather than a gas. As a result, the efficiency of these types of water heaters is significantly higher than standard water heaters.	
Baseline:	A conventional storage natural gas hot water heater (EF of 0.62 or 0.64 assumed)	Current BC hot water heater regulations require an EF of 0.62 for 40 gallon (151 L) tanks and 0.64 for 30 gallon (114 L) tanks.
Upgrade:	A condensing natural gas water heater (EF of 0.80 assumed)	ENERGY STAR requirement for condensing hot water heaters is an EF of 0.80

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.128	$1.128	$1.128	$1.128	$1.128	$1.128	$1.128	$1.128
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.083	$0.083	$0.083	$0.083	$0.083	$0.083	$0.083	$0.083
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	17,189	17,189	17,189	14,514	14,514	14,514	14,965	14,965	16,821	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	13,322	13,322	13,322	11,248	11,248	11,248	11,972	11,972	13,054	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	3,868	3,868	3,868	3,266	3,266	3,266	2,993	2,993	3,767	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$1,500.00	$1,500.00	$1,500.00	$1,500.00	$1,500.00	$1,500.00	$1,500.00	$1,500.00	$1,500.00	Habart & Associates, "Market Transformation: Domestic Water Heaters," July 2010
	Upgrade, Installation ($)	$1,305.00	$1,305.00	$1,333.00	$1,305.00	$1,305.00	$1,333.00	$1,305.00	$1,333.00	$1,319.00	Habart & Associates, "Market Transformation: Domestic Water Heaters," July 2010
	Baseline, Material ($)	$675.00	$675.00	$675.00	$675.00	$675.00	$675.00	$675.00	$675.00	$675.00	Habart & Associates, "Market Transformation: Domestic Water Heaters," July 2010
	Baseline, Installation ($)	$563.00	$563.00	$1,085.00	$563.00	$563.00	$1,085.00	$563.00	$1,085.00	$824.00	Habart & Associates, "Market Transformation: Domestic Water Heaters," July 2010
	Total Measure Cost ($)	$1,567.00	$1,567.00	$1,073.00	$1,567.00	$1,567.00	$1,073.00	$1,567.00	$1,073.00	$1,320.00	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	13	13	13	13	13	13	13	13	13	Assume similar lifetime to conventional tanks. Habart report also makes this assumption.
	Baseline (yrs.)	13	13	13	13	13	13	13	13	13	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 495, January 2010.
Cost Savings ($/yr.)		$38	$38	$38	$32	$32	$32	$29	$29	$37	
Simple Payback (yrs.)		41.3	41.3	28.3	49.0	49.0	33.5	53.4	36.6	35.88	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$321	$321	$321	$271	$271	$271	$248	$248	$312	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$1,246	-$1,246	-$752	-$1,296	-$1,296	-$802	-$1,319	-$825	-$1,008	
Benefit/Cost Ratio		0.20	0.20	0.30	0.17	0.17	0.25	0.16	0.23	0.24	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	1	1	22.5%	22.5%	22.5%	22.5%	22.5%	22.5%	20.0%	20.0%	22.4%	EF of 0.80 versus an EF of 0.62 (40 gal) or 0.64 (30 gal)
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	

Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	**Sub End Use/Equipment (If Applicable)**	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
		Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	22.5%	22.5%	22.5%	22.5%	22.5%	22.5%	20.0%	20.0%	22.4%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, NORTHERN INTERIOR - NATURAL GAS EFFICIENCY

Back to Index

Point-of-Use (Tankless) Water Heaters (Gas)

		References/Notes
Description:	Tankless water heaters heat water on demand, eliminating hot water storage. The absence of hot water storage reduces standby heat losses. The efficiency of tankless water heaters is generally improved by the addition of features such as modulating controls, electric spark ignitions and direct venting. The applicability of tankless gas-fired DHW systems is somewhat limited by venting constraints; the burner is significantly larger than for a standard water heater, so a larger vent is required. Some houses cannot accommodate the larger flue because of requirements for clearance from other structures, windows, etc.	
Baseline:	A conventional storage natural gas hot water heater (EF of 0.60 assumed)	Based on a scan of models certified by the Air Conditioning, Heating, and Refrigeration Institute (AHRI), the average energy factor (EF) for conventional storage natural gas water heaters is ~0.60.
Upgrade:	A tankless natural gas hot water heater (EF of 0.82 assumed)	Based on a scan of models certified by the Air Conditioning, Heating, and Refrigeration Institute (AHRI), the overwhelming majority of tankless gas hot water heaters have an energy factor (EF) of 0.82

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)								
Electricity ($/kWh)	$0.083	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	
Natural Gas ($/MJ)	$0.010	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	17,189	17,189	17,189	14,514	14,514	14,514	14,965	14,965	16,821	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	11,173	11,173	11,173	9,434	9,434	9,434	9,727	9,727	10,934	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	6,016	6,016	6,016	5,080	5,080	5,080	5,238	5,238	5,887	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$1,500.00	$1,500.00	$1,500.00	$1,500.00	$1,500.00	$1,500.00	$1,500.00	$1,500.00	$1,500.00	Habart & Associates, "Market Transformation: Domestic Water Heaters," July 2010
	Upgrade, Installation ($)	$2,331.00	$2,331.00	$2,359.00	$2,331.00	$2,331.00	$2,359.00	$2,331.00	$2,359.00	$2,345.00	Habart & Associates, "Market Transformation: Domestic Water Heaters," July 2010
	Baseline, Material ($)	$675.00	$675.00	$675.00	$675.00	$675.00	$675.00	$675.00	$675.00	$675.00	Habart & Associates, "Market Transformation: Domestic Water Heaters," July 2010
	Baseline, Installation ($)	$563.00	$563.00	$1,085.00	$563.00	$563.00	$1,085.00	$563.00	$1,085.00	$824.00	Habart & Associates, "Market Transformation: Domestic Water Heaters," July 2010
	Total Measure Cost ($)	$2,274.04	$2,274.04	$1,645.56	$2,274.04	$2,274.04	$1,645.56	$2,274.04	$1,645.56	$1,959.80	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	20	20	20	20	20	20	20	20	20	Habart & Associates report: 25 yrs. Navigant Consulting Inc., Measures and Assumptions for Demand Side Management (DSM) Planning, p. C-87, April 16, 2009 indicated 18 yrs. Using 20 years as an intermediate value, after personal communication with J. Habart, Dec 2010.
	Baseline (yrs.)	13	13	13	13	13	13	13	13	13	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 495, January 2010.
Cost Savings ($/yr.)		$59	$59	$59	$50	$50	$50	$51	$51	$58	
Simple Payback (yrs.)		38.6	38.6	27.9	45.7	45.7	33.1	44.3	32.1	34.03	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$672	$672	$672	$568	$568	$568	$585	$585	$658	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$1,602	-$1,602	-$973	-$1,707	-$1,707	-$1,078	-$1,689	-$1,060	-$1,302	
Benefit/Cost Ratio		0.30	0.30	0.41	0.25	0.25	0.34	0.26	0.36	0.34	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	1	1	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	Actual use study shows average of 37% savings. We've assumed 35% because conventional EF is slightly higher and instantanoues EF is slightly lower than used in the study.
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	

Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Active Solar Water Heating Systems

		References/Notes
Description:	Solar DHW systems use the energy of the sun to heat water. The primary components of a solar water heating system are a solar collector, a heat transfer fluid and a well-insulated storage tank. Due to Canada's colder climate and the higher likelihood of freezing, active closed-loop systems are generally used. These systems use a pump to circulate a non-freezing heat transfer fluid through the collectors and then through a heat exchanger so that the thermal energy can be transferred to the water. Solar DHW are not generally sized to supply all of the annual requirement for water heating in the home, because if the system is sized for cloudy winter periods it will have enormous excess capacity during sunny summer periods, and will cost far too much to install. The system analyzed here meets approximately 2/3 of the annual requirements	
Baseline:	No solar water heating system installed	
Upgrade:	Solar DHW systems use the energy of the sun to heat water. The primary components of a solar water heating system are a solar collector, a heat transfer fluid and a well-insulated storage tank. Due to Canada's colder climate and the higher likelihood of	System sizes of 5.75 m^2 are assumed .

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.553	$1.553	$1.553	$1.553	$1.553	$1.553	$1.553	$1.553
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.127	$0.127	$0.127	$0.127	$0.127	$0.127	$0.127	$0.127
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	17,189	17,189	17,189	14,514	14,514	14,514	14,965	14,965	16,821	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	6,360	6,360	6,360	4,644	4,644	4,644	4,040	4,040	6,081	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	10,829	10,829	10,829	9,869	9,869	9,869	10,924	10,924	10,740	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	SolarBC incentive program average cost of 100 installed systems
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Costs above are installed.
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	25	25	25	25	25	25	25	25	25	Retscreen default assumption.
	Baseline (yrs.)	-	-	-	-	-	-	-	-	-	
Cost Savings ($/yr.)		$106	$106	$106	$97	$97	$97	$107	$107	$105	
Simple Payback (yrs.)		66.0	66.0	66.0	72.4	72.4	72.4	65.4	65.4	66.56	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$1,376	$1,376	$1,376	$1,254	$1,254	$1,254	$1,388	$1,388	$1,364	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$5,624	-$5,624	-$5,624	-$5,746	-$5,746	-$5,746	-$5,612	-$5,612	-$5,636	
Benefit/Cost Ratio		0.20	0.20	0.20	0.18	0.18	0.18	0.20	0.20	0.19	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	1	1	63.0%	63.0%	63.0%	68.0%	68.0%	68.0%	73.0%	73.0%	64.0%	Based on RETScreen modeling results (Assuming average occupancies for detached, attached and mobile homes are 3.1, 2.4, 1.9 respectively, DHW use of 60 L/day/person, 55°C DHW temperature, southerly directional angle 30° away from optimal (i.e. azimuth)
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	

Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	63.0%	63.0%	63.0%	68.0%	68.0%	68.0%	73.0%	73.0%	64.0%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

DHW Tank Insulation

		References/Notes
Description:	Pre-cut tank jackets/blankets (DHW tank insulation) are readily available and can be installed on hot water storage tanks to reduce standby heat losses. Caution is required to install blankets on gas water heaters, to avoid blocking the flue, the air intake to the burner, or the drain at the bottom. The thermostat should also remain uncovered.	
Baseline:	No additional tank insulation installed on a conventional hot water storage tank	
Upgrade:	An insulating blanket installed on a hot water storage tank to reduce standby losses	

Baseline Reference:	1. Annual consumption, end use
Heating Fuel Type:	All Fuels (Average Fuel Mix)
Main End Use:	Space Heating
Discount Rate:	7.38%
GHG Adder Incl.?	No
Resource Costs:	Baseload

= User Input
= Calculation

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.128	$1.128	$1.128	$1.128	$1.128	$1.128	$1.128	$1.128
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.083	$0.083	$0.083	$0.083	$0.083	$0.083	$0.083	$0.083
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	1,289	1,289	1,289	1,089	1,089	1,089	1,122	1,122	1,262	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	967	967	967	816	816	816	842	842	946	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	322	322	322	272	272	272	281	281	315	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$35.00	$35.00	$35.00	$25.00	$25.00	$25.00	$25.00	$25.00	$33.54	Based on a 2010 retail scan of insulating blankets
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Assuming that homeowners are able to install the insulating blankets on their own.
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$35.00	$35.00	$35.00	$25.00	$25.00	$25.00	$25.00	$25.00	$33.54	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	13	13	13	13	13	13	13	13	13	Assuming a lifetime similar to that of a hot water heater (hot water heater lifetime based on OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 495, January 2010.)
	Baseline (yrs.)	-	-	-	-	-	-	-	-	-	
Cost Savings ($/yr.)		$3	$3	$3	$3	$3	$3	$3	$3	$3	
Simple Payback (yrs.)		11.1	11.1	11.1	9.4	9.4	9.4	9.1	9.1	10.82	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$27	$27	$27	$23	$23	$23	$23	$23	$26	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$8	-$8	-$8	-$2	-$2	-$2	-$2	-$2	-$7	
Benefit/Cost Ratio		0.76	0.76	0.76	0.90	0.90	0.90	0.93	0.93	0.79	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	1	1	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	US DOE website suggests that insulating blankets can reduce standby losses by 25-45%. Lower end assumed to be conservative and accounts for fact that newer storage tanks are better insulated
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	

Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	1.9%	1.9%	1.9%	1.9%	1.9%	1.9%	1.9%	1.9%	1.9%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

DHW Pipe Insulation

		References/Notes
Description:	Hot water pipe insulation reduces the distribution losses for DHW. In general, only the first one or two metres of pipe nearest the DHW tank are accessible enough to insulate. However, since the dominant loss is from the pipe transferring heat out of the tank and then losing it to the basement, the first meter of pipe is the most important and only worthwhile section of pipe to insulate. Insulating this section of piping affects both the delivery of hot water and the losses from the tank. Delivery temperature is slightly increased during a hot water draw, and the water in the piping does not lose its stored heat as quickly between draws.	In SaskPower
Baseline:	No insulation installed on the piping leading out of a hot water storage tank	
Upgrade:	Installing pipe insulation on the first meter of piping leading out of a hot water storage tank	

Baseline Reference:	1. Annual consumption, end use
Heating Fuel Type:	All Fuels (Average Fuel Mix)
Main End Use:	Space Heating
Discount Rate:	7.38%
GHG Adder Incl.?	No
Resource Costs:	Baseload

= User Input
= Calculation

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.226	$1.226	$1.226	$1.226	$1.226	$1.226	$1.226	$1.226
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.092	$0.092	$0.092	$0.092	$0.092	$0.092	$0.092	$0.092
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	1,289	1,289	1,289	1,089	1,089	1,089	1,122	1,122	1,262	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	1,173	1,173	1,173	991	991	991	1,021	1,021	1,148	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	116	116	116	98	98	98	101	101	114	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$0.70	$0.70	$0.70	$0.70	$0.70	$0.70	$0.70	$0.70	$0.70	Based on OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 492, January 2010.
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Assuming that homeowners are able to install the insulation on their own.
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$0.70	$0.70	$0.70	$0.70	$0.70	$0.70	$0.70	$0.70	$0.70	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	15	15	15	15	15	15	15	15	15	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 495, January 2010.
	Baseline (yrs.)	-	-	-	-	-	-	-	-	-	
Cost Savings ($/yr.)		$1	$1	$1	$1	$1	$1	$1	$1	$1	
Simple Payback (yrs.)		0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.63	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$11	$11	$11	$9	$9	$9	$9	$9	$10	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		$10	$10	$10	$8	$8	$8	$9	$9	$10	
Benefit/Cost Ratio		15.29	15.29	15.29	12.91	12.91	12.91	13.31	13.31	14.97	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	1	1	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	Original number of 15% was used: this was just over 1% of DHW overall and was based on Shipley's engineering calculations for a pipe acting as a fin on the tank. A paper by Andersen, Fan & Furbo called "Heat Losses from Pipes Connected to Hot Water Storage Tanks" estimates a heat trap reduces the losses in the first section of pipe by 40%.
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	

Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

DHW Heat Traps

Not used because many or most new hot water heaters have integral heat traps

		References/Notes
Description:	This measure involves the installation of external "S-type" pre-bent copper pipe heat traps on both of the outlets ofwater heaters. This measure is only being considered during the installation of new tanks since it can be prohibitively expensive to bring in a plumber otherwise.	
Baseline:	No heat trap installed on a new electric storage hot water heater	
Upgrade:	Installing an external "S-type" pre-bent copper pipe heat trap on an gas-fired storage hot water heater. This option no longer applies because most new hot water heaters include an integrated heat trap.	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083			$1.128			$1.128		$1.128
Electricity ($/kW)	$0.000			$0.000			$0.000		$0.000
Natural Gas ($/MJ)	$0.010			$0.083			$0.083		$0.083
Oil ($/L)	$0.000			$0.000			$0.000		$0.000
Water ($/1000L)	$0.000			$0.000			$0.000		$0.000

Sub-sector		Detached (Pre-1976) ☐	Detached (Post-1976) ☐	Detached (New) ☑	Attached (Pre-1976) ☐	Attached (Post-1976) ☐	Attached (New) ☑	Mobile (Existing) ☐	Mobile (New) ☑	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)			-			-		-	-	
	Natural Gas (MJ/yr.)			-			-		-	-	
	Oil (L/yr.)			-			-		-	-	
	Water (L/yr.)			-			-		-	-	
Upgrade Consumption	Electricity (kWh/yr.)			-			-		-	-	
	Natural Gas (MJ/yr.)			-			-		-	-	
	Oil (L/yr.)			-			-		-	-	
	Water (L/yr.)			-			-		-	-	
Interactive Effects (Inputs)	Heating Penalty ☐			0%			0%		0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐			0%			0%		0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)			-			-		-	-	
	Electricity, Cooling (kWh/yr.)			-			-		-	-	
	Electricity, Total (kWh/yr.)			-			-		-	-	
	Natural Gas (MJ/yr.)			-			-		-	-	
	Oil (L/yr.)			-			-		-	-	
Winter Peak Hours-Use Factor				-			-		-	-	
Resource Savings	Electricity (kWh/yr.)			-			-		-	-	
	Electricity (kW peak)			-			-		-	-	
	Natural Gas (MJ/yr.)			-			-		-	-	
	Oil (L/yr.)			-			-		-	-	
	Water (L/yr.)			-			-		-	-	
Cost Parameters	Upgrade, Material ($)			$0.00			$0.00		$0.00	$0.00	
	Upgrade, Installation ($)			$0.00			$0.00		$0.00	$0.00	Minimal labour costs since tank is already being installed
	Baseline, Material ($)			$0.00			$0.00		$0.00	$0.00	
	Baseline, Installation ($)			$0.00			$0.00		$0.00	$0.00	
	Total Measure Cost ($)			$0.00			$0.00		$0.00	$0.00	
	Basis (Full/Incremental)			Full			Full		Full	Full	
Incremental O&M ($/yr.)				$0			$0		$0	$0	
Lifetimes	Upgrade (yrs.)			13			13		13	13	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 495, January 2010.
	Baseline (yrs.)			-			-		-	-	
Cost Savings ($/yr.)				$0			$0		$0	$0	
Simple Payback (yrs.)				N/A			N/A		N/A	0.00	
NPV of O&M Costs ($)				$0			$0		$0	$0	
Total Benefits ($)	Electric Energy			$0			$0		$0	$0	
	Electric Demand			$0			$0		$0	$0	
	Natural Gas			$0			$0		$0	$0	
	Oil			$0			$0		$0	$0	
	Water			$0			$0		$0	$0	
Measure TRC ($)				$0			$0		$0	$0	
Benefit/Cost Ratio				0.00			0.00		0.00	0.00	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed			1			1		1	
Cost Flag (i.e. way measure is typically applied)			Incremental			Incremental		Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No) Baseline	Upgrade	Measure Resource Savings (%) Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No) Baseline	Upgrade	Measure Resource Savings (%) Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0			25.0%			25.0%		25.0%	25.0%	Based on Acker, L. Advanced Conservation Technology Inc. Improving the Efficiency of Hot Water Distribution Systems, ACEEE Forum, p. 12, 2008, installing a heat trap improves the energy factor of a hot water heater by about 0.02 (i.e. 2%) or about 25% of pipe losses.
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No) Baseline	Upgrade	Measure Resource Savings (%) Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	

Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0			-			-		-	-	
Space Cooling	0	0			-			-		-	-	
Clothes Washers	0	0			-			-		-	-	
Dishwashers	0	0			-			-		-	-	
Other Electric Loads	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0			-			-		-	-	
Domestic Hot Water (DHW)	0	0			-			-		-	-	
Fireplaces	0	0			-			-		-	-	
Cooking	0	0			-			-		-	-	
Clothes Dryers	0	0			-			-		-	-	
Pool and Spa Heaters	0	0			-			-		-	-	
Other	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0			-			-		-	-	
Domestic Hot Water (DHW)	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Ultra Low-Flow Showerheads

		References/Notes
Description:	Ultra low-flow showerheads have aerators and flow restrictors to reduce water use. At 4.75 LPM (1.25 GPM), their flow rates are substantially lower than traditional low-flow fixtures, whose flow rates range between 7.6 LPM and 9.5 LPM (2.0-2.5 GPM).	
Baseline:	A low-flow showerhead with a 2.0 GPM (7.6 LPM) flow rate (conservative estimate)	
Upgrade:	An ultra low-flow showerhead with a 1.25 GPM (4.75) flow rate	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached ☑ (Pre-1976)	Detached ☑ (Post-1976)	Detached ☑ (New)	Attached ☑ (Pre-1976)	Attached ☑ (Post-1976)	Attached ☑ (New)	Mobile ☑ (Existing)	Mobile ☑ (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	4,469	4,469	4,469	3,774	3,774	3,774	3,891	3,891	4,374	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	2,793	2,793	2,793	2,358	2,358	2,358	2,432	2,432	2,733	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	1,676	1,676	1,676	1,415	1,415	1,415	1,459	1,459	1,640	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$13.00	$13.00	$13.00	$13.00	$13.00	$13.00	$13.00	$13.00	$13.00	Incremental cost of $7 based on OPA, OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 193, January 2010.
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Assuming that homeowners are able to install the showerheads on their own
	Baseline, Material ($)	$6.00	$6.00	$6.00	$6.00	$6.00	$6.00	$6.00	$6.00	$6.00	Based on a retail scan of low-flow showerheads (2010)
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Assuming that homeowners are able to install the showerheads on their own
	Total Measure Cost ($)	$13.00	$13.00	$13.00	$13.00	$13.00	$13.00	$13.00	$13.00	$13.00	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	10	10	10	10	10	10	10	10	10	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 193, January 2010.
	Baseline (yrs.)	10	10	10	10	10	10	10	10	10	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 193, January 2010.
Cost Savings ($/yr.)		$16	$16	$16	$14	$14	$14	$14	$14	$16	
Simple Payback (yrs.)		0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.81	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$112	$112	$112	$95	$95	$95	$98	$98	$110	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		$99	$99	$99	$82	$82	$82	$85	$85	$97	
Benefit/Cost Ratio		8.63	8.63	8.63	7.29	7.29	7.29	7.52	7.52	8.45	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	1	1	37.5%	37.5%	37.5%	37.5%	37.5%	37.5%	37.5%	37.5%	37.5%	1.25 GPM (4.75 LPM) showerhead versus a 2.0 GPM (7.6 LPM) showerhead and assuming that the length of showers does not change
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	

Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	9.8%	9.8%	9.8%	9.8%	9.8%	9.8%	9.8%	9.8%	9.8%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Faucet Aerators

		References/Notes
Description:	Aerators can easily be attached to most faucets to restrict the flow rate of water flowing from them. This can result in savings to both water consumption and DHW energy.	Not in SaskPower
Baseline:	No faucet aerator installed on the kitchen faucet	
Upgrade:	A 1.5 GPM (5.7 LPM) faucet aerator installed on the kitchen faucet	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☑	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☑	Mobile (Existing) ☑	Mobile (New) ☑	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	3,266	3,266	3,266	2,758	2,758	2,758	2,843	2,843	3,196	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	2,254	2,254	2,254	1,903	1,903	1,903	1,962	1,962	2,205	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	1,012	1,012	1,012	855	855	855	881	881	991	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$15.00	$15.00	$15.00	$15.00	$15.00	$15.00	$15.00	$15.00	$15.00	Based on a 2010 retail scan of faucet aerators and OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 190, January 2010. The cost of faucet aerators is about $5. Assuming 3 aerators per home in order to realize full savings.
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$15.00	$15.00	$15.00	$15.00	$15.00	$15.00	$15.00	$15.00	$15.00	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	10	10	10	10	10	10	10	10	10	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 190, January 2010.
	Baseline (yrs.)	-	-	-	-	-	-	-	-	-	
Cost Savings ($/yr.)		$10	$10	$10	$8	$8	$8	$9	$9	$10	
Simple Payback (yrs.)		1.5	1.5	1.5	1.8	1.8	1.8	1.7	1.7	1.55	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$68	$68	$68	$57	$57	$57	$59	$59	$66	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		$53	$53	$53	$42	$42	$42	$44	$44	$51	
Benefit/Cost Ratio		4.52	4.52	4.52	3.82	3.82	3.82	3.94	3.94	4.42	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	1	1	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 190, January 2010.
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	

Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	5.9%	5.9%	5.9%	5.9%	5.9%	5.9%	5.9%	5.9%	5.9%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Wastewater Heat Recovery Systems

		References/Notes
Description:	Residential wastewater heat recovery systems transfer the waste heat from drains to preheat make-up water. These systems work well only for DHW uses in which the hot water use and the draining of wastewater are simultaneous. Thus, in homes, application to anything other than showers is difficult. Heat recovery systems incorporate shell-and-tube heat exchangers that typically have efficiencies in the range of 40% to 55%, depending on factors such as design, material, overall length, and fluid flow rate.	In SaskPower
Baseline:	No wastewater heat recovery system installed	
Upgrade:	A 60" wastewater heat recovery system	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.648	$1.648	$1.648	$1.648	$1.648	$1.648	$1.648	$1.648
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.139	$0.139	$0.139	$0.139	$0.139	$0.139	$0.139	$0.139
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	4,469	4,469	4,469	3,774	3,774	3,774	3,891	3,891	4,374	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	2,145	2,145	2,145	1,811	1,811	1,811	1,868	1,868	2,099	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	2,324	2,324	2,324	1,962	1,962	1,962	2,023	2,023	2,274	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$680.00	$680.00	$680.00	$611.00	$611.00	$611.00	$611.00	$611.00	$669.95	Based on the cost of a Powerpipe R3-60 (3" diameter, 60" length) model for detached and an R3-48 in attached and mobile homes. Costs from Home Depot (2010).
	Upgrade, Installation ($)	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	Assuming 2 hours of labour @ $60/hr
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$800.00	$800.00	$800.00	$731.00	$731.00	$731.00	$731.00	$731.00	$789.95	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	30	30	30	30	30	30	30	30	30	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 498, January 2010.
	Baseline (yrs.)	-	-	-	-	-	-	-	-	-	
Cost Savings ($/yr.)		$23	$23	$23	$19	$19	$19	$20	$20	$22	
Simple Payback (yrs.)		35.1	35.1	35.1	38.0	38.0	38.0	36.9	36.9	35.49	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$323	$323	$323	$273	$273	$273	$281	$281	$316	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$477	-$477	-$477	-$458	-$458	-$458	-$450	-$450	-$474	
Benefit/Cost Ratio		0.40	0.40	0.40	0.37	0.37	0.37	0.38	0.38	0.40	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	1	1	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	Avg efficiency is ~52% for 2.0 GPM flow rates and a 60" model, based on RenewABILITY Energy Inc., "Power-Pipe: Backgrounder for Homes" (Note: Estimate may be high since there would be heat losses between the showerhead and the top of the HEX)
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heater	-	0	0									-	
Pool and Spa Heater	Pool Heaters	0	0									-	
Pool and Spa Heater	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	

Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

DHW Recirculation Systems (e.g. Metlund D'MAND®)

		References/Notes
Description:	When turning on the hot water tap, it often takes a long time before hot water begins to flow. DHW recirculation systems can be used to pump hot water to a faucet at the demand of a user, getting hot water to the fixture four to five times quicker than traditional systems. Water that is in the hot water lines is pumped back to the water heater either through the cold water lines or through a dedicated line. This pumping continues until the temperature of the hot water at the point of use reaches a specified value. In retrofit situations, this pumping system is generally installed at the faucet that is furthest away from the water heater and the system is enabled by remote activation from the other points of use. Along with improved convenience and water savings (since water isn't flushed down the drain), energy savings are achieved since the water that is pumped back to the water heater is generally warmer than city water. In addition, since the pump gets water to the fixture more quickly, there is an overall reduction of hot water use.	
Baseline:	A home with no DHW recirculation system	
Upgrade:	A home with a DHW recirculation system installed on the point-of-use farthest away from the hot water tank	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	17,189	17,189	17,189	14,514	14,514	14,514	14,965	14,965	16,821	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	14,439	14,439	14,439	12,192	12,192	12,192	12,570	12,570	14,130	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	2,750	2,750	2,750	2,322	2,322	2,322	2,394	2,394	2,691	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$450.00	$450.00	$450.00	$350.00	$350.00	$350.00	$350.00	$350.00	$435.43	Material cost varies from $250 to $500, depending on pump size (based on an online retail scan of these systems (2010))
	Upgrade, Installation ($)	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	Assuming 2 hours of labour @ $60/hr
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$570.00	$570.00	$570.00	$470.00	$470.00	$470.00	$470.00	$470.00	$555.43	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	18	18	18	18	18	18	18	18	18	High lifetime assumed since the systems are fairly simple (i.e. lifetime of a pump is fairly high)
	Baseline (yrs.)	-	-	-	-	-	-	-	-	-	
Cost Savings ($/yr.)		$27	$27	$27	$23	$23	$23	$23	$23	$26	
Simple Payback (yrs.)		21.1	21.1	21.1	20.7	20.7	20.7	20.0	20.0	21.05	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$288	$288	$288	$243	$243	$243	$250	$250	$281	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$282	-$282	-$282	-$227	-$227	-$227	-$220	-$220	-$274	
Benefit/Cost Ratio		0.50	0.50	0.50	0.52	0.52	0.52	0.53	0.53	0.51	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	1	1	16.0%	16.0%	16.0%	16.0%	16.0%	16.0%	16.0%	16.0%	16.0%	Oak Ridge National Laboratory, "Water and Energy Savings using Demand Hot Water Recirculating Systems in Residential Homes: A Case Study of Five Homes in Palo Alto, California", Sept. 2002, suggests 16-32% savings on DHW. Lower end assumed since very little research is available on these devices and savings are uncertain.
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	

Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	**Sub End Use/Equipment (If Applicable)**	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
		Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	16.0%	16.0%	16.0%	16.0%	16.0%	16.0%	16.0%	16.0%	16.0%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, NORTHERN INTERIOR - NATURAL GAS EFFICIENCY

Back to Index

High-Efficiency (ENERGY STAR®) Dishwashers

		References/Notes
Description:	ENERGY STAR® dishwashers save energy by using improved technology for the primary wash cycle and by using less hot water to clean. Features include more effective washing action, energy-efficient motors, and sensors that determine the length of the wash cycle and the temperature of the water necessary to clean the dishes. In addition, some advanced dishwashers can sense and adjust for the amount of soil on dishes, using only as much water as necessary. These savings affect both the energy used for heating the water and the mechanical energy of the dishwasher.	
Baseline:	A standard-sized new dishwasher	Link to bulletin on performance standards (new standards took effect on Jan. 1, 2010).
Upgrade:	An ENERGY STAR® certified, standard-sized new dishwasher	ENERGY STAR® standard for dishwashers to improve to 307 kWh/yr by July 1, 2011 (assumed here)

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.015	$1.015	$1.015	$1.015	$1.015	$1.015	$1.015	$1.015
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.073	$0.073	$0.073	$0.073	$0.073	$0.073	$0.073	$0.073
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	75	75	75	58	58	58	60	60	73	
	Natural Gas (MJ/yr.)	2,063	2,063	2,063	1,742	1,742	1,742	1,796	1,796	2,019	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	65	65	65	50	50	50	52	52	63	
	Natural Gas (MJ/yr.)	1,784	1,784	1,784	1,507	1,507	1,507	1,553	1,553	1,746	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	10	10	10	8	8	8	8	8	10	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	278	278	278	235	235	235	242	242	273	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$395.00	$395.00	$395.00	$395.00	$395.00	$395.00	$395.00	$395.00	$395.00	Incr. cost of $45 indicated in OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 34, January 2010.
	Upgrade, Installation ($)	$60.00	$60.00	$60.00	$60.00	$60.00	$60.00	$60.00	$60.00	$60.00	Assuming 1 hour of labour @ $60/hr
	Baseline, Material ($)	$350.00	$350.00	$350.00	$350.00	$350.00	$350.00	$350.00	$350.00	$350.00	Based on a retail scan of dishwashers offered by Sears (lowest cost models by reliable manufacturers) (2010)
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Assuming 1 hour of labour @ $60/hr
	Total Measure Cost ($)	$105.00	$105.00	$105.00	$105.00	$105.00	$105.00	$105.00	$105.00	$105.00	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	11	11	11	11	11	11	11	11	11	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 34, January 2010.
	Baseline (yrs.)	11	11	11	11	11	11	11	11	11	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 34, January 2010.
Cost Savings ($/yr.)		$4	$4	$4	$3	$3	$3	$3	$3	$3	
Simple Payback (yrs.)		29.4	29.4	29.4	35.6	35.6	35.6	34.5	34.5	30.28	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$10	$10	$10	$8	$8	$8	$8	$8	$10	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$20	$20	$20	$17	$17	$17	$18	$18	$20	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$75	-$75	-$75	-$80	-$80	-$80	-$79	-$79	-$75	
Benefit/Cost Ratio		0.29	0.29	0.29	0.24	0.24	0.24	0.25	0.25	0.28	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	1	1	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%		
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	1	1	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	ENERGY STAR® standard for dishwashers to improve to 307 kWh/yr by July 1, 2011
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	

Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	1	1	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	1	1	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, NORTHERN INTERIOR - NATURAL GAS EFFICIENCY

Back to Index

High-Efficiency (ENERGY STAR®) Clothes Washers

		References/Notes
Description:	In January 2011, the ENERGY STAR® standard for clothes washers will be increased once again. As a result, very few top loading washers will meet ENERGY STAR® requirements. Instead, the overwhelming majority of ENERGY STAR® models will be front loading (horizontal axis) models. Compared to standard models, front loading washing machines use less hot water, less mechanical energy, and result in dryer energy savings due to faster spin cycle speeds.	
Baseline:	A standard 3.2 cu. ft. (90.6 L) top loading clothes washer	Link to minimum energy performance standards, which took effect on Jan. 1, 2007. Note: Top loading washer assumed since very few front loading models do not meet ENERGY STAR requirements
Upgrade:	An ENERGY STAR® certified, 3.2 cu. ft. (90.6 L) front loading clothes washer	Link to ENERGY STAR® standards -- new standards to take effect on Jan. 1, 2011

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.179	$1.179	$1.179	$1.179	$1.179	$1.179	$1.179	$1.179
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/m^3)	$0.010	$0.088	$0.088	$0.088	$0.088	$0.088	$0.088	$0.088	$0.088
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	64	64	64	48	48	48	51	51	62	
	Natural Gas (MJ/yr.)	7,206	7,206	7,206	6,282	6,282	6,282	6,562	6,562	7,084	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	40	40	40	30	30	30	32	32	39	
	Natural Gas (MJ/yr.)	4,539	4,539	4,539	3,958	3,958	3,958	4,134	4,134	4,463	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	24	24	24	18	18	18	19	19	23	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	2,666	2,666	2,666	2,324	2,324	2,324	2,428	2,428	2,621	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 25, January 2010.
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Material ($)	$450.00	$450.00	$450.00	$450.00	$450.00	$450.00	$450.00	$450.00	$450.00	Based on a scan of non-ENERGY STAR top-loading models available from various retailers (Note: Current ENERGY STAR models may not meet new standards) (2010). Top loading washer assumed since very few front loading models do not meet ENERGY STAR requirements.
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$300.00	$300.00	$300.00	$300.00	$300.00	$300.00	$300.00	$300.00	$300.00	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	14	14	14	14	14	14	14	14	14	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 24, January 2010.
	Baseline (yrs.)	14	14	14	14	14	14	14	14	14	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 24, January 2010.
Cost Savings ($/yr.)		$28	$28	$28	$24	$24	$24	$25	$25	$28	
Simple Payback (yrs.)		10.7	10.7	10.7	12.4	12.4	12.4	11.8	11.8	10.90	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$28	$28	$28	$21	$21	$21	$22	$22	$27	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$234	$234	$234	$204	$204	$204	$213	$213	$230	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$38	-$38	-$38	-$75	-$75	-$75	-$65	-$65	-$43	
Benefit/Cost Ratio		0.87	0.87	0.87	0.75	0.75	0.75	0.78	0.78	0.86	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	1	1	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	Link to ENERGY STAR® standards -- new standards to take effect on Jan. 1, 2011 (these stds assumed)
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	1	1	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	Assuming water savings increase is approx. proportional to increase in mechanical energy savings with new standards (DHW savings included in MEF (Modified Energy Factor)).
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	1	1	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	Savings due to higher spin speeds (dryer savings are incorporated into MEF (Modified Energy Factor)). Assuming savings are proportional to the mechanical energy savings.
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	

Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	1	1	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	6.7%	6.7%	6.7%	6.7%	6.7%	6.7%	6.7%	6.7%	6.7%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	1	1	20.4%	20.4%	20.4%	20.4%	20.4%	20.4%	20.4%	20.4%	20.4%	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

High-Efficiency Gas Clothes Dryers

Not used--moisture sensors have become common.

		References/Notes
Description:	The major distinction with energy-efficient gas clothes dryer models is that they incorporate termination controls to sense dryness and turn off automatically. The most efficient models have moisture sensors in the drum for sensing dryness, while other lower-cost and slightly less efficient models infer dryness by sensing the temperature of the exhaust air. The majority of the retail models currently available employ some type of dryness sensing technology but it is unclear how often these controls are used by homeowners.	
Baseline:	A gas clothes dryer with a temperature sensor	
Upgrade:	A gas clothes dryer with a moisture sensor. This option is no longer valid because almost all new gas dryers have moisture sensors.	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$500.00	$500.00	$500.00	$500.00	$500.00	$500.00	$500.00	$500.00	$500.00	Based on a retail scan of low-cost gas dryers with moisture sensors (2009)
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Material ($)	$450.00	$450.00	$450.00	$450.00	$450.00	$450.00	$450.00	$450.00	$450.00	Based on a retail scan of low-cost gas dryers without moisture sensors (2009)
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	18	18	18	18	18	18	18	18	18	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 58, January 2010.
	Baseline (yrs.)	18	18	18	18	18	18	18	18	18	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 58, January 2010.
Cost Savings ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Simple Payback (yrs.)		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$50	-$50	-$50	-$50	-$50	-$50	-$50	-$50	-$50	
Benefit/Cost Ratio		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	Savings for moisture sensor relative to temperature sensor, according to Citizen Gas, "Buyer's Guide: Natural Gas Clothes Dryers"
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	

Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Insulating Pool Covers

		References/Notes
Description:	Between 30% and 50% of the heat loss from a swimming pool is due to evaporation. In an outdoor pool, this heat loss either adds to the cost of heating the pool or shortens the swimming season. Evaporation also increases the quantity of chemicals that must be added to the pool. A pool cover can reduce evaporation and other heat losses but can also reduce heat gains depending on the design. An insulating vinyl pool cover is assumed for this analysis. Although substantially more expensive than the bubble type covers, insulating vinyl pool covers are much more robust and, thus, have much longer lifetimes. They are also more effective at trapping heat.	In SaskPower
Baseline:	A pool with no insulating cover	
Upgrade:	Installing a pool cover to reduce the heat loss from a heated pool	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	23,096	23,096	23,096	23,096	23,096	23,096	23,096	23,096	23,096	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	15,397	15,397	15,397	15,397	15,397	15,397	15,397	15,397	15,397	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$1,200.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00	Based on quotes from suppliers for a 50 m^2 pool with a manual reel. Cost also used in several previous studies, particularly TG 2005, when this cost was endorsed by TG staff.
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Installation cost included above
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$1,200.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	10	10	10	10	10	10	10	10	10	Reasonable lifetime assumed
	Baseline (yrs.)	-	-	-	-	-	-	-	-	-	
Cost Savings ($/yr.)		$151	$151	$151	$151	$151	$151	$151	$151	$151	
Simple Payback (yrs.)		8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	7.95	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$1,031	$1,031	$1,031	$1,031	$1,031	$1,031	$1,031	$1,031	$1,031	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$169	-$169	-$169	-$169	-$169	-$169	-$169	-$169	-$169	
Benefit/Cost Ratio		0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	1	1	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	CanREN, "How Can I best Manage My Pool's Energy Use?", 2002., mid range of 30-50% savings estimate used
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	

Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	1	1	26.4%	26.4%	26.4%	26.4%	26.4%	26.4%	26.4%	26.4%	26.4%	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, NORTHERN INTERIOR - NATURAL GAS EFFICIENCY

Back to Index

Heat Pump Pool Heaters

Not used--this is a fuel-switching measure.

		References/Notes
Description:	Air source heat pumps can be used to replace electric or gas-fired pool heaters. The principal of operation for these types of heat pumps is very similar to refrigerators and air conditioning units, in that they are used to transfer heat from one place to another. This allows them to be significantly more efficient than electric or gas-fired pool heaters, since these types of heaters generate heat rather than transferring it.	
Baseline:	A standard efficiency gas-fired pool heater	
Upgrade:	A heat pump pool heater. This option is not valid in this study because it is a fuel-switching measure.	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/m^3)	$0.010	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☑	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☑	Mobile (Existing) ☑	Mobile (New) ☑	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Nat. Gas (m3/yr.)	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	Approximate cost of an 80,000 BTU heat pump pool heater, based on a scan of models available from online retailers
	Upgrade, Installation ($)	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	Assuming 2 hours of labour @ $60/hr
	Baseline, Material ($)	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	Based on Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-81, April 16, 2009.
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Included in cost above
	Total Measure Cost ($)	$524.65	$524.65	$524.65	$524.65	$524.65	$524.65	$524.65	$524.65	$524.65	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	Assuming no incremental O&M
Lifetimes	Upgrade (yrs.)	10	10	10	10	10	10	10	10	10	Lifetime based on a US DOE website on heat pump pool heaters
	Baseline (yrs.)	7	7	7	7	7	7	7	7	7	US DOE suggests lifetime of 5 years or longer.
Cost Savings ($/yr.)		$377	$377	$377	$377	$377	$377	$377	$377	$377	
Simple Payback (yrs.)		1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.39	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$2,578	$2,578	$2,578	$2,578	$2,578	$2,578	$2,578	$2,578	$2,578	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		$2,053	$2,053	$2,053	$2,053	$2,053	$2,053	$2,053	$2,053	$2,053	
Benefit/Cost Ratio		4.91	4.91	4.91	4.91	4.91	4.91	4.91	4.91	4.91	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	This is where electricity increase would go, in fuel switching analysis.

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	1	1	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	Heat pump pool heater replaces all gas use for pool heating
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	

Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	1	1	66.1%	66.1%	66.1%	66.1%	66.1%	66.1%	66.1%	66.1%	66.1%	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

High-Efficiency Gas-Fired Pool Heaters

		References/Notes
Description:	High-efficiency pool heaters incorporate advanced heat exchangers, forced draft combustion systems, pilot-less ignitions and innovations in hydraulics, which results in performance efficiencies that range between 90% and 95%, compared to efficiencies of 80% to 85% for standard models.	
Baseline:	A standard efficiency gas-fired pool heater (82.5% efficiency assumed)	
Upgrade:	A high efficiency gas-fired pool heater (92.5% efficiency assumed)	

Baseline Reference:	1. Annual consumption, end use
Heating Fuel Type:	All Fuels (Average Fuel Mix)
Main End Use:	Space Heating
Discount Rate:	7.38%
GHG Adder Incl.?	No
Resource Costs:	Baseload

= User Input
= Calculation

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$0.733	$0.733	$0.733	$0.733	$0.733	$0.733	$0.733	$0.733
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/m^3)	$0.010	$0.048	$0.048	$0.048	$0.048	$0.048	$0.048	$0.048	$0.048
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☑	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☑	Mobile (Existing) ☑	Mobile (New) ☑	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	34,259	34,259	34,259	34,259	34,259	34,259	34,259	34,259	34,259	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Nat. Gas (m3/yr.)	4,234	4,234	4,234	4,234	4,234	4,234	4,234	4,234	4,234	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$2,900.00	$2,900.00	$2,900.00	$2,900.00	$2,900.00	$2,900.00	$2,900.00	$2,900.00	$2,900.00	Personal communication with Jandy pool heater manufacturers, 2008<-- consider updating
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	installation costs included above
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Cost of upgrade is incremental cost
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	installation costs included above
	Total Measure Cost ($)	$2,900.00	$2,900.00	$2,900.00	$2,900.00	$2,900.00	$2,900.00	$2,900.00	$2,900.00	$2,900.00	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Set to incremental since cost above is incremental
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	7	7	7	7	7	7	7	7	7	US DOE suggests lifetime of 5 years or longer for a conventional heater. No evidence that high efficiency lifetimes are different.
	Baseline (yrs.)	7	7	7	7	7	7	7	7	7	US DOE suggests lifetime of 5 years or longer.
Cost Savings ($/yr.)		$41	$41	$41	$41	$41	$41	$41	$41	$41	
Simple Payback (yrs.)		69.9	69.9	69.9	69.9	69.9	69.9	69.9	69.9	69.89	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$204	$204	$204	$204	$204	$204	$204	$204	$204	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$2,696	-$2,696	-$2,696	-$2,696	-$2,696	-$2,696	-$2,696	-$2,696	-$2,696	
Benefit/Cost Ratio		0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	1	1	11.0%	11.0%	11.0%	11.0%	11.0%	11.0%	11.0%	11.0%	11.0%	Difference between energy use of 82.5% and 92.5% heaters.
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	

Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	1	1	7.3%	7.3%	7.3%	7.3%	7.3%	7.3%	7.3%	7.3%	7.3%	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Solar Pool Heaters

		References/Notes
Description:	Unlike other types of solar hot water systems, solar pool heaters do not include storage tanks or heat exchangers, and, since they are only used in warmer weather, they generally employ unglazed solar collectors that are composed of a polymer. These collectors are mounted of the roofs of homes or in an unshaded part of the yard. The heat transfer fluid is usually pool water that is pumped directly into the array of collectors and flows within the polymer in a serpentine array in order to pick up heat. Although solar DHW systems do require a pump, its consumption is similar to that used in electric and gas-fired pool heaters. Solar pool heaters can completely offset the energy requirements of conventional pool heaters. And, since they are much simpler than solar DHW systems, they are also much more affordable.	
Baseline:	A standard efficiency gas-fired pool heater	
Upgrade:	A solar pool heater with an unglazed collector	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$3,450.00	$3,450.00	$3,450.00	$3,450.00	$3,450.00	$3,450.00	$3,450.00	$3,450.00	$3,450.00	Based on Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-81, April 16, 2009.
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Installation costs included above
	Baseline, Material ($)	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	Based on Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-81, April 16, 2009.
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Installation costs included above
	Total Measure Cost ($)	$3,450.00	$3,450.00	$3,450.00	$3,450.00	$3,450.00	$3,450.00	$3,450.00	$3,450.00	$3,450.00	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	20	20	20	20	20	20	20	20	20	Based on Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-81, April 16, 2009.
	Baseline (yrs.)	7	7	7	7	7	7	7	7	7	US DOE suggests lifetime of 5 years or longer.
Cost Savings ($/yr.)		$377	$377	$377	$377	$377	$377	$377	$377	$377	
Simple Payback (yrs.)		9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.15	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$4,301	$4,301	$4,301	$4,301	$4,301	$4,301	$4,301	$4,301	$4,301	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		$851	$851	$851	$851	$851	$851	$851	$851	$851	
Benefit/Cost Ratio		1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	1	1	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	

Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	**Sub End Use/Equipment (If Applicable)**	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
		Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	1	1	66.1%	66.1%	66.1%	66.1%	66.1%	66.1%	66.1%	66.1%	66.1%	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, NORTHERN INTERIOR - NATURAL GAS EFFICIENCY

Back to Index

Micro-Combined Heat and Power (CHP)

		References/Notes
Description:	Several types of micro-combustion heat and power (micro CHP) systems are either available or under development. These units all generate electrical power and capture the resulting "waste" heat for space and/or water heating. Reciprocating engine units such as the Honda Freewatt use a well-developed technology and can be scaled to a residential size. Power generate efficiencies range from 20-40% and up to 90% of the waste heat can be captured. Various sizing and control strategies can be used: for example, the amount of heat can be maximized or the amount of electricity can be maximized. This example assumes a unit such as the Honda Freewatt hydronic system, which has a 1.2 kW maximum electrical output and a 3.5 kW thermal output. Heat load following control is assumed to avoid fuel-switching, however power load following control is usually more economically attractive for applications involving seasonally varying loads. A back-up boiler is included in the Honda Freewatt package. Net-metering is assumed.	
Baseline:	Condensing gas-fired boiler (92% AFUE)	
Upgrade:	Installing a microturbine system in an average home, offsetting both the electric consumption from the grid and the amount of space and water heating that must be provided by a boiler. Note that this technology is not currently available in Canada.	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)								
Electricity ($/kWh)	$0.083	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	
Natural Gas ($/m^3)	$0.010	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-2,000	-2,000	-2,000	-2,000	-2,000	-2,000	-2,000	-2,000	-2,000	
	Natural Gas (m3/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Nat. Gas (m3/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$13,000.00	$13,000.00	$13,000.00	$13,000.00	$13,000.00	$13,000.00	$13,000.00	$13,000.00	$13,000.00	Cost is anecdotal, gleaned from websites. Waiting for confirmation from Honda. This technology is not available in Canada and is not expected to be soon.
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Above cost includes installation
	Baseline, Material ($)	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	Cost is base case cost of 82 AFUE boiler. Update if base case for condensing boiler is updated.
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Above cost includes installation
	Total Measure Cost ($)	$8,000.00	$8,000.00	$8,000.00	$8,000.00	$8,000.00	$8,000.00	$8,000.00	$8,000.00	$8,000.00	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	20	20	20	20	20	20	20	20	20	Lifetime not well established--lifetime of base case boiler assumed.
	Baseline (yrs.)	20	20	20	20	20	20	20	20	20	
Cost Savings ($/yr.)		$166	$166	$166	$166	$166	$166	$166	$166	$166	
Simple Payback (yrs.)		48.3	48.3	48.3	48.3	48.3	48.3	48.3	48.3	48.31	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$2,837	$2,837	$2,837	$2,837	$2,837	$2,837	$2,837	$2,837	$2,837	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$5,163	-$5,163	-$5,163	-$5,163	-$5,163	-$5,163	-$5,163	-$5,163	-$5,163	
Benefit/Cost Ratio		0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	-1									-	RETSreen run indicates that mCHP delivers about 7200 MJ per year with heat following control

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	RETScreen run indicates heat load following strategy uses about the same amount of gas a 92 AFUE boiler would use.
Domestic Hot Water (DHW)	-	0	0										RETScreen run indicates heat load following strategy uses about the same amount of gas a 92 AFUE boiler would use.
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	

Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	-1	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

INDEX

Tab Name	Measure Description	Average B/C Ratio
HEATING: SHELL MEASURES		
Attic Insulation	Improving the attic insulation in an average home by RSI-3.5 (R-20), through the addition of cellulose insulation	0.73
Wall Insulation	Improving the wall insulation in an average home by RSI-1.76 (R-10) to RSI-4.2 (R-24)	0.70
Slab Insulation	The addition of slab (basement floor) insulation in homes with unfinished basements. It is assumed that 2" polystyrene rigid foam insulation (RSI-1.76 (R-10)) is being added.	0.07
Basement Insulation	In average homes with basements, improving the foundation wall insulation by RSI-2.12 (R-12)	0.69
Crawl Space Insul.	In homes with crawlspaces, the addition of crawlspace insulation to bring the thermal resistance values up to RSI-2.1 (R-12)	0.25
Air Sealing	A comprehensive air sealing job, which results in an air tightness (ACH @ 50 Pa) improvement of 30%	0.35
Homeowner Air Sealing	A homeowner air sealing job, which results in an air tightness (ACH @ 50 Pa) improvement of 15-20%	0.66
Sealing & Insul. - Old Homes	Improve both the attic insulation and the air tightness (ACH@50 Pa) in an old home. It is assumed that the air tightness is improved by 30% and that RSI-3.52 (R-20) of attic insulation is added.	0.44
ESTAR Windows	In existing homes, replacing 50% of windows with ENERGY STAR windows from Zone D (double-glazed, argon fill, low-e coating, insulating spacer, vinyl frame, hinged). In hew homes, replacing 100% of windows.	0.21
Super Windows	In existing homes, replacing 50% of windows with super high-performance windows (triple-glazed, krypton fill, low-e and insulating coatings, insulating spacer, fiberglass frame, hinged). In new homes, replacing all of the windows with super high-performance windows.	0.59
HEATING: SHELL MEASURES (NEW HOMES)		
High-Perf. New Homes	A high-performance new home (EGH rating of 80 assumed). This option no longer applies as EGH of 80 is now the minimum.	0.00
Net Zero Ready Homes	A net-zero energy ready home (EGH rating of 86 assumed)	0.21
HEATING: EQUIPMENT		
Condensing Gas Furnaces	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 96%	0.21
Early Retire Gas Furnaces	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 90%	0.23
Condensing Gas Boilers	A condensing natural gas boiler (92% AFUE assumed)	0.18
Gas Fireplaces	A high efficiency natural gas fireplace (80% assumed)	2.50
Prog. Thermostats	Programmable thermostat installed on central forced-air natural gas furnace and electric space cooling system	5.94
Solar Make-Up Air	A 10 m2 solar pre-heated make-up air system, located on the south side of a home	0.14
HRVs	A high-efficiency heat recovery ventilator (HRV) (sensible efficiency of approximately 85%), in a home with central heating and cooling	0.35
Air Heat Pumps	A gas-fired air-source heat pump. This option is not valid because these units are not available in residential sizes.	0.00
Ground Heat Pumps	A gas-fired ground-source heat pump. This option is not valid because these units are not available in residential sizes.	0.00
Heating & DHW	An integrated heating and DHW system, with a condensing furnace (AFUE of 94), a condensing natural gas water heater (EF of 0.80 assumed), and an HRV with an efficiency similar to that in the base case (72%).	0.12
Heating & DHW (Hydronic)	An integrated heating and DHW system, with a condensing boiler (AFUE 92.7), a condensing natural gas water heater (EF of .85) and an HRV with an efficiency similar to that in the base case (72%).	0.24
WATER HEATING		
Condensing Gas DHW	A condensing natural gas water heater (EF of 0.80 assumed)	0.21
Tankless Gas DHW	A tankless natural gas hot water heater (EF of 0.82 assumed)	0.30
Solar DHW	Solar DHW systems use the energy of the sun to heat water. The primary components of a solar water heating system are a solar collector, a heat transfer fluid and a well-insulated storage tank. Due to Canada's colder climate and the higher likelihood of	0.17
DHW Tank Insulation	An insulating blanket installed on a hot water storage tank to reduce standby losses	0.68
DHW Pipe Insulation	Installing pipe insulation on the first meter of piping leading out of a hot water storage tank	13.00
DHW Heat Traps	Installing an external "S-type" pre-bent copper pipe heat trap on an gas-fired storage hot water heater. This option no longer applies because most new hot water heaters include an integrated heat trap.	0.00
Showerheads	An ultra low-flow showerhead with a 1.25 GPM (4.75) flow rate	7.34
Faucet Aerators	A 1.5 GPM (5.7 LPM) faucet aerator installed on the kitchen faucet	3.84
Wastewater Heat Recovery	A 60" wastewater heat recovery system	0.35
DHW Recirculation	A home with a DHW recirculation system installed on the point-of-use farthest away from the hot water tank	0.44
APPLIANCES		
ESTAR Dishwashers	An ENERGY STAR® certified, standard-sized new dishwasher	0.26
ESTAR Clothes Washers	An ENERGY STAR® certified, 3.2 cu. ft. (90.6 L) front loading clothes washer	0.77
Gas Clothes Dryers	A gas clothes dryer with a moisture sensor. This option is no longer valid because almost all new gas dryers have moisture sensors.	0.00
OTHER		
Pool Covers	Installing a pool cover to reduce the heat loss from a heated pool	0.86
Heat Pump Pool Heaters	A heat pump pool heater. This option is not valid in this study because it is a fuel-switching measure.	4.91
Efficient Pool Heaters	A high efficiency gas-fired pool heater (92.5% efficiency assumed)	0.07
Solar Pool Heaters	A solar pool heater with an unglazed collector	1.25
Micro-CHP	Installing a microturbine system in an average home, offsetting both the electric consumption from the grid and the amount of space and water heating that must be provided by a boiler. Note that this technology is not currently available in Canada.	0.35

Measure Name	Basis (Full/ Incremental)	Weighted Average	
		B/C Ratio	Measure TRC ($)
DHW Pipe Insulation	Full	13.00	$8
Ultra Low-Flow Showerheads	Full	7.34	$82
Programmable Thermostats (Central Heating and Cooling)	Full	5.94	$247
Faucet Aerators	Full	3.84	$43
Solar Pool Heaters	Full	1.25	$851
Insulating Pool Covers	Full	0.86	-$169
Attic Insulation	Full	0.73	-$183
DHW Tank Insulation	Full	0.68	-$11
Homeowner Air Sealing/Weather Stripping/Caulking	Full	0.66	-$116
DHW Recirculation Systems (e.g. Metlund D'MAND®)	Full	0.44	-$311
Air Leakage Sealing and Insulation (Old Homes)	Full	0.44	-$1,802
Professional Air Sealing/Weather Stripping/Caulking	Full	0.35	-$1,308
Wastewater Heat Recovery Systems	Full	0.35	-$515
Crawl Space Insulation	Full	0.25	-$604
Net-Zero Ready Energy Homes	Full	0.21	-$10,378
Active Solar Water Heating Systems	Full	0.17	-$5,815
Solar Pre-Heated Make-Up Air Systems (e.g., SolarWall®)	Full	0.14	-$1,124
High-Performance Homes (EGH 80/R2000/ENERGY STAR®)	Full	0.00	-$5,538
High Efficiency Gas Fireplaces	Incr.	2.50	$225
High-Efficiency (ENERGY STAR®) Clothes Washers	Incr.	0.77	-$69
Wall Insulation	Incr.	0.70	-$578
Basement (Foundation) Insulation	Incr.	0.69	-$441
Super High-Performance Windows	Incr.	0.59	-$1,189
Micro-Combined Heat and Power (CHP)	Incr.	0.35	-$5,163
High Efficiency Heat Recovery Ventilators (HRVs)	Incr.	0.35	-$390
Point-of-Use (Tankless) Water Heaters (Gas)	Incr.	0.30	-$1,388
High-Efficiency (ENERGY STAR®) Dishwashers	Incr.	0.26	-$78
Integrated Heating and DHW (Hydronic Heating)	Incr.	0.24	-$4,432
Early Retirement of Existing Gas Furnaces	Incr.	0.23	-$1,431
Zoned-Up Windows: (ENERGY STAR®) Rating for a Colder Zone	Incr.	0.21	-$1,427
Condensing Gas Water Heaters	Incr.	0.21	-$1,049
High Efficiency Condensing Gas Furnaces	Incr.	0.21	-$1,168
Condensing Gas Boilers	Incr.	0.18	-$2,629
Integrated Heating and DHW (Forced Air Heating)	Incr.	0.12	-$5,384
Slab Insulation (Unfinished Basements)	Incr.	0.07	-$1,125
High-Efficiency Gas-Fired Pool Heaters	Incr.	0.07	-$2,696

Back to Index

Tab Name	Measure Name (Full)	General Measure Description	Baseline Description	Upgrade Description	
Attic Insulation	Attic Insulation	Insulation levels can be increased in attics by blowing insulation into the attic spaces to fill and cover the space within the roof frame. One technique is to make sure loose-fill or batt insulation fills the attic floor joists fully and then add an additional layer of unfaced fibreglass batt insulation across the joists. To reduce cost, it is also possible to blow in cellulose insulation on top of the existing insulation instead.	A home with average insulation in the attic	Improving the attic insulation in an average home by RSI-3.5 (R-20), through the addition of cellulose insulation	Cool
Wall Insulation	Wall Insulation	It can be challenging to retrofit wall insulation in existing homes since the inside surfaces of the exterior walls are already finished. It is sometimes possible to add insulation to a wall by blowing insulating materials into the wall cavity, if sufficient space exists. Alternatively, if the siding is old and due for replacement, rigid foam insulation can be added before the new siding is installed. In this situation, it would also be quite cost-effective to install a more effective vapour and air barrier (e.g., Dupont Tyvek®) to reduce the amount of air leakage through the walls.	A home with average wall insulation	Improving the wall insulation in an average home by RSI-1.76 (R-10) to RSI-4.2 (R-24)	Cool
Slab Insulation	Slab Insulation (Unfinished Basements)	Insulation can be added both under and on top of basement slab floors. However, in existing homes, only the latter is practical. It is assumed that additional insulation is added to the slab floor while the basement is being finished. This can be done by purchasing insulated subfloor panels or laying down extruded polystyrene rigid foam insulation.	Homes with unfinished basements	The addition of slab (basement floor) insulation in homes with unfinished basements. It is assumed that 2" polystyrene rigid foam insulation (RSI-1.76 (R-10)) is being added.	Cool
Basement Insulation	Basement (Foundation) Insulation	In many homes, the basement is often under-insulated or even left uninsulated. Increasing the insulation level in basements can be achieved in a number of ways, including constructing a new insulated frame wall, moving the existing frame wall to increase the insulation level, adding extra insulation to the existing frame wall, adding rigid board insulation to the exterior of the foundation, or using a combination of interior and exterior rigid board insulation. As a lower cost alternative, it is also possible to use polyurethane foam	A home with average insulation in the basement (foundation) walls	In average homes with basements, improving the foundation wall insulation by RSI-2.12 (R-12)	Cool
Crawl Space Insul.	Crawl Space Insulation	Insulation levels remain below code in many homes that include crawlspaces as part of the basement design. If the floor is exposed, it would first be necessary to install a vapour barrier (e.g., 6 mil (600 gauge/0.15 mm) polyurethane barrier). Polyurethane foam could then be applied to the ceiling of the crawlspace (or the outer walls if there are pipes running below the floor). In addition to increasing the insulation of the crawlspace, this would help to eliminate any air leaks. Co-benefits of improved crawlspace insulation include improved thermal comfort, fewer drafts, and less condensation.	Minimal crawlspace insulation in homes with crawlspaces	In homes with crawlspaces, the addition of crawlspace insulation to bring the thermal resistance values up to RSI-2.1 (R-12)	Cool
Air Sealing	Professional Air Sealing/Weather Stripping/Caulking	Air leakage sealing of building envelopes includes completion of a blower door test to quantify leakage levels and to identify the location of air leaks. Generally, major leakage occurs at window-to-wall interfaces, around doors (especially patio doors), through electrical and plumbing penetrations and at the top of foundation walls. Installation of sealant and gaskets are generally accepted methods for reducing air leakage in buildings. Other sources of air leaks include pot lights, wall-to-floor interfaces (i.e., top and bottom of baseboards) and bathroom and kitchen exhaust piping.	No action taken	A comprehensive air sealing job, which results in an air tightness (ACH @ 50 Pa) improvement of 30%	Cool
Homeowner Air Sealing	Homeowner Air Sealing/Weather Stripping/Caulking	Homeowner air leakage sealing does not include a blower door test to quantify leakage levels and to identify the location of air leaks. Homeowners are likely to identify leakage primarily in more visible areas of the envelope, for example, the major leakage at window-to-wall interfaces, around doors (especially patio doors), through electrical and plumbing penetrations and perhaps at the top of foundation walls. Installation of weather stripping, sealant and gaskets are the most likely methods to be used. Less visible sources of air leaks such as pot lights, wall-to-floor interfaces (i.e., top and bottom of baseboards), bathroom and kitchen exhaust piping, and leaks from the top of walls into the attic are less likely to be addressed by the homeowner	No action taken	A homeowner air sealing job, which results in an air tightness (ACH @ 50 Pa) improvement of 15-20%	Cool
Sealing & Insul. - Old Homes	Air Leakage Sealing and Insulation (Old Homes)	This measure is targeted at homes that are at least 30 years old, since many of these homes haven't had any work done to improve insulation and air-sealing deficiencies and it is generally most cost-effective to upgrade the insulation and the air sealing at the same time. This includes wall, attic, foundation, and crawlspace retrofits of older homes but, for the purposes of this analysis, it is assumed that a retrofit is being conducted on the attic. The air-sealing portion of the work could be accomplished by segmenting the attic. In each segment, the existing insulation could be moved to one side and polyurethane foam could be sprayed in (serves as an air sealant in addition to its insulating properties). It may also be necessary to install or refurbish top plates to prevent airflow into the attic through exterior wall cavities. Other considerations that would increase the cost of the air-sealing portion of the work and may be present in some homes include sealing pot lights and kitchen or bathroom exhaust piping. When completed, these measures would dramatically improve the air tightness of an older home. The attic insulation could subsequently be cost-effectively improved with cellulose insulation.	An older home with average air tightness and attic insulation (for that particular vintage)	Improve both the attic insulation and the air tightness (ACH@50 Pa) in an old home. It is assumed that the air tightness is improved by 30% and that RSI-3.52 (R-20) of attic insulation is added.	Cool
Zone Up Windows	Zoned-Up Windows: (ENERGY STAR®) Rating for a Colder Zone	High-performance windows incorporate a number of additional energy-saving features, including low-E (soft coating), insulating spacers, argon fill and low conductivity frames (which can be sliders, hinged or picture). These windows are certified based on their energy rating (ER), which is based on their tested energy performance, rather than on their specific combination of features. In this case, however, the Energy Star windows for a colder zone are specified instead of the Energy Star windows for the zone where the house is located - for example, Zone C Energy Star windows would be chosen for a house in Zone A. High-performance windows also provide occupant co-benefits, such as reduced interior noise, reduced air leakage, greater thermal comfort, and fewer condensation problems.	ENERGY STAR windows for Zone B (double glazed, argon fill, low-e coating, insulating spacer, vinyl frame, hinged)	In existing homes, replacing 50% of windows with ENERGY STAR windows from Zone D (double-glazed, argon fill, low-e coating, insulating spacer, vinyl frame, hinged). In hew homes, replacing 100% of windows.	Not cool
Super Windows	Super High-Performance Windows	In addition to low-E coating, argon fill and insulating spacers, super-high performance windows incorporate features such as triple glazing, transparent insulating films, and fibreglass frames.	Standard windows (double glazed, air fill, no coating, metal spacer, vinyl frame, slider with sash)	In existing homes, replacing 50% of windows with super high-performance windows (triple-glazed, krypton fill, low-e and insulating coatings, insulating spacer, fiberglass frame, hinged). In new homes, replacing all of the windows with super high-performance windows.	Cool
High-Perf. New Homes	High-Performance Homes (EGH 80/R2000/ENERGY STAR®)	There are several certification schemes for energy-efficient new homes that incorporate integrated design and multiple envelope measures. An EnerGuide for Houses (EGH) rating is a standard measure of a home's energy performance, calculated by a professional EGH advisor. The rating is based on information on the construction of the home and the results of a blower door test performed once the house has been built. The R2000 standard is one method of achieving an EGH 80 rating. However, R2000 homes are required to achieve an air tightness level of 1.5 ACH@50Pa, install a heat recovery ventilator (HRV), and meet other environmental requirements. This substantially increases the cost of the measure. The ENERGY STAR® for New Homes program has similar requirements and also requires that homes be rated EGH 80. Since these three high performance home standards all result in essentially the same energy performance, the costs assumed for the measure are those of the least expensive of the three. EGH 80 is the lowest cost, since it allows the builder the most flexibitility for achieving the energy performance.	An average new home (EGH rating of 76 assumed)	A high-performance new home (EGH rating of 80 assumed). This option no longer applies as EGH of 80 is now the minimum.	Cool
Net Zero Ready Homes	Net-Zero Ready Energy Homes	Net-zero energy homes (NZEH) produce at least as much energy as they consume. This is accomplished by incorporating on-site power generation, such as solar PV panels or small wind turbines, to offset electrical loads. However, the energy consumption of a NZEH is significantly lower, due to the addition of a wide array of energy efficiency features. Measures that are typically considered include increased insulation, super high-performance windows, ENERGY STAR® appliances, solar thermal space and/or water heating, heat pumps, and passive solar designs. This measure is designed to produce a highly efficient house that is ready to be turned into a NZEH with the addition of on-site renewable energy generation.	An average new home (Minimum EGH rating of 80 required)	A net-zero energy ready home (EGH rating of 86 assumed)	Cool
Condensing Gas Furnaces	High Efficiency Condensing Gas Furnaces	Federal legislation now requires that all residential furnaces meet the minimum performance standard of 90% AFUE . However, higher efficiency condensing furnaces are available. These furnaces include more advanced heat exchanger designs that extract more heat from the flue gases before they are exhausted.	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 90%	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 96%	Cool
Early Retire Gas Furnaces	Early Retirement of Existing Gas Furnaces	Federal legislation now requires that all residential furnaces meet the minimum performance standard of 90% AFUE . However, consumers with less efficient furnaces that still work may wait years before replacing them. Early retirement of existing furnaces that are still functional is an option. Energy savings only last until the old furnace would have been replaced, because after that the energy consumption of the base case and upgrade is the same. The consumer has the added peace of mind of having a new furnace that is less likely to break down in winter	Keep existing 77% efficient furnace until failure, assumed to be in 9 years; then replace with the same furnace as the upgrade	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 90%	Cool
Condensing Gas Boilers	Condensing Gas Boilers	High-efficiency condensing boilers feature advanced heat exchanger designs that extract more heat from the flue gases before they are exhausted. So much heat is extracted that the flue gases condense and must be discharged as a condensate rather than a gas. In retrofit applications where condensing boilers are replacing non-condensing units, it may be necessary to modify the radiating system. Otherwise, the units may not actually condense the flue gas and realize their full efficiency potential.	A non-condensing mid-efficiency natural gas boiler (82% AFUE assumed)	A condensing natural gas boiler (92% AFUE assumed)	Cool
Gas Fireplaces	High Efficiency Gas Fireplaces	All vented gas fireplaces sold in Canada must now be tested for their energy efficiency using the Canadian Standards Association CSA-P.4.1-02 standard if they are shipped across provincial lines. The energy-efficiency rating of the fireplace is printed on the EnerGuide label. EnerGuide does not set a minimum efficiency level, so savings are possible by using the EnerGuide label to choose the more efficient unit.	An average efficiency natural gas fireplace (60% assumed)	A high efficiency natural gas fireplace (80% assumed)	Cool
Prog. Thermostats	Programmable Thermostats (Central Heating and Cooling)	Digital programmable thermostats provide improved temperature setting accuracy and allow occupants to preset temperatures for various time periods. A 4ºC temperature setback is often assumed during night and unoccupied periods. However, utility studies have indicated that a lower average setback value should be used to reflect the fact that the thermostat's setback capabilities do not completely reflect how they are used. For example, some home occupants reliably set back manual thermostats while others do not use the setback features on their electronic thermostats.	Non-programmable thermostat installed on central forced-air natural gas furnace and electric space cooling system	Programmable thermostat installed on central forced-air natural gas furnace and electric space cooling system	Cool
Solar Make-Up Air	Solar Pre-Heated Make-Up Air Systems (e.g., SolarWall®)	Solar preheated ventilation systems preheat incoming ventilation air and reduce heat loss through the portion of the building shell covered by them. They consist of perforated steel or aluminum absorber sheets that are mounted vertically on a building's exterior surface and are ideally mounted on southerly facing walls, plus or minus 20 degrees. The dark coloured metal sheets that make up the system are mounted a small distance away from the building's surface, creating an air cavity. A negative pressure is created within the cavity by ventilation fans and air is drawn through small holes in the metal panels. On sunny winter days, these systems can raise incoming air temperatures by 25°C to 35°C. In summer months, ventilation air can be drawn directly from the outside through a bypass damper, while heated air is rejected through vents at the top of the air cavity. These systems are generally used in commercial and industrial applications but they have seen some limited residential use.	Homes with ducting and heat recovery ventilators (HRVs)	A 10 m2 solar pre-heated make-up air system, located on the south side of a home	Cool
HRVs	High Efficiency Heat Recovery Ventilators (HRVs)	Heat recovery ventilators (HRVs) are heat exchangers that are integrated into the centralized ventilation and exhaust systems of many newer homes. In the winter, they allow for incoming fresh air to be heated by outgoing stale air. Conversely, in homes with central air conditioning systems, they allow incoming fresh air to be cooled by outgoing stale air in the summer. High efficiency HRVs incorporate more effective heat exchangers. Some models also include desiccant wheels so that latent heat (i.e. humidity) can be transferred between the two air streams.	A standard-efficiency (sensible efficiency of approximately 70%) heat recovery ventilator (HRV), in a home with central heating and cooling	A high-efficiency heat recovery ventilator (HRV) (sensible efficiency of approximately 85%), in a home with central heating and cooling	Cool
Air Heat Pumps	Gas-Fired Air-Source Heat Pumps	Early gas-fired heat pumps, such as the York Triathlon, were unsuccessful due to their bulky size and poor quality design. A new generation of gas absorption heat pumps (GAHPs) is currently available through Robur, an Italian manufacturer. These systems can either be ground-source or air-source (i.e., the heat sink may be either an underground fluid loop or an above ground heat exchanger coil). Air-source systems are substantially less expensive since they don't require drilling to install underground fluid loops. However, they can also be much less efficient than ground-source versions since their efficiency is a function of outside air temperature. Commercial-sized GAHP systems have been available in Canada since mid-2007 but residential-sized systems are rare in North America. It is hoped that residential-sized units will become more available in Canada within the study period, but the current manufacturers do not have specific plans at this time. It is estimated that air-source systems can operate at temperatures as low as -29°C and have annual efficiencies of 105% in cold winter locations. In more moderate winter climates, an efficiency of up to 129% is advertised. Unlike electric heat pump systems, GAHPs do not require any auxiliary heating equipment. In addition, the lack of a mechanical compressor extends their lifetime and allows air-source systems to withstand more extreme temperatures.	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 90%	A gas-fired air-source heat pump. This option is not valid because these units are not available in residential sizes.	Cool

Ground Heat Pumps	Gas-Fired Ground-Source Heat Pumps	Early gas-fired heat pumps, such as the York Triathlon, were unsuccessful due to their bulky size and poor quality design. A new generation of gas absorption heat pumps (GAHPs) is currently available through Robur, an Italian manufacturer. These systems can either be ground-source or air-source (i.e., the heat sink may be either an underground fluid loop or an above ground heat exchanger coil). Air-source systems are substantially less expensive since they don't require drilling to install underground fluid loops. However, they can also be much less efficient than ground-source versions since their efficiency is a function of outside air temperature. Commercial-sized GAHP systems have been available in Canada since mid-2007 but residential-sized systems are not currently available outside of Europe. It is hoped that residential-sized units will become more available in Canada within the study period, but the current manufacturers do not have specific plans at this time. Ground-source GAHPs have efficiencies (COPs) ranging from 120% to 130% Unlike electric heat pump systems, GAHPs do not require any auxiliary heating equipment. In addition, the lack of a mechanical compressor extends their lifetime.	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 90%	A gas-fired ground-source heat pump. This option is not valid because these units are not available in residential sizes.	Cool
Heating & DHW	Integrated Heating and DHW (Forced Air Heating)	Integrated mechanical systems combine the most efficient technologies for residential space heating and domestic water heating into one package. For example, the Matrix system by NTI NY Thermal incorporates a condensing furnace, condensing boiler, condensing water heater and HRV all in one unit. Primary benefits of the integrated units include compact construction, lower cost of installation (only one set of gas, water and circulation connections are required), and lower installation and maintenance costs (once the technology is mature). Since the minimum performance standards for furnaces was brought up to 90% efficiency at the end of 2009, the base case system is a 90% efficient forced-air furnace and a standard efficiency natural gas tank-style water heater. With this baseline, the integrated system would offer little in the way of space heating savings, but it does still offer DHW savings because the integrated system would heat domestic water with	A 90% AFUE efficient forced-air condensing furnace, a standard efficiency natural gas tank-style water heater (EF of 0.62 or 0.64 assumed) and a standard efficiency HRV	An integrated heating and DHW system, with a condensing furnace (AFUE of 94), a condensing natural gas water heater (EF of 0.80 assumed), and an HRV with an efficiency similar to that in the base case (72%).	Cool
Heating & DHW (Hydronic)	Integrated Heating and DHW (Hydronic Heating)	Integrated mechanical systems combine the most efficient technologies for residential space heating and domestic water heating into one package. For example, the Matrix system by NTI NY Thermal incorporates a condensing furnace, condensing boiler, condensing water heater and HRV all in one unit. Primary benefits of the integrated units include compact construction, lower cost of installation (only one set of gas, water and circulation connections are required), and lower installation and maintenance costs (once the technology is mature). Water heating in the base case is assumed to be provided by a standard efficiency natural gas tank-style water heater (EF of 0.62 or 0.64), while space heating is provided by a non-condensing boiler, assumed to have an AFUE of 82% . The HRV in the base case is assumed to be of similar efficiency to the HRV in the	A non-condensing boiler with an AFUE of 82% and a standard efficiency natural gas tank-style water heater (EF of 0.62 or 0.64). An HRV of similar efficiency to the integrated unit (72%) is assumed.	An integrated heating and DHW system, with a condensing boiler (AFUE 92.7), a condensing natural gas water heater (EF of .85) and an HRV with an efficiency similar to that in the base case (72%).	Cool
Condensing Gas DHW	Condensing Gas Water Heaters	Condensing water heaters feature advanced heat exchanger designs that extract more heat from the flue gases before they are exhausted. So much heat is extracted that the flue gases condense and must be discharged as a condensate rather than a gas. As a result, the efficiency of these types of water heaters is significantly higher than standard water heaters.	A conventional storage natural gas hot water heater (EF of 0.62 or 0.64 assumed)	A condensing natural gas water heater (EF of 0.80 assumed)	Cool
Tankless Gas DHW	Point-of-Use (Tankless) Water Heaters (Gas)	Tankless water heaters heat water on demand, eliminating hot water storage. The absence of hot water storage reduces standby heat losses. The efficiency of tankless water heaters is generally improved by the addition of features such as modulating controls, electric spark ignitions and direct venting. The applicability of tankless gas-fired DHW systems is somewhat limited by venting constraints; the burner is significantly larger than for a standard water heater, so a larger vent is required. Some houses cannot accommodate the larger flue because of requirements for clearance from other structures, windows, etc.	A conventional storage natural gas hot water heater (EF of 0.60 assumed)	A tankless natural gas hot water heater (EF of 0.82 assumed)	Cool
Solar DHW	Active Solar Water Heating Systems	Solar DHW systems use the energy of the sun to heat water. The primary components of a solar water heating system are a solar collector, a heat transfer fluid and a well-insulated storage tank. Due to Canada's colder climate and the higher likelihood of freezing, active closed-loop systems are generally used. These systems use a pump to circulate a non-freezing heat transfer fluid through the collectors and then through a heat exchanger so that the thermal energy can be transferred to the water. Solar DHW are not generally sized to supply all of the annual requirement for water heating in the home, because if the system is sized for cloudy winter periods it will have enormous excess capacity during sunny summer periods, and will cost far too much to install. The system analyzed here meets approximately 2/3 of the annual requirements.	No solar water heating system installed	Solar DHW systems use the energy of the sun to heat water. The primary components of a solar water heating system are a solar collector, a heat transfer fluid and a well-insulated storage tank. Due to Canada's colder climate and the higher likelihood of	Cool
DHW Tank Insulation	DHW Tank Insulation	Pre-cut tank jackets/blankets (DHW tank insulation) are readily available and can be installed on hot water storage tanks to reduce standby heat losses. Caution is required to install blankets on gas water heaters, to avoid blocking the flue, the air intake to the burner, or the drain at the bottom. The thermostat should also remain uncovered.	No additional tank insulation installed on a conventional hot water storage tank	An insulating blanket installed on a hot water storage tank to reduce standby losses	Cool
DHW Pipe Insulation	DHW Pipe Insulation	Hot water pipe insulation reduces the distribution losses for DHW. In general, only the first one or two metres of pipe nearest the DHW tank are accessible enough to insulate. However, since the dominant loss is from the pipe transferring heat out of the tank and then losing it to the basement, the first meter of pipe is the most important and only worthwhile section of pipe to insulate. Insulating this section of piping affects both the delivery of hot water and the losses from the tank. Delivery temperature is slightly increased during a hot water draw, and the water in the piping does not lose its stored heat as quickly between draws	No insulation installed on the piping leading out of a hot water storage tank	Installing pipe insulation on the first meter of piping leading out of a hot water storage tank	Cool
DHW Heat Traps	DHW Heat Traps	This measure involves the installation of external "S-type" pre-bent copper pipe heat traps on both of the outlets ofwater heaters. This measure is only being considered during the installation of new tanks since it can be prohibitively expensive to bring in a plumber otherwise.	No heat trap installed on a new electric storage hot water heater	Installing an external "S-type" pre-bent copper pipe heat trap on an gas-fired storage hot water heater. This option no longer applies because most new hot water heaters include an integrated heat trap.	Cool
Showerheads	Ultra Low-Flow Showerheads	Ultra low-flow showerheads have aerators and flow restrictors to reduce water use. At 4.75 LPM (1.25 GPM), their flow rates are substantially lower than traditional low-flow fixtures, whose flow rates range between 7.6 LPM and 9.5 LPM (2.0-2.5 GPM).	A low-flow showerhead with a 2.0 GPM (7.6 LPM) flow rate (conservative estimate)	An ultra low-flow showerhead with a 1.25 GPM (4.75) flow rate	Cool
Faucet Aerators	Faucet Aerators	Aerators can easily be attached to most faucets to restrict the flow rate of water flowing from them. This can result in savings to both water consumption and DHW energy.	No faucet aerator installed on the kitchen faucet	A 1.5 GPM (5.7 LPM) faucet aerator installed on the kitchen faucet	Cool
Wastewater Heat Recovery	Wastewater Heat Recovery Systems	Residential wastewater heat recovery systems transfer the waste heat from drains to preheat make-up water. These systems work well only for DHW uses in which the hot water use and the draining of wastewater are simultaneous. Thus, in homes, application to anything other than showers is difficult. Heat recovery systems incorporate shell-and-tube heat exchangers that typically have efficiencies in the range of 40% to 55%, depending on factors such as design, material, overall length, and fluid flow rate.	No wastewater heat recovery system installed	A 60" wastewater heat recovery system	Cool
DHW Recirculation	DHW Recirculation Systems (e.g. Metlund D'MAND®)	When turning on the hot water tap, it often takes a long time before hot water begins to flow. DHW recirculation systems can be used to pump hot water to a faucet at the demand of a user, getting hot water to the fixture four to five times quicker than traditional systems. Water that is in the hot water lines is pumped back to the water heater either through the cold water lines or through a dedicated line. This pumping continues until the temperature of the hot water at the point of use reaches a specified value. In retrofit situations, this pumping system is generally installed at the faucet that is furthest away from the water heater and the system is enabled by remote activation from the other points of use. Along with improved convenience and water savings (since water isn't flushed down the drain), energy savings are achieved since the water that is pumped back to the water heater is generally warmer than city water. In addition, since the pump gets water to the fixture more quickly, there is an overall reduction of hot water use.	A home with no DHW recirculation system	A home with a DHW recirculation system installed on the point-of-use farthest away from the hot water tank	Cool
ESTAR Dishwashers	High-Efficiency (ENERGY STAR®) Dishwashers	ENERGY STAR® dishwashers save energy by using improved technology for the primary wash cycle and by using less hot water to clean. Features include more effective washing action, energy-efficient motors, and sensors that determine the length of the wash cycle and the temperature of the water necessary to clean the dishes. In addition, some advanced dishwashers can sense and adjust for the amount of soil on dishes, using only as much water as necessary. These savings affect both the energy used for heating the water and the mechanical energy of the dishwasher.	A standard-sized new dishwasher	An ENERGY STAR® certified, standard-sized new dishwasher	Cool
ESTAR Clothes Washers	High-Efficiency (ENERGY STAR®) Clothes Washers	In January 2011, the ENERGY STAR® standard for clothes washers will be increased once again. As a result, very few top loading washers will meet ENERGY STAR® requirements. Instead, the overwhelming majority of ENERGY STAR® models will be front loading (horizontal axis) models. Compared to standard models, front loading washing machines use less hot water, less mechanical energy, and result in dryer energy savings due to faster spin cycle speeds.	A standard 3.2 cu. ft. (90.6 L) top loading clothes washer	An ENERGY STAR® certified, 3.2 cu. ft. (90.6 L) front loading clothes washer	Cool
Gas Clothes Dryers	High-Efficiency Gas Clothes Dryers	The major distinction with energy-efficient gas clothes dryer models is that they incorporate termination controls to sense dryness and turn off automatically. The most efficient models have moisture sensors in the drum for sensing dryness, while other lower-cost and slightly less efficient models infer dryness by sensing the temperature of the exhaust air. The majority of the retail models currently available employ some type of dryness sensing technology but it is unclear how often these controls are used by homeowners	A gas clothes dryer with a temperature sensor	A gas clothes dryer with a moisture sensor. This option is no longer valid because almost all new gas dryers have moisture sensors.	Cool
Pool Covers	Insulating Pool Covers	Between 30% and 50% of the heat loss from a swimming pool is due to evaporation. In an outdoor pool, this heat loss either adds to the cost of heating the pool or shortens the swimming season. Evaporation also increases the quantity of chemicals that must be added to the pool. A pool cover can reduce evaporation and other heat losses but can also reduce heat gains depending on the design. An insulating vinyl pool cover is assumed for this analysis. Although substantially more expensive than the bubble type covers, insulating vinyl pool covers are much more robust and, thus, have much longer lifetimes. They are also more effective at trapping heat.	A pool with no insulating cover	Installing a pool cover to reduce the heat loss from a heated pool	Cool
Heat Pump Pool Heaters	Heat Pump Pool Heaters	Air source heat pumps can be used to replace electric or gas-fired pool heaters. The principal of operation for these types of heat pumps is very similar to refrigerators and air conditioning units, in that they are used to transfer heat from one place to another. This allows them to be significantly more efficient than electric or gas-fired pool heaters, since these types of heaters generate heat rather than transferring it.	A standard efficiency gas-fired pool heater	A heat pump pool heater. This option is not valid in this study because it is a fuel-switching measure.	Cool
Efficient Pool Heaters	High-Efficiency Gas-Fired Pool Heaters	High-efficiency pool heaters incorporate advanced heat exchangers, forced draft combustion systems, pilot-less ignitions and innovations in hydraulics, which results in performance efficiencies that range between 90% and 95%, compared to efficiencies of 80% to 85% for standard models.	A standard efficiency gas-fired pool heater (82.5% efficiency assumed)	A high efficiency gas-fired pool heater (92.5% efficiency assumed)	Cool
Solar Pool Heaters	Solar Pool Heaters	Unlike other types of solar hot water systems, solar pool heaters do not include storage tanks or heat exchangers, and, since they are only used in warmer weather, they generally employ unglazed solar collectors that are composed of a polymer. These collectors are mounted of the roofs of homes or in an unshaded part of the yard. The heat transfer fluid is usually pool water that is pumped directly into the array of collectors and flows within the polymer in a serpentine array in order to pick up heat. Although solar DHW systems do require a pump, its consumption is similar to that used in electric and gas-fired pool heaters. Solar pool heaters can completely offset the energy requirements of conventional pool heaters. And,	A standard efficiency gas-fired pool heater	A solar pool heater with an unglazed collector	Cool
Micro-CHP	Micro-Combined Heat and Power (CHP)	Several types of micro-combustion heat and power (micro CHP) systems are either available or under development. These units all generate electrical power and capture the resulting "waste" heat for space and/or water heating. Reciprocating engine units such as the Honda Freewatt use a well-developed technology and can be scaled to a residential size. Power generate efficiencies range from 20-40% and up to 90% of the waste heat can be captured. Various sizing and control strategies can be used: for example, the amount of heat can be maximized or the amount of electricity can be maximized. This example assumes a unit such as the Honda Freewatt hydronic system, which has a 1.2 kW maximum electrical output and a 3.5 kW thermal output. Heat load following control is assumed to avoid fuel-switching, however power load following control is usually more economically attractive for applications involving seasonally varying loads. A back-up boiler is included in the Honda Freewatt package. Net-metering is	Condensing gas-fired boiler (92% AFUE)	Installing a microturbine system in an average home, offsetting both the electric consumption from the grid and the amount of space and water heating that must be provided by a boiler. Note that this technology is not currently available in Canada.	Cool

MISCELLANEOUS INPUTS

Back to Index

Measure Sheet Title: TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Number of Sub-Sectors (1 to 15): 8

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Average
Sub-Sector Names:	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	9	10	11	12	13	14	15	Weighted Avg.

FUEL MIX

Space Heating

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	9	10	11	12	13	14	15	Weighted Avg.	References/Notes
Electricity	16.2%	16.2%	16.2%	17.1%	17.1%	17.1%	16.2%	16.2%								16.3%	
Natural Gas	82.6%	82.6%	82.6%	82.6%	82.6%	82.6%	82.6%	82.6%								82.6%	
Oil																0.0%	Not used
Wood																0.0%	Not used
Total	**98.8%**	**98.8%**	**98.8%**	**99.7%**	**99.7%**	**99.7%**	**98.8%**	**98.8%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**98.9%**	

DHW

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	9	10	11	12	13	14	15	Weighted Avg.	References/Notes
Electricity	9.2%	9.2%	9.2%	9.8%	9.8%	9.8%	9.0%	9.0%								9.2%	
Natural Gas	90.3%	90.3%	90.3%	89.7%	89.7%	89.7%	90.3%	90.3%								90.2%	
Oil																0.0%	Not used
Total	**99.5%**	**99.5%**	**99.5%**	**99.5%**	**99.5%**	**99.5%**	**99.3%**	**99.3%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**99.5%**	

Cooking

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	9	10	11	12	13	14	15	Weighted Avg.	References/Notes
Electricity	85.4%	85.4%	85.4%	89.2%	89.2%	89.2%	85.6%	85.6%								85.8%	
Natural Gas	14.6%	14.6%	14.6%	10.8%	10.8%	10.8%	14.4%	14.4%								14.2%	
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**100.0%**	

Clothes Dryers

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	9	10	11	12	13	14	15	Weighted Avg.	References/Notes
Electricity	94.1%	94.1%	94.1%	96.3%	96.3%	96.3%	94.2%	94.2%								94.3%	
Natural Gas	5.9%	5.9%	5.9%	3.7%	3.7%	3.7%	5.8%	5.8%								5.7%	
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**100.0%**	

Pools and Spas

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	9	10	11	12	13	14	15	Weighted Avg.	References/Notes
Electricity	64.2%	64.2%	64.2%	64.2%	64.2%	64.2%	64.2%	64.2%								64.2%	
Natural Gas	21.9%	21.9%	21.9%	21.9%	21.9%	21.9%	21.9%	21.9%								21.9%	
Total	**86.1%**	**86.1%**	**86.1%**	**86.1%**	**86.1%**	**86.1%**	**86.1%**	**86.1%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**86.1%**	

HEATING PENALTY/ COOLING BENEFITS

Mix of Heating Fuels (for heating penalty and cooling benefits calculations)

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	9	10	11	12	13	14	15	Weighted Avg.	References/Notes
Electricity	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%								0.0%	Not used
Natural Gas	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%								0.0%	Not used
Oil	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%								0.0%	Not used
Wood	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%								0.0%	Not used
Total	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	

Average Heating System Efficiency by Fuel

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	9	10	11	12	13	14	15	Weighted Avg.	References/Notes
Electricity	110.0%	110.0%	110.0%	110.0%	110.0%	110.0%	100.0%	100.0%								109.5%	Not used
Natural Gas	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%								85.0%	Not used
Oil	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%								75.0%	Not used

Average Cooling System Efficiency by Fuel

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	9	10	11	12	13	14	15	Weighted Avg.	References/Notes
Electricity	300.0%	300.0%	300.0%	300.0%	300.0%	300.0%	300.0%	300.0%								300.0%	Not used

HOUSING STOCK

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	9	10	11	12	13	14	15	Weighted Avg.	References/Notes
Occupancy Rates	3.1	3.1	3.1	2.4	2.4	2.4	1.9	1.9								3.0	Stats Canada, values for Vancouver
Distribution of Housing Types	31.2%	59.1%	80.6%	0.6%	4.4%	14.6%	4.8%	4.8%								N/A	

ECONOMIC PARAMETERS

Back to Index

Customer Resource Costs

Electric Energy ($/kWh)	$0.083
Electric Demand ($/kW)	
Natural Gas ($/MJ)	$0.010
Oil ($/L)	
Water ($/1000L)	

Sources:

Electricity: Residential retail cost of electricity and demand taken from the spreadsheet "20100111_Planning Tool with Partners_TGVI_Res.xlsx" provided by Terasen

Gas: TGI rate taken from the spreadsheet "20100111_Planning Tool with Partners_TGVI_Res.xlsx" provided by Terasen

Oil: Cost not used

Water: Cost not used

GHG Adder Inputs

	Electricity (kWh)	Natural Gas (m^3)	Fuel Oil (L)	Water (1000L)	
			Not used	Not used	
GHG Cost, 2010 ($/tonne CO_2e)					Not used--GHG costs already in avoided cost
GHG Cost, 2011 ($/tonne CO_2e)					Not used--GHG costs already in avoided cost
GHG Cost, 2012+ ($/tonne CO_2e)					Not used--GHG costs already in avoided cost
Emissions Coefficient (tonnes CO_2e/unit)	0.0000	0			Not used--GHG costs already in avoided cost
GHG Adder, 2010 ($/unit)	0.0000	0	0.0000	0.0000	Not used--GHG costs already in avoided cost
GHG Adder, 2011 ($/unit)	0.0000	0	0.0000	0.0000	Not used--GHG costs already in avoided cost
GHG Adder, 2012+ ($/unit)	0.0000	0	0.0000	0.0000	Not used--GHG costs already in avoided cost

- Electricity emissions factors based on BC emission factors presented on http://www.ec.gc.ca/ges-ghg/default.asp?lang=En&n=EAF0E96A-1#section11, from Environment Canada; *National Inventory Report (1990-2008): Greenhouse Gas Sources and Sinks in Canada* , May 2008.

- Natural gas emissions factors based on BC emission factors presented on http://www.ec.gc.ca/ges-ghg/default.asp?lang=En&n=AC2B7641-1 from Environment Canada; *National Inventory Report (1990-2008): Greenhouse Gas Sources and Sinks in Canada* , May 2008.

Other Economic Parameters

Discount Rate	7.38%

AVOIDED COSTS (2009)

Back to Index

GHG Adder	No	**Note:** GHG adders already added to avoided costs
Inflation Factor	N/A	**Note:** Not currently being used
Discount Rate	7.38%	

YEAR	ELECTRICITY (ENERGY) ☑				ELECTRICITY (DEMAND) ☐				NATURAL GAS ☑				FUEL OIL ☐		WATER ☐	
	Baseload		Peak		Baseload		Peak		Baseload		Weather Sensitive		Rates	NPV	Rates	NPV
	Rates	NPV	Rates	NPV	Rates	NPV	Rates	NPV	Rates	NPV	Rates	NPV				
1	0.1284	0.1284	0.1584	0.1584	0.0000	0.0000	0.0000	0.0000	0.0065	0.0065	0.3407	0.3407	0.00000	0.00000	0.00000	0.00000
2	0.1284	0.2480	0.1584	0.3059	0.0000	0.0000	0.0000	0.0000	0.0070	0.0130	0.3251	0.6434	0.00000	0.00000	0.00000	0.00000
3	0.1284	0.3593	0.1584	0.4433	0.0000	0.0000	0.0000	0.0000	0.0080	0.0200	0.3324	0.9317	0.00000	0.00000	0.00000	0.00000
4	0.1284	0.4630	0.1584	0.5712	0.0000	0.0000	0.0000	0.0000	0.0090	0.0272	0.3265	1.1954	0.00000	0.00000	0.00000	0.00000
5	0.1284	0.5596	0.1584	0.6904	0.0000	0.0000	0.0000	0.0000	0.0096	0.0344	0.3408	1.4517	0.00000	0.00000	0.00000	0.00000
6	0.1284	0.6496	0.1584	0.8013	0.0000	0.0000	0.0000	0.0000	0.0101	0.0415	0.3535	1.6993	0.00000	0.00000	0.00000	0.00000
7	0.1284	0.7333	0.1584	0.9046	0.0000	0.0000	0.0000	0.0000	0.0105	0.0483	0.3599	1.9341	0.00000	0.00000	0.00000	0.00000
8	0.1284	0.8113	0.1584	1.0009	0.0000	0.0000	0.0000	0.0000	0.0108	0.0548	0.3557	2.1501	0.00000	0.00000	0.00000	0.00000
9	0.1284	0.8840	0.1584	1.0905	0.0000	0.0000	0.0000	0.0000	0.0110	0.0611	0.3626	2.3553	0.00000	0.00000	0.00000	0.00000
10	0.1284	0.9516	0.1584	1.1739	0.0000	0.0000	0.0000	0.0000	0.0112	0.0670	0.3697	2.5500	0.00000	0.00000	0.00000	0.00000
11	0.1284	1.0146	0.1584	1.2517	0.0000	0.0000	0.0000	0.0000	0.0114	0.0726	0.3769	2.7349	0.00000	0.00000	0.00000	0.00000
12	0.1284	1.0733	0.1584	1.3240	0.0000	0.0000	0.0000	0.0000	0.0116	0.0779	0.3842	2.9105	0.00000	0.00000	0.00000	0.00000
13	0.1284	1.1279	0.1584	1.3914	0.0000	0.0000	0.0000	0.0000	0.0119	0.0829	0.3917	3.0771	0.00000	0.00000	0.00000	0.00000
14	0.1284	1.1788	0.1584	1.4542	0.0000	0.0000	0.0000	0.0000	0.0121	0.0877	0.3993	3.2354	0.00000	0.00000	0.00000	0.00000
15	0.1284	1.2262	0.1584	1.5127	0.0000	0.0000	0.0000	0.0000	0.0123	0.0923	0.4071	3.3856	0.00000	0.00000	0.00000	0.00000
16	0.1284	1.2703	0.1584	1.5671	0.0000	0.0000	0.0000	0.0000	0.0125	0.0966	0.4150	3.5282	0.00000	0.00000	0.00000	0.00000
17	0.1284	1.3114	0.1584	1.6178	0.0000	0.0000	0.0000	0.0000	0.0128	0.1007	0.4231	3.6636	0.00000	0.00000	0.00000	0.00000
18	0.1284	1.3497	0.1584	1.6650	0.0000	0.0000	0.0000	0.0000	0.0130	0.1045	0.4313	3.7922	0.00000	0.00000	0.00000	0.00000
19	0.1284	1.3853	0.1584	1.7090	0.0000	0.0000	0.0000	0.0000	0.0133	0.1082	0.4397	3.9143	0.00000	0.00000	0.00000	0.00000
20	0.1284	1.4185	0.1584	1.7499	0.0000	0.0000	0.0000	0.0000	0.0135	0.1117	0.4483	4.0302	0.00000	0.00000	0.00000	0.00000
21	0.1284	1.4494	0.1584	1.7881	0.0000	0.0000	0.0000	0.0000	0.0139	0.1151	0.4570	4.1402	0.00000	0.00000	0.00000	0.00000
22	0.1284	1.4782	0.1584	1.8236	0.0000	0.0000	0.0000	0.0000	0.0143	0.1183	0.4659	4.2446	0.00000	0.00000	0.00000	0.00000
23	0.1284	1.5050	0.1584	1.8566	0.0000	0.0000	0.0000	0.0000	0.0146	0.1213	0.4750	4.3438	0.00000	0.00000	0.00000	0.00000
24	0.1284	1.5300	0.1584	1.8874	0.0000	0.0000	0.0000	0.0000	0.0150	0.1242	0.4843	4.4380	0.00000	0.00000	0.00000	0.00000
25	0.1284	1.5532	0.1584	1.9161	0.0000	0.0000	0.0000	0.0000	0.0154	0.1270	0.4937	4.5274	0.00000	0.00000	0.00000	0.00000
26	0.1284	1.5749	0.1584	1.9428	0.0000	0.0000	0.0000	0.0000	0.0157	0.1297	0.5033	4.6122	0.00000	0.00000	0.00000	0.00000
27	0.1284	1.5950	0.1584	1.9677	0.0000	0.0000	0.0000	0.0000	0.0161	0.1322	0.5131	4.6928	0.00000	0.00000	0.00000	0.00000
28	0.1284	1.6138	0.1584	1.9909	0.0000	0.0000	0.0000	0.0000	0.0165	0.1346	0.5231	4.7693	0.00000	0.00000	0.00000	0.00000
29	0.1284	1.6313	0.1584	2.0124	0.0000	0.0000	0.0000	0.0000	0.0168	0.1369	0.5333	4.8419	0.00000	0.00000	0.00000	0.00000
30	0.1284	1.6476	0.1584	2.0325	0.0000	0.0000	0.0000	0.0000	0.0172	0.1391	0.5419	4.9107	0.00000	0.00000	0.00000	0.00000

AVOIDED COSTS (2009) - RAW INPUTS

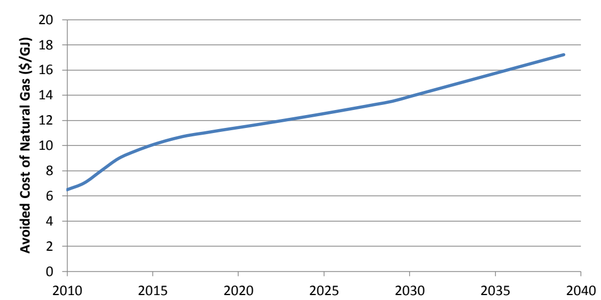
Back to Index

GHG Adder	N/A	**Note:** Not to be modified here
Inflation Factor	N/A	**Note:** Not currently being used
Discount Rate	7.38%	

Units are $/MJ

YEAR	ELECTRICITY (ENERGY)				ELECTRICITY (DEMAND)				NATURAL GAS				FUEL OIL		WATER	
	Baseload		Peak		Baseload		Peak		Baseload		Weather Sensitive		Rates	NPV	Rates	NPV
	Rates	NPV	Rates	NPV	Rates	NPV	Rates	NPV	Rates	NPV	Rates	NPV				
			Not used		Not used		Not used				Not used		Not used		Not used	
1	0.1284	0.1284	0.1584	0.1584	15.0000	15.0000	15.0000	15.0000	0.0065	0.0065	0.3407	0.3407	0.75000	0.75000	1.68504	1.68504
2	0.1284	0.2480	0.1584	0.3059	15.1000	29.0622	15.1000	29.0622	0.0070	0.0130	0.3251	0.6434	0.76000	1.45777	1.71705	3.28408
3	0.1284	0.3593	0.1584	0.4433	15.2000	42.2447	15.2000	42.2447	0.0080	0.0200	0.3324	0.9317	0.77000	2.12556	1.74967	4.80151
4	0.1284	0.4630	0.1584	0.5712	15.3000	54.6019	15.3000	54.6019	0.0090	0.0272	0.3265	1.1954	0.78000	2.75554	1.78292	6.24151
5	0.1284	0.5596	0.1584	0.6904	15.4000	66.1851	15.4000	66.1851	0.0096	0.0344	0.3408	1.4517	0.79000	3.34974	1.81679	7.60802
6	0.1284	0.6496	0.1584	0.8013	15.5000	77.0422	15.5000	77.0422	0.0101	0.0415	0.3535	1.6993	0.80000	3.91011	1.85131	8.90479
7	0.1284	0.7333	0.1584	0.9046	15.6000	87.2184	15.6000	87.2184	0.0105	0.0483	0.3599	1.9341	0.81000	4.43849	1.88649	10.13538
8	0.1284	0.8113	0.1584	1.0009	15.7000	96.7559	15.7000	96.7559	0.0108	0.0548	0.3557	2.1501	0.82000	4.93662	1.92233	11.30317
9	0.1284	0.8840	0.1584	1.0905	15.8000	105.6945	15.8000	105.6945	0.0110	0.0611	0.3626	2.3553	0.83000	5.40618	1.95886	12.41136
10	0.1284	0.9516	0.1584	1.1739	15.9000	114.0715	15.9000	114.0715	0.0112	0.0670	0.3697	2.5500	0.84000	5.84874	1.99607	13.46300
11	0.1284	1.0146	0.1584	1.2517	16.0000	121.9218	16.0000	121.9218	0.0114	0.0726	0.3769	2.7349	0.85000	6.26579	2.03400	14.46096
12	0.1284	1.0733	0.1584	1.3240	16.1000	129.2782	16.1000	129.2782	0.0116	0.0779	0.3842	2.9105	0.86000	6.65874	2.07265	15.40800
13	0.1284	1.1279	0.1584	1.3914	16.2000	136.1716	16.2000	136.1716	0.0119	0.0829	0.3917	3.0771	0.87000	7.02894	2.11203	16.30671
14	0.1284	1.1788	0.1584	1.4542	16.3000	142.6309	16.3000	142.6309	0.0121	0.0877	0.3993	3.2354	0.88000	7.37766	2.15215	17.15955
15	0.1284	1.2262	0.1584	1.5127	16.4000	148.6831	16.4000	148.6831	0.0123	0.0923	0.4071	3.3856	0.89000	7.70611	2.19304	17.96887
16	0.1284	1.2703	0.1584	1.5671	16.5000	154.3538	16.5000	154.3538	0.0125	0.0966	0.4150	3.5282	0.90000	8.01542	2.23471	18.73689
17	0.1284	1.3114	0.1584	1.6178	16.6000	159.6667	16.6000	159.6667	0.0128	0.1007	0.4231	3.6636	0.91000	8.30667	2.27717	19.46571
18	0.1284	1.3497	0.1584	1.6650	16.7000	164.6443	16.7000	164.6443	0.0130	0.1045	0.4313	3.7922	0.92000	8.58088	2.32044	20.15734
19	0.1284	1.3853	0.1584	1.7090	16.8000	169.3075	16.8000	169.3075	0.0133	0.1082	0.4397	3.9143	0.93000	8.83903	2.36453	20.81367
20	0.1284	1.4185	0.1584	1.7499	16.9000	173.6761	16.9000	173.6761	0.0135	0.1117	0.4483	4.0302	0.94000	9.08201	2.40945	21.43651
21	0.1284	1.4494	0.1584	1.7881	17.0000	177.7686	17.0000	177.7686	0.0139	0.1151	0.4570	4.1402	0.95000	9.31071	2.45523	22.02756
22	0.1284	1.4782	0.1584	1.8236	17.1000	181.6021	17.1000	181.6021	0.0143	0.1183	0.4659	4.2446	0.96000	9.52593	2.50188	22.58844
23	0.1284	1.5050	0.1584	1.8566	17.2000	185.1931	17.2000	185.1931	0.0146	0.1213	0.4750	4.3438	0.97000	9.72844	2.54942	23.12071
24	0.1284	1.5300	0.1584	1.8874	17.3000	188.5568	17.3000	188.5568	0.0150	0.1242	0.4843	4.4380	0.98000	9.91898	2.59786	23.62581
25	0.1284	1.5532	0.1584	1.9161	17.4000	191.7073	17.4000	191.7073	0.0154	0.1270	0.4937	4.5274	0.99000	10.09824	2.64722	24.10513
26	0.1284	1.5749	0.1584	1.9428	17.5000	194.6582	17.5000	194.6582	0.0157	0.1297	0.5033	4.6122	1.00000	10.26686	2.69751	24.55999
27	0.1284	1.5950	0.1584	1.9677	17.6000	197.4220	17.6000	197.4220	0.0161	0.1322	0.5131	4.6928	1.01000	10.42546	2.74877	24.99164
28	0.1284	1.6138	0.1584	1.9909	17.7000	200.0105	17.7000	200.0105	0.0165	0.1346	0.5231	4.7693	1.02000	10.57463	2.80099	25.40126
29	0.1284	1.6313	0.1584	2.0124	17.8000	202.4346	17.8000	202.4346	0.0168	0.1369	0.5333	4.8419	1.03000	10.71490	2.85421	25.78997
30	0.1284	1.6476	0.1584	2.0325	17.9000	204.7049	17.9000	204.7049	0.0172	0.1391	0.5419	4.9107	1.04000	10.84681	2.90844	26.15885

2010	6.490252		1	
2011	7.025272	0.53502	2	
2012	8.005337	0.980065	3	
2013	8.966252	0.960915	4	
2014	9.567327	0.601075	5	
2015	10.06053	0.493207	6	
2016	10.46367	0.403134	7	
2017	10.78438	0.320707	8	
2018	10.99733	0.212952	9	
2019	11.22083	0.223501	10	
2020	11.42842	0.207588	11	
2021	11.64064	0.212223	12	
2022	11.8576	0.216965	13	
2023	12.07942	0.221816	14	
2024	12.3062	0.22678	15	
2025	12.53806	0.23186	16	
2026	12.77512	0.237057	17	
2027	13.01749	0.242375	18	
2028	13.26531	0.247816	19	
2029	13.51869	0.253384	20	
2030	13.88861	0.369918	21	
2031	14.25853	0.369918	22	
2032	14.62845	0.369918	23	
2033	14.99836	0.369918	24	
2034	15.36828	0.369918	25	
2035	15.7382	0.369918	26	df
2036	16.10812	0.369918	27	
2037	16.47803	0.369918	28	
2038	16.84795	0.369918	29	
2039	17.21787	0.369918	30	
2040	17.58779	0.369918	31	
2041	17.95771	0.369918	32	
2042	18.32762	0.369918	33	
2043	18.69754	0.369918	34	
2044	19.06746	0.369918	35	
2045	19.43738	0.369918	36	
2046	19.8073	0.369918	37	
2047	20.17721	0.369918	38	
2048	20.54713			



	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Avoided commodity and Mindstream cost($/GJ)	$ 5.59	$ 5.88	$ 6.61	$ 7.32	$ 7.92	$ 8.41	$ 8.82	$ 9.14	$ 9.35	$ 9.57	$ 9.78	$ 9.99	$ 10.21	$ 10.43	$ 10.66	$ 10.89	$ 11.13	$ 11.37	$ 11.62	$ 11.87
Distribution adder($/GJ)	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
CARBON TAX($/GJ)	*0.75*	*1.00*	*1.25*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*
Total	$ 6.49	$ 7.03	$ 8.01	$ 8.97	$ 9.57	$ 10.06	$ 10.46	$ 10.78	$ 11.00	$ 11.22	$ 11.43	$ 11.64	$ 11.86	$ 12.08	$ 12.31	$ 12.54	$ 12.78	$ 13.02	$ 13.27	$ 13.52

Baseline Consumption (Case 1)

Back to Index

BASIS/TAG: 1. Annual consumption, end use
DESCRIPTION: Annual energy consumption, at the end use level
UNIT: /yr.

CONVERSION FACTORS:

Electricity (kWh to MJ):	3.60	
Natural Gas (m^3 to MJ):	39.62	Not used
Fuel Oil (L to MJ):	36.74	Not used

NATURAL UNITS:

Electricity

#	Main End Use	Sub End Use/Equipment (If Applicable)	% of Main End-Use (Default)	Average Consumption (kWh/yr.)									References/Notes
				Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
1	Ventilation and Circulation		100.0%	600.0	800.0	768.3	400.0	400.0	384.2	241.3	231.7	688.9	
2	Space Cooling		100.0%	2,596.5	2,596.5	2,493.7	1,384.8	1,384.8	1,330.0	1,627.0	1,562.5	2,384.6	
3	Clothes Washers		100.0%	64.0	64.0	64.0	48.2	48.2	48.2	51.0	51.0	61.8	
4	Dishwashers		100.0%	75.0	75.0	75.0	57.6	57.6	57.6	60.0	60.0	72.6	
5	Other Electric Loads		100.0%	2,000.0	2,000.0	2,000.0	2,000.0	2,000.0	2,000.0	2,000.0	2,000.0	2,000.0	Value based on electricity generated by micro-CHP measure
6			100.0%									0.0	
7			100.0%									0.0	
8			100.0%									0.0	
9			100.0%									0.0	
10			100.0%									0.0	
11			100.0%									0.0	
12			100.0%									0.0	
13			100.0%									0.0	
14			100.0%									0.0	
15			100.0%									0.0	
16			100.0%									0.0	
17			100.0%									0.0	
18			100.0%									0.0	
19			100.0%									0.0	
20			100.0%									0.0	
21			100.0%									0.0	
22			100.0%									0.0	
23			100.0%									0.0	
24			100.0%									0.0	
25			100.0%									0.0	
26			100.0%									0.0	
27			100.0%									0.0	
28			100.0%									0.0	
29			100.0%									0.0	
30			100.0%									0.0	
31			100.0%									0.0	
32			100.0%									0.0	
33			100.0%									0.0	
34			100.0%									0.0	
35			100.0%									0.0	
36			100.0%									0.0	
37			100.0%									0.0	
38			100.0%									0.0	
39			100.0%									0.0	
40			100.0%									0.0	

Natural Gas

#	Main End Use	Sub End Use/Equipment (If Applicable)	% of Main End-Use (Default)	Average Consumption (m3/yr.)									References/Notes
				Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
1	Space Heating		100.0%	56,472.7	47,766.8	47,766.8	33,755.9	29,899.6	29,899.6	37,393.2	37,393.2	46,888.7	
2	Domestic Hot Water (DHW)		100.0%	14,933.9	14,933.9	14,933.9	12,609.3	12,609.3	12,609.3	13,001.1	13,001.1	14,614.0	
3	Domestic Hot Water (DHW)	Clothes Washers	18.0%	2,688.1	2,688.1	2,688.1	2,269.7	2,269.7	2,269.7	2,340.2	2,340.2	2,630.5	DHW end-use breakdown based on several studies, as outlined in baseline report
4	Domestic Hot Water (DHW)	Showers	26.0%	3,882.8	3,882.8	3,882.8	3,278.4	3,278.4	3,278.4	3,380.3	3,380.3	3,799.6	DHW end-use breakdown based on several studies, as outlined in baseline report
5	Domestic Hot Water (DHW)	Faucets	19.0%	2,837.4	2,837.4	2,837.4	2,395.8	2,395.8	2,395.8	2,470.2	2,470.2	2,776.7	DHW end-use breakdown based on several studies, as outlined in baseline report
6	Domestic Hot Water (DHW)	Baths	4.0%	597.4	597.4	597.4	504.4	504.4	504.4	520.0	520.0	584.6	DHW end-use breakdown based on several studies, as outlined in baseline report
7	Domestic Hot Water (DHW)	Dishwashers	12.0%	1,792.1	1,792.1	1,792.1	1,513.1	1,513.1	1,513.1	1,560.1	1,560.1	1,753.7	DHW end-use breakdown based on several studies, as outlined in baseline report
8	Domestic Hot Water (DHW)	Leaks	6.0%	896.0	896.0	896.0	756.6	756.6	756.6	780.1	780.1	876.8	DHW end-use breakdown based on several studies, as outlined in baseline report
9	Domestic Hot Water (DHW)	Tank (Standby) Losses	7.5%	1,120.0	1,120.0	1,120.0	945.7	945.7	945.7	975.1	975.1	1,096.0	DHW end-use breakdown based on several studies, as outlined in baseline report
10	Domestic Hot Water (DHW)	Pipe Losses	7.5%	1,120.0	1,120.0	1,120.0	945.7	945.7	945.7	975.1	975.1	1,096.0	DHW end-use breakdown based on several studies, as outlined in baseline report
11	Fireplaces		100.0%	17,120.7	17,120.7	17,120.7	11,299.7	11,299.7	11,299.7	11,299.7	11,299.7	16,272.8	
12	Cooking		100.0%	4,599.1	4,599.1	4,599.1	3,889.1	3,889.1	3,889.1	4,015.5	4,015.5	4,501.7	
13	Cooking	Cooktops	40.0%	1,839.6	1,839.6	1,839.6	1,555.6	1,555.6	1,555.6	1,606.2	1,606.2	1,800.7	
14	Cooking	Ovens	55.0%	2,529.5	2,529.5	2,529.5	2,139.0	2,139.0	2,139.0	2,208.6	2,208.6	2,475.9	
15	Clothes Dryers		55.0%	3,701.0	3,701.0	3,701.0	3,303.2	3,303.2	3,303.2	3,482.4	3,482.4	3,651.6	
16	Pool and Spa Heaters		100.0%	27,693.2	27,693.2	27,693.2	27,693.2	27,693.2	27,693.2	27,693.2	27,693.2	27,693.2	
17	Pool and Spa Heaters	Pool Heaters	139.0%	38,493.5	38,493.5	38,493.5	38,493.5	38,493.5	38,493.5	38,493.5	38,493.5	38,493.5	
18	Pool and Spa Heaters	Spa Heaters	71.5%	19,800.6	19,800.6	19,800.6	19,800.6	19,800.6	19,800.6	19,800.6	19,800.6	19,800.6	
19	Other		100.0%									0.0	
20			100.0%									0.0	
21			100.0%									0.0	
22			100.0%									0.0	
23			100.0%									0.0	
24			100.0%									0.0	
25			100.0%									0.0	
26			100.0%									0.0	
27			100.0%									0.0	
28			100.0%									0.0	
29			100.0%									0.0	
30			100.0%									0.0	
31			100.0%									0.0	
32			100.0%									0.0	
33			100.0%									0.0	
34			100.0%									0.0	
35			100.0%									0.0	
36			100.0%									0.0	
37			100.0%									0.0	
38			100.0%									0.0	
39			100.0%									0.0	
40			100.0%									0.0	

Oil

#	Main End Use	Sub End Use/Equipment (If Applicable)	% of Main End-Use (Default)	Average Consumption (L/yr.)									References/Notes
				Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
1	Space Heating		100.0%									0.0	
2	Domestic Hot Water (DHW)		100.0%									0.0	
3	Domestic Hot Water (DHW)	Clothes Washer	18.0%									0.0	DHW end-use breakdown based on several studies, as outlined in baseline report
4	Domestic Hot Water (DHW)	Showers	26.0%									0.0	DHW end-use breakdown based on several studies, as outlined in baseline report
5	Domestic Hot Water (DHW)	Faucets	19.0%									0.0	DHW end-use breakdown based on several studies, as outlined in baseline report
6	Domestic Hot Water (DHW)	Baths	4.0%									0.0	DHW end-use breakdown based on several studies, as outlined in baseline report
7	Domestic Hot Water (DHW)	Dishwasher	12.0%									0.0	DHW end-use breakdown based on several studies, as outlined in baseline report
8	Domestic Hot Water (DHW)	Leaks	6.0%									0.0	DHW end-use breakdown based on several studies, as outlined in baseline report
9	Domestic Hot Water (DHW)	Tank (Standby) Losses	7.5%									0.0	DHW end-use breakdown based on several studies, as outlined in baseline report
10	Domestic Hot Water (DHW)	Pipe Losses	7.5%									0.0	DHW end-use breakdown based on several studies, as outlined in baseline report
11			100.0%									0.0	
12			100.0%									0.0	
13			100.0%									0.0	
14			100.0%									0.0	
15			100.0%									0.0	
16			100.0%									0.0	
17			100.0%									0.0	
18			100.0%									0.0	
19			100.0%									0.0	
20			100.0%									0.0	
21			100.0%									0.0	
22			100.0%									0.0	
23			100.0%									0.0	
24			100.0%									0.0	
25			100.0%									0.0	
26			100.0%									0.0	
27			100.0%									0.0	
28			100.0%									0.0	
29			100.0%									0.0	
30			100.0%									0.0	
31			100.0%									0.0	
32			100.0%									0.0	
33			100.0%									0.0	
34			100.0%									0.0	
35			100.0%									0.0	
36			100.0%									0.0	
37			100.0%									0.0	
38			100.0%									0.0	
39			100.0%									0.0	
40			100.0%									0.0	

Water

#	Main End Use	Sub End Use/Equipment (If Applicable)	Approx. DHW % (Default)	Average Consumption (L/yr.)									References/Notes
				Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
1	Water	Clothes Washer	40.0%									0.0	Based on averaging overall water consumption (per capita, per day) values from two studies: - Resource Management Strategies Inc., "Regional Municipality of York:
2	Water	Showers	70.0%									0.0	

3	Water	Faucets	40.0%									0.0	Water Efficiency Master Plan Update, Final Report", pg. 15, April 27, 2007 - Canadian sites in American Water Works Association (AWWA) Research Foundation, "Residential End Uses of Water", pg. 107, 1999.
4	Water	Baths	70.0%									0.0	
5	Water	Dishwasher	100.0%									0.0	
6	Water	Leaks	25.0%									0.0	
7	Water	Tank (Standby) Losses	100.0%									0.0	
8	Water	Pipe Losses	100.0%									0.0	
9			**100.0%**									0.0	
10			**100.0%**									0.0	
11			**100.0%**									0.0	
12			**100.0%**									0.0	
13			**100.0%**									0.0	
14			**100.0%**									0.0	
15			**100.0%**									0.0	
16			**100.0%**									0.0	
17			**100.0%**									0.0	
18			**100.0%**									0.0	
19			**100.0%**									0.0	
20			**100.0%**									0.0	

COMMON UNITS: **Note:** Used since it may be more convenient to enter values in their natural units and then convert using the conversion factors above

Electricity

#	Main End Use	% of Main End-Use (Default)	Average Consumption (MJ/yr.)									References/Notes
			Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
1	**Ventilation and Circulation**		2,160.0	2,880.0	2,766.0	1,440.0	1,440.0	1,383.0	868.6	834.2	2,479.9	
2	**Space Cooling**		9,347.5	9,347.5	8,977.4	4,985.3	4,985.3	4,787.9	5,857.1	5,625.1	8,584.6	
3	**Clothes Washers**		230.4	230.4	230.4	173.4	173.4	173.4	183.6	183.6	222.6	
4	**Dishwashers**		270.0	270.0	270.0	207.4	207.4	207.4	216.0	216.0	261.3	
5	**Other Electric Loads**		7,200.0	7,200.0	7,200.0	7,200.0	7,200.0	7,200.0	7,200.0	7,200.0	7,200.0	Value based on electricity generated by micro-CHP measure
6											0.0	
7											0.0	
8											0.0	
9											0.0	
10											0.0	
11											0.0	
12											0.0	
13											0.0	
14											0.0	
15											0.0	
16											0.0	
17											0.0	
18											0.0	
19											0.0	
20											0.0	

Natural Gas

#	Main End Use	% of Main End-Use (Default)	Average Consumption (MJ/yr.)									References/Notes
			Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
1	**Space Heating**		56,472.7	47,766.8	47,766.8	33,755.9	29,899.6	29,899.6	37,393.2	37,393.2	46,888.7	
2	**Domestic Hot Water (DHW)**		14,933.9	14,933.9	14,933.9	12,609.3	12,609.3	12,609.3	13,001.1	13,001.1	14,614.0	
3	**Fireplaces**		17,120.7	17,120.7	17,120.7	11,299.7	11,299.7	11,299.7	11,299.7	11,299.7	16,272.8	
4	**Cooking**		4,599.1	4,599.1	4,599.1	3,889.1	3,889.1	3,889.1	4,015.5	4,015.5	4,501.7	
5	**Clothes Dryers**		3,701.0	3,701.0	3,701.0	3,303.2	3,303.2	3,303.2	3,482.4	3,482.4	3,651.6	
6	**Pools and Spa Heaters**		27,693.2	27,693.2	27,693.2	27,693.2	27,693.2	27,693.2	27,693.2	27,693.2	27,693.2	
7	**Other**										0.0	
8											0.0	
9											0.0	
10											0.0	
11											0.0	
12											0.0	
13											0.0	
14											0.0	
15											0.0	
16											0.0	
17											0.0	
18											0.0	
19											0.0	
20											0.0	

Oil

#	Main End Use	% of Main End-Use (Default)	Average Consumption (MJ/yr.)									References/Notes
			Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
1	**Space Heating**										0.0	
2	**Domestic Hot Water (DHW)**										0.0	
3											0.0	
4											0.0	
5											0.0	
6											0.0	
7											0.0	
8											0.0	
9											0.0	
10											0.0	
11											0.0	
12											0.0	
13											0.0	
14											0.0	
15											0.0	
16											0.0	
17											0.0	
18											0.0	
19											0.0	
20											0.0	

Baseline Consumption (Case 2)

Back to Index

BASIS/TAG: 2. Annual consumption, equip.
DESCRIPTION: Annual energy consumption, at the equipment level
UNIT: /yr.

CONVERSION FACTORS:

Electricity (kWh to MJ):	3.60
Natural Gas (m^3 to MJ):	39.62
Fuel Oil (L to MJ):	36.74

U.S. Department of Energy (DOE) Energy Information Administration (EIA), *International Energy Annual 1997,* DOE/EIA-0219 (97), 1997

NATURAL UNITS:

Electricity

#	Main End Use	Sub End Use/Equipment (If Applicable)	% of Main End-Use (Default)	Average Consumption (kWh/yr.)									References/Notes
				Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
1			100.0%									0.0	
2			100.0%									0.0	
3			100.0%									0.0	
4			100.0%									0.0	
5			100.0%									0.0	
6			100.0%									0.0	
7			100.0%									0.0	
8			100.0%									0.0	
9			100.0%									0.0	
10			100.0%									0.0	
11			100.0%									0.0	
12			100.0%									0.0	
13			100.0%									0.0	
14			100.0%									0.0	
15			100.0%									0.0	
16			100.0%									0.0	
17			100.0%									0.0	
18			100.0%									0.0	
19			100.0%									0.0	
20			100.0%									0.0	
21			100.0%									0.0	
22			100.0%									0.0	
23			100.0%									0.0	
24			100.0%									0.0	
25			100.0%									0.0	
26			100.0%									0.0	
27			100.0%									0.0	
28			100.0%									0.0	
29			100.0%									0.0	
30			100.0%									0.0	
31			100.0%									0.0	
32			100.0%									0.0	
33			100.0%									0.0	
34			100.0%									0.0	
35			100.0%									0.0	
36			100.0%									0.0	
37			100.0%									0.0	
38			100.0%									0.0	
39			100.0%									0.0	
40			100.0%									0.0	

Natural Gas

#	Main End Use	Sub End Use/Equipment (If Applicable)	% of Main End-Use (Default)	Average Consumption (m3/yr.)									References/Notes
				Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
1			100.0%									0.0	
2			100.0%									0.0	
3			100.0%									0.0	
4			100.0%									0.0	
5			100.0%									0.0	
6			100.0%									0.0	
7			100.0%									0.0	
8			100.0%									0.0	
9			100.0%									0.0	
10			100.0%									0.0	
11			100.0%									0.0	
12			100.0%									0.0	
13			100.0%									0.0	
14			100.0%									0.0	
15			100.0%									0.0	
16			100.0%									0.0	
17			100.0%									0.0	
18			100.0%									0.0	
19			100.0%									0.0	
20			100.0%									0.0	
21			100.0%									0.0	
22			100.0%									0.0	
23			100.0%									0.0	
24			100.0%									0.0	
25			100.0%									0.0	
26			100.0%									0.0	
27			100.0%									0.0	
28			100.0%									0.0	
29			100.0%									0.0	
30			100.0%									0.0	
31			100.0%									0.0	
32			100.0%									0.0	
33			100.0%									0.0	
34			100.0%									0.0	
35			100.0%									0.0	
36			100.0%									0.0	
37			100.0%									0.0	
38			100.0%									0.0	
39			100.0%									0.0	
40			100.0%									0.0	

Oil

#	Main End Use	Sub End Use/Equipment (If Applicable)	% of Main End-Use (Default)	Average Consumption (L/yr.)									References/Notes
				Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
1			100.0%									0.0	
2			100.0%									0.0	
3			100.0%									0.0	
4			100.0%									0.0	
5			100.0%									0.0	
6			100.0%									0.0	
7			100.0%									0.0	
8			100.0%									0.0	
9			100.0%									0.0	
10			100.0%									0.0	
11			100.0%									0.0	
12			100.0%									0.0	
13			100.0%									0.0	
14			100.0%									0.0	
15			100.0%									0.0	
16			100.0%									0.0	
17			100.0%									0.0	
18			100.0%									0.0	
19			100.0%									0.0	
20			100.0%									0.0	
21			100.0%									0.0	
22			100.0%									0.0	
23			100.0%									0.0	
24			100.0%									0.0	
25			100.0%									0.0	
26			100.0%									0.0	
27			100.0%									0.0	
28			100.0%									0.0	
29			100.0%									0.0	
30			100.0%									0.0	
31			100.0%									0.0	
32			100.0%									0.0	
33			100.0%									0.0	
34			100.0%									0.0	
35			100.0%									0.0	
36			100.0%									0.0	
37			100.0%									0.0	
38			100.0%									0.0	
39			100.0%									0.0	
40			100.0%									0.0	

Water

#	Main End Use	Sub End Use/Equipment (If Applicable)	Approx. DHW % (Default)	Average Consumption (L/yr.)									References/Notes
				Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
1			100.0%									0.0	
2			100.0%									0.0	
3			100.0%									0.0	
4			100.0%									0.0	
5			100.0%									0.0	
6			100.0%									0.0	
7			100.0%									0.0	
8			100.0%									0.0	
9			100.0%									0.0	
10			100.0%									0.0	
11			100.0%									0.0	
12			100.0%									0.0	
13			100.0%									0.0	
14			100.0%									0.0	
15			100.0%									0.0	
16			100.0%									0.0	
17			100.0%									0.0	
18			100.0%									0.0	
19			100.0%									0.0	
20			100.0%									0.0	

COMMON UNITS: **Note:** Used since it may be more convenient to enter values in their natural units and then convert using the conversion factors above

Electricity

#	Main End Use	% of Main End-Use (Default)	Average Consumption (kWh/yr.)									References/Notes
			Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
1	0										0.0	
2	0										0.0	
3	0										0.0	
4	0										0.0	
5	0										0.0	
6	0										0.0	
7	0										0.0	
8	0										0.0	
9	0										0.0	
10	0										0.0	
11	0										0.0	
12	0										0.0	
13	0										0.0	
14	0										0.0	
15	0										0.0	
16	0										0.0	
17	0										0.0	
18	0										0.0	
19	0										0.0	
20	0										0.0	

Natural Gas

#	Main End Use	% of Main End-Use (Default)	Average Consumption (kWh/yr.)									References/Notes
			Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
1	0										0.0	
2	0										0.0	
3	0										0.0	
4	0										0.0	
5	0										0.0	
6											0.0	
7											0.0	
8											0.0	
9											0.0	
10											0.0	
11											0.0	
12											0.0	
13											0.0	
14											0.0	
15											0.0	
16											0.0	
17											0.0	
18											0.0	
19											0.0	
20											0.0	

Oil

#	Main End Use	% of Main End-Use (Default)	Average Consumption (kWh/yr.)									References/Notes
			Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
1	0										0.0	
2	0										0.0	
3											0.0	
4											0.0	
5											0.0	
6											0.0	
7											0.0	
8											0.0	
9											0.0	
10											0.0	
11											0.0	
12											0.0	
13											0.0	
14											0.0	
15											0.0	
16											0.0	
17											0.0	
18											0.0	
19											0.0	
20											0.0	

End Use Numbering	Baseline 1 End Use	Line Lookup for Baseline 1	Baseline 2 End Use	Line Lookup for Baseline 2
1	Space heating	1	Space heating	1
2	Space cooling	-1	Space cooling	-1
3	Ventilation and Circulation	-1	Ventilation and	-1
4	Domestic hot water (DHW)	2	Domestic hot water	2
5	Fireplace	3	Fireplace	3
6	Cooking	4	Cooking	4
7	Dishwasher	-1	Dishwasher	-1
8	Clothes washer	-1	Clothes washer	-1
9	Clothes dryer	5	Clothes dryer	5
10	Pool & spa heaters	6	Pool & spa heaters	6
11	Other gas uses	7	Other gas uses	7
12	Other electrical internal loads	-1	Other electrical	-1
13		-1		-1
14		-1		-1
15		-1		-1
16		-1		-1
17		-1		-1
18		-1		-1
19		-1		-1
20		-1		-1

End Use Numbering	Baseline 1 End Use	Line Lookup for Baseline 1	Baseline 2 End Use	Line Lookup for Baseline 2
1	Space heating	-1	Space heating	-1
2	Space cooling	2	Space cooling	2
3	Ventilation and Circulation	1	Ventilation and	1
4	Domestic hot water (DHW)	-1	Domestic hot water	-1
5	Fireplace	-1	Fireplace	-1
6	Cooking	-1	Cooking	-1
7	Dishwasher	4	Dishwasher	4
8	Clothes washer	3	Clothes washer	3
9	Clothes dryer	-1	Clothes dryer	-1
10	Pool & spa heaters	-1	Pool & spa heaters	-1
11	Other gas uses	-1	Other gas uses	-1
12	Other electrical internal loads	5	Other electrical	5
13		-1		-1
14		-1		-1
15		-1		-1
16		-1		-1
17		-1		-1
18		-1		-1
19		-1		-1
20		-1		-1

Measure Information		Applicability										Savings by End Use																				
Measure #	Technology	Climate Zone	Building Type(s)	Exist	Reno	New	Life	Cost	Benefit/Cost Ratio	Economic Screen	Basis	Space heating	Space cooling	Ventilation and Circulation	Domestic hot water (DHW)	Fireplace	Cooking	Dishwasher	Clothes washer	Clothes dryer	Pool & spa heaters	Other gas uses	Other electrical internal loads									
1	Attic Insulation	2	Detached (Pre-1976)	y	y		30.0	$675	0.94	Fail	Full	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2	Attic Insulation	2	Detached (Post-1976)	y	y		30.0	$713	0.64	Fail	Full	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3	Attic Insulation	2	Attached (Pre-1976)	y	y		30.0	$450	0.83	Fail	Full	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4	Attic Insulation	2	Attached (Post-1976)	y	y		30.0	$488	0.56	Fail	Full	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5	Attic Insulation	2	Mobile (Existing)	y	y		30.0	$525	0.68	Fail	Full	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6	Wall Insulation	2	Detached (Pre-1976)	y	y		30.0	$2,000	0.77	Fail	Incr.	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
7	Wall Insulation	2	Detached (Post-1976)	y	y		30.0	$2,000	0.68	Fail	Incr.	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
8	Wall Insulation	2	Attached (Pre-1976)	y	y		30.0	$1,500	0.61	Fail	Incr.	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
9	Wall Insulation	2	Attached (Post-1976)	y	y		30.0	$1,500	0.55	Fail	Incr.	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
10	Wall Insulation	2	Mobile (Existing)	y	y		30.0	$1,500	0.64	Fail	Incr.	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
11	Slab Insulation	2	Detached (Pre-1976)	y	y		30.0	$1,125	0.10	Fail	Incr.	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12	Slab Insulation	2	Detached (Post-1976)	y	y		30.0	$1,275	0.06	Fail	Incr.	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
13	Slab Insulation	2	Attached (Pre-1976)	y	y		30.0	$975	0.07	Fail	Incr.	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
14	Slab Insulation	2	Attached (Post-1976)	y	y		30.0	$1,050	0.05	Fail	Incr.	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
15	Basement Insulation	2	Detached (Pre-1976)	y	y		30.0	$1,400	0.75	Fail	Incr.	12%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
16	Basement Insulation	2	Detached (Post-1976)	y	y		30.0	$1,500	0.68	Fail	Incr.	13%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
17	Basement Insulation	2	Attached (Pre-1976)	y	y		30.0	$900	0.58	Fail	Incr.	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
18	Basement Insulation	2	Attached (Post-1976)	y	y		30.0	$1,000	0.49	Fail	Incr.	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
19	Crawl Space Insul.	2	Detached (Pre-1976)	y	y		30.0	$800	0.27	Fail	Full	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
20	Crawl Space Insul.	2	Detached (Post-1976)	y	y		30.0	$800	0.24	Fail	Full	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21	Crawl Space Insul.	2	Attached (Pre-1976)	y	y		30.0	$800	0.16	Fail	Full	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22	Crawl Space Insul.	2	Attached (Post-1976)	y	y		30.0	$800	0.15	Fail	Full	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23	Air Sealing	2	Detached (Pre-1976)	y	y		25.0	$1,800	0.42	Fail	Full	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
24	Air Sealing	2	Detached (Post-1976)	y	y		25.0	$1,800	0.34	Fail	Full	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
25	Air Sealing	2	Attached (Pre-1976)	y	y		25.0	$1,800	0.26	Fail	Full	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
26	Air Sealing	2	Attached (Post-1976)	y	y		25.0	$1,800	0.20	Fail	Full	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
27	Air Sealing	2	Mobile (Existing)	y	y		25.0	$1,800	0.24	Fail	Full	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
28	Homeowner Air Sealing	2	Detached (Pre-1976)	y	y		10.0	$200	0.78	Fail	Full	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
29	Homeowner Air Sealing	2	Detached (Post-1976)	y	y		10.0	$200	0.63	Fail	Full	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
30	Homeowner Air Sealing	2	Attached (Pre-1976)	y	y		10.0	$200	0.47	Fail	Full	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
31	Homeowner Air Sealing	2	Attached (Post-1976)	y	y		10.0	$200	0.38	Fail	Full	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
32	Homeowner Air Sealing	2	Mobile (Existing)	y	y		10.0	$200	0.45	Fail	Full	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
33	Sealing & Insul. - Old Homes	2	Detached (Pre-1976)	y	y		25.0	$3,000	0.44	Fail	Full	17%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
34	Sealing & Insul. - Old Homes	2	Attached (Pre-1976)	y	y		25.0	$2,500	0.31	Fail	Full	17%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
35	Zone Up Windows	2	Detached (Pre-1976)	y	y		25.0	$1,000	0.24	Fail	Incr.	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
36	Zone Up Windows	2	Detached (Post-1976)	y	y		25.0	$1,200	0.25	Fail	Incr.	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
37	Zone Up Windows	2	Detached (New)			y	25.0	$2,600	0.19	Fail	Incr.	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
38	Zone Up Windows	2	Attached (Pre-1976)	y	y		25.0	$800	0.18	Fail	Incr.	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
39	Zone Up Windows	2	Attached (Post-1976)	y	y		25.0	$960	0.18	Fail	Incr.	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
40	Zone Up Windows	2	Attached (New)			y	25.0	$2,080	0.14	Fail	Incr.	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
41	Zone Up Windows	2	Mobile (Existing)	y	y		25.0	$720	0.26	Fail	Incr.	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
42	Zone Up Windows	2	Mobile (New)			y	25.0	$1,600	0.21	Fail	Incr.	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
43	Super Windows	2	Detached (Pre-1976)	y	y		25.0	$1,500	0.66	Fail	Incr.	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
44	Super Windows	2	Detached (Post-1976)	y	y		25.0	$1,800	0.73	Fail	Incr.	13%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
45	Super Windows	2	Detached (New)			y	25.0	$3,900	0.51	Fail	Incr.	19%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
46	Super Windows	2	Attached (Pre-1976)	y	y		25.0	$1,200	0.48	Fail	Incr.	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
47	Super Windows	2	Attached (Post-1976)	y	y		25.0	$1,440	0.53	Fail	Incr.	13%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
48	Super Windows	2	Attached (New)			y	25.0	$3,120	0.37	Fail	Incr.	19%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
49	Super Windows	2	Mobile (Existing)	y	y		25.0	$1,080	0.67	Fail	Incr.	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
50	Super Windows	2	Mobile (New)			y	25.0	$2,400	0.56	Fail	Incr.	19%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
51	High-Perf. New Homes	2	Detached (New)			y	30.0	$6,000	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
52	High-Perf. New Homes	2	Attached (New)			y	30.0	$4,800	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
53	High-Perf. New Homes	2	Mobile (New)			y	30.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
54	Net Zero Ready Homes	2	Detached (New)			y	30.0	$14,000	0.21	Fail	Full	30%	0%	0%	30%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
55	Net Zero Ready Homes	2	Attached (New)			y	30.0	$9,800	0.20	Fail	Full	30%	0%	0%	30%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
56	Net Zero Ready Homes	2	Mobile (New)			y	30.0	$9,800	0.23	Fail	Full	30%	0%	0%	30%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
57	Condensing Gas Furnaces	2	Detached (Pre-1976)	y	y		18.0	$1,477	0.25	Fail	Incr.	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
58	Condensing Gas Furnaces	2	Detached (Post-1976)	y	y		18.0	$1,477	0.21	Fail	Incr.	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
59	Condensing Gas Furnaces	2	Detached (New)			y	18.0	$1,477	0.21	Fail	Incr.	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
60	Condensing Gas Furnaces	2	Attached (Pre-1976)	y	y		18.0	$1,477	0.15	Fail	Incr.	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
61	Condensing Gas Furnaces	2	Attached (Post-1976)	y	y		18.0	$1,477	0.13	Fail	Incr.	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
62	Condensing Gas Furnaces	2	Attached (New)			y	18.0	$1,477	0.13	Fail	Incr.	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
63	Condensing Gas Furnaces	2	Mobile (Existing)	y	y		18.0	$1,477	0.17	Fail	Incr.	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
64	Condensing Gas Furnaces	2	Mobile (New)			y	18.0	$1,477	0.17	Fail	Incr.	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
65	Early Retire Gas Furnaces	2	Detached (Pre-1976)	y	y		9.0	$1,864	0.27	Fail	Incr.	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
66	Early Retire Gas Furnaces	2	Detached (Post-1976)	y	y		9.0	$1,864	0.23	Fail	Incr.	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
67	Early Retire Gas Furnaces	2	Attached (Pre-1976)	y	y		9.0	$1,864	0.16	Fail	Incr.	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
68	Early Retire Gas Furnaces	2	Attached (Post-1976)	y	y		9.0	$1,864	0.14	Fail	Incr.	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
69	Early Retire Gas Furnaces	2	Mobile (Existing)	y	y		9.0	$1,864	0.18	Fail	Incr.	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
70	Condensing Gas Boilers	2	Detached (Pre-1976)	y	y		20.0	$3,200	0.21	Fail	Incr.	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
71	Condensing Gas Boilers	2	Detached (Post-1976)	y	y		20.0	$3,200	0.18	Fail	Incr.	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
72	Condensing Gas Boilers	2	Detached (New)			y	20.0	$3,200	0.18	Fail	Incr.	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
73	Condensing Gas Boilers	2	Attached (Pre-1976)	y	y		20.0	$3,200	0.13	Fail	Incr.	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
74	Condensing Gas Boilers	2	Attached (Post-1976)	y	y		20.0	$3,200	0.11	Fail	Incr.	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
75	Condensing Gas Boilers	2	Attached (New)			y	20.0	$3,200	0.11	Fail	Incr.	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
76	Condensing Gas Boilers	2	Mobile (Existing)	y	y		20.0	$3,200	0.14	Fail	Incr.	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
77	Condensing Gas Boilers	2	Mobile (New)			y	20.0	$3,200	0.14	Fail	Incr.	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
78	Gas Fireplaces	2	Detached (Pre-1976)	y	y		15.0	$150	2.63	Pass	Incr.	0%	0%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
79	Gas Fireplaces	2	Detached (Post-1976)	y	y		15.0	$150	2.63	Pass	Incr.	0%	0%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
80	Gas Fireplaces	2	Detached (New)			y	15.0	$150	2.63	Pass	Incr.	0%	0%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
81	Gas Fireplaces	2	Attached (Pre-1976)	y	y		15.0	$150	1.74	Pass	Incr.	0%	0%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
82	Gas Fireplaces	2	Attached (Post-1976)	y	y		15.0	$150	1.74	Pass	Incr.	0%	0%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
83	Gas Fireplaces	2	Attached (New)			y	15.0	$150	1.74	Pass	Incr.	0%	0%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
84	Gas Fireplaces	2	Mobile (Existing)	y	y		15.0	$150	1.74	Pass	Incr.	0%	0%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
85	Gas Fireplaces	2	Mobile (New)			y	15.0	$150	1.74	Pass	Incr.	0%	0%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
86	Prog. Thermostats	2	Detached (Pre-1976)	y	y		11.0	$50	6.95	Pass	Full	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
87	Prog. Thermostats	2	Detached (Post-1976)	y	y		11.0	$50	6.16	Pass	Full	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
88	Prog. Thermostats	2	Detached (New)			y	11.0	$50	6.10	Pass	Full	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
89	Prog. Thermostats	2	Attached (Pre-1976)	y	y		11.0	$50	4.06	Pass	Full	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
90	Prog. Thermostats	2	Attached (Post-1976)	y	y		11.0	$50	3.70	Pass	Full	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
91	Prog. Thermostats	2	Attached (New)			y	11.0	$50	3.67	Pass	Full	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
92	Prog. Thermostats	2	Mobile (Existing)	y	y		11.0	$50	4.52	Pass	Full	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
93	Prog. Thermostats	2	Mobile (New)			y	11.0	$50	4.49	Pass	Full	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
94	Solar Make-Up Air	2	Detached (Pre-1976)	y	y		40.0	$1,300	0.16	Fail	Full	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
95	Solar Make-Up Air	2	Detached (Post-1976)	y	y		40.0	$1,300	0.14	Fail	Full	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
96	Solar Make-Up Air	2	Detached (New)			y	40.0	$1,300	0.14	Fail	Full	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
97	Solar Make-Up Air	2	Attached (Pre-1976)	y	y		40.0	$1,300	0.09	Fail	Full	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
98	Solar Make-Up Air	2	Attached (Post-1976)	y	y		40.0	$1,300	0.09	Fail	Full	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
99	Solar Make-Up Air	2	Attached (New)			y	40.0	$1,300	0.08	Fail	Full	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
100	Solar Make-Up Air	2	Mobile (Existing)	y	y		40.0	$1,300	0.10	Fail	Full	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
101	Solar Make-Up Air	2	Mobile (New)			y	40.0	$1,300	0.10	Fail	Full	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
102	HRVs	2	Detached (Pre-1976)	y	y		15.0	$600	0.40	Fail	Incr.	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
103	HRVs	2	Detached (Post-1976)	y	y		15.0	$600	0.37	Fail	Incr.	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
104	HRVs	2	Detached (New)			y	15.0	$600	0.36	Fail	Incr.	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
105	HRVs	2	Attached (Pre-1976)	y	y		15.0	$600	0.23	Fail	Incr.	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
106	HRVs	2	Attached (Post-1976)	y	y		15.0	$600	0.21	Fail	Incr.	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
107	HRVs	2	Attached (New)			y	15.0	$600	0.21	Fail	Incr.	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
108	HRVs	2	Mobile (Existing)	y	y		15.0	$600	0.25	Fail	Incr.	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
109	HRVs	2	Mobile (New)			y	15.0	$600	0.24	Fail	Incr.	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
110	Air Heat Pumps	2	Detached (Pre-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
111	Air Heat Pumps	2	Detached (Post-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
112	Air Heat Pumps	2	Detached (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
113	Air Heat Pumps	2	Attached (Pre-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
114	Air Heat Pumps	2	Attached (Post-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
115	Air Heat Pumps	2	Attached (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
116	Air Heat Pumps	2	Mobile (Existing)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
117	Air Heat Pumps	2	Mobile (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
118	Ground Heat Pumps	2	Detached (Pre-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
119	Ground Heat Pumps	2	Detached (Post-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
120	Ground Heat Pumps	2	Detached (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
121	Ground Heat Pumps	2	Attached (Pre-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
122	Ground Heat Pumps	2	Attached (Post-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
123	Ground Heat Pumps	2	Attached (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
124	Ground Heat Pumps	2	Mobile (Existing)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
125	Ground Heat Pumps	2	Mobile (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
126	Heating & DHW	2	Detached (Pre-1976)	y	y		18.0	$8,506	0.08	Fail	Incr.	4%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
127	Heating & DHW	2	Detached (Post-1976)	y	y		18.0	$8,506	0.07	Fail	Incr.	4%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
128	Heating & DHW	2	Detached (New)			y	18.0	$3,506	0.18	Fail	Incr.	4%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
129	Heating & DHW	2	Attached (Pre-1976)	y	y		18.0	$8,506	0.06	Fail	Incr.	4%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
130	Heating & DHW	2	Attached (Post-1976)	y	y		18.0	$8,506	0.06	Fail	Incr.	4%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
131	Heating & DHW	2	Attached (New)			y	18.0	$3,506	0.14	Fail	Incr.	4%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
132	Heating & DHW	2	Mobile (Existing)	y	y		18.0	$8,506	0.06	Fail	Incr.	4%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
133	Heating & DHW	2	Mobile (New)			y	18.0	$3,506	0.14	Fail	Incr.	4%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
134	Heating & DHW (Hydronic)	2	Detached (Pre-1976)	y	y		20.0	$8,000	0.15	Fail	Incr.	12%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
135	Heating & DHW (Hydronic)	2	Detached (Post-1976)	y	y		20.0	$8,000	0.14	Fail	Incr.	12%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
136	Heating & DHW (Hydronic)	2	Detached (New)			y	20.0	$3,000	0.36	Fail	Incr.	12%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
137	Heating & DHW (Hydronic)	2	Attached (Pre-1976)	y	y		20.0	$8,000	0.10	Fail	Incr.	12%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
138	Heating & DHW (Hydronic)	2	Attached (Post-1976)	y	y		20.0	$8,000	0.10	Fail	Incr.	12%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
139	Heating & DHW (Hydronic)	2	Attached (New)			y	20.0	$3,000	0.26	Fail	Incr.	12%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
140	Heating & DHW (Hydronic)	2	Mobile (Existing)	y	y		20.0	$8,000	0.11	Fail	Incr.	12%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
141	Heating & DHW (Hydronic)	2	Mobile (New)			y	20.0	$3,000	0.29	Fail	Incr.	12%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
142	Condensing Gas DHW	2	Detached (Pre-1976)	y	y		13.0	$1,567	0.18	Fail	Incr.	0%	0%	0%	23%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
143	Condensing Gas DHW	2	Detached (Post-1976)	y	y		13.0	$1,567	0.18	Fail	Incr.	0%	0%	0%	23%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
144	Condensing Gas DHW	2	Detached (New)			y	13.0	$1,073	0.26	Fail	Incr.	0%	0%	0%	23%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
145	Condensing Gas DHW	2	Attached (Pre-1976)	y	y		13.0	$1,567	0.15	Fail	Incr.	0%	0%	0%	23%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
146	Condensing Gas DHW	2	Attached (Post-1976)	y	y		13.0	$1,567	0.15	Fail	Incr.	0%	0%	0%	23%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
147	Condensing Gas DHW	2	Attached (New)			y	13.0	$1,073	0.22	Fail	Incr.	0%	0%	0%	23%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
148	Condensing Gas DHW	2	Mobile (Existing)	y	y		13.0	$1,567	0.14	Fail	Incr.	0%	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
149	Condensing Gas DHW	2	Mobile (New)			y	13.0	$1,073	0.20	Fail	Incr.	0%	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
150	Tankless Gas DHW	2	Detached (Pre-1976)	y	y		20.0	$2,274	0.26	Fail	Incr.	0%	0%	0%	35%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
151	Tankless Gas DHW	2	Detached (Post-1976)	y	y		20.0	$2,274	0.26	Fail	Incr.	0%	0%	0%	35%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
152	Tankless Gas DHW	2	Detached (New)			y	20.0	$1,646	0.35	Fail	Incr.	0%	0%	0%	35%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
153	Tankless Gas DHW	2	Attached (Pre-1976)	y	y		20.0	$2,274	0.22	Fail	Incr.	0%	0%	0%	35%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
154	Tankless Gas DHW	2	Attached (Post-1976)	y	y		20.0	$2,274	0.22	Fail	Incr.	0%	0%	0%	35%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
155	Tankless Gas DHW	2	Attached (New)			y	20.0	$1,646	0.30	Fail	Incr.	0%	0%	0%	35%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
156	Tankless Gas DHW	2	Mobile (Existing)	y	y		20.0	$2,274	0.22	Fail	Incr.	0%	0%	0%	35%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
157	Tankless Gas DHW	2	Mobile (New)			y	20.0	$1,646	0.31	Fail	Incr.	0%	0%	0%	35%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
158	Solar DHW	2	Detached (Pre-1976)	y	y		25.0	$7,000	0.17	Fail	Full	0%	0%	0%	63%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
159	Solar DHW	2	Detached (Post-1976)	y	y		25.0	$7,000	0.17	Fail	Full	0%	0%	0%	63%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
160	Solar DHW	2	Detached (New)			y	25.0	$7,000	0.17	Fail	Full	0%	0%	0%	63%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
161	Solar DHW	2	Attached (Pre-1976)	y	y		25.0	$7,000	0.16	Fail	Full	0%	0%	0%	68%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
162	Solar DHW	2	Attached (Post-1976)	y	y		25.0	$7,000	0.16	Fail	Full	0%	0%	0%	68%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
163	Solar DHW	2	Attached (New)			y	25.0	$7,000	0.16	Fail	Full	0%	0%	0%	68%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
164	Solar DHW	2	Mobile (Existing)	y	y		25.0	$7,000	0.17	Fail	Full	0%	0%	0%	73%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%
165	Solar DHW	2	Mobile (New)			y	25.0	$7,000	0.17	Fail	Full	0%	0%	0%	73%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%
166	DHW Tank Insulation	2	Detached (Pre-1976)	y	y		13.0	$35	0.66	Fail	Full	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
167	DHW Tank Insulation	2	Detached (Post-1976)	y	y		13.0	$35	0.66	Fail	Full	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
168	DHW Tank Insulation	2	Detached (New)			y	13.0	$35	0.66	Fail	Full	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
169	DHW Tank Insulation	2	Attached (Pre-1976)	y	y		13.0	$25	0.78	Fail	Full	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
170	DHW Tank Insulation	2	Attached (Post-1976)	y	y		13.0	$25	0.78	Fail	Full	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
171	DHW Tank Insulation	2	Attached (New)			y	13.0	$25	0.78	Fail	Full	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
172	DHW Tank Insulation	2	Mobile (Existing)	y	y		13.0	$25	0.81	Fail	Full	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
173	DHW Tank Insulation	2	Mobile (New)			y	13.0	$25	0.81	Fail	Full	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
174	DHW Pipe Insulation	2	Detached (Pre-1976)	y	y		15.0	$1	13.29	Pass	Full	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
175	DHW Pipe Insulation	2	Detached (Post-1976)	y	y		15.0	$1	13.29	Pass	Full	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
176	DHW Pipe Insulation	2	Detached (New)			y	15.0	$1	13.29	Pass	Full	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
177	DHW Pipe Insulation	2	Attached (Pre-1976)	y	y		15.0	$1	11.22	Pass	Full	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
178	DHW Pipe Insulation	2	Attached (Post-1976)	y	y		15.0	$1	11.22	Pass	Full	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
179	DHW Pipe Insulation	2	Attached (New)			y	15.0	$1	11.22	Pass	Full	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
180	DHW Pipe Insulation	2	Mobile (Existing)	y	y		15.0	$1	11.57	Pass	Full	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
181	DHW Pipe Insulation	2	Mobile (New)			y	15.0	$1	11.57	Pass	Full	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
182	DHW Heat Traps	2	Detached (New)			y	13.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
183	DHW Heat Traps	2	Attached (New)			y	13.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
184	DHW Heat Traps	2	Mobile (New)			y	13.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
185	Showerheads	2	Detached (Pre-1976)	y	y		10.0	$13	7.50	Pass	Full	0%	0%	0%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
186	Showerheads	2	Detached (Post-1976)	y	y		10.0	$13	7.50	Pass	Full	0%	0%	0%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
187	Showerheads	2	Detached (New)			y	10.0	$13	7.50	Pass	Full	0%	0%	0%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
188	Showerheads	2	Attached (Pre-1976)	y	y		10.0	$13	6.33	Pass	Full	0%	0%	0%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
189	Showerheads	2	Attached (Post-1976)	y	y		10.0	$13	6.33	Pass	Full	0%	0%	0%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
190	Showerheads	2	Attached (New)			y	10.0	$13	6.33	Pass	Full	0%	0%	0%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
191	Showerheads	2	Mobile (Existing)	y	y		10.0	$13	6.53	Pass	Full	0%	0%	0%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
192	Showerheads	2	Mobile (New)			y	10.0	$13	6.53	Pass	Full	0%	0%	0%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
193	Faucet Aerators	2	Detached (Pre-1976)	y	y		10.0	$15	3.93	Pass	Full	0%	0%	0%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
194	Faucet Aerators	2	Detached (Post-1976)	y	y		10.0	$15	3.93	Pass	Full	0%	0%	0%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
195	Faucet Aerators	2	Detached (New)			y	10.0	$15	3.93	Pass	Full	0%	0%	0%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
196	Faucet Aerators	2	Attached (Pre-1976)	y	y		10.0	$15	3.32	Pass	Full	0%	0%	0%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
197	Faucet Aerators	2	Attached (Post-1976)	y	y		10.0	$15	3.32	Pass	Full	0%	0%	0%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
198	Faucet Aerators	2	Attached (New)			y	10.0	$15	3.32	Pass	Full	0%	0%	0%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
199	Faucet Aerators	2	Mobile (Existing)	y	y		10.0	$15	3.42	Pass	Full	0%	0%	0%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
200	Faucet Aerators	2	Mobile (New)			y	10.0	$15	3.42	Pass	Full	0%	0%	0%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
201	Wastewater Heat Recovery	2	Detached (Pre-1976)	y	y		30.0	$800	0.35	Fail	Full	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
202	Wastewater Heat Recovery	2	Detached (Post-1976)	y	y		30.0	$800	0.35	Fail	Full	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
203	Wastewater Heat Recovery	2	Detached (New)			y	30.0	$800	0.35	Fail	Full	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
204	Wastewater Heat Recovery	2	Attached (Pre-1976)	y	y		30.0	$731	0.32	Fail	Full	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
205	Wastewater Heat Recovery	2	Attached (Post-1976)	y	y		30.0	$731	0.32	Fail	Full	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
206	Wastewater Heat Recovery	2	Attached (New)			y	30.0	$731	0.32	Fail	Full	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
207	Wastewater Heat Recovery	2	Mobile (Existing)	y	y		30.0	$731	0.33	Fail	Full	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
208	Wastewater Heat Recovery	2	Mobile (New)			y	30.0	$731	0.33	Fail	Full	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
209	DHW Recirculation	2	Detached (Pre-1976)	y	y		18.0	$570	0.44	Fail	Full	0%	0%	0%	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%

210	DHW Recirculation	2	Detached (Post-1976)	y	y		18.0	$570	0.44	Fail	Full	0%	0%	0%	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
211	DHW Recirculation	2	Detached (New)			y	18.0	$570	0.44	Fail	Full	0%	0%	0%	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
212	DHW Recirculation	2	Attached (Pre-1976)	y	y		18.0	$470	0.45	Fail	Full	0%	0%	0%	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
213	DHW Recirculation	2	Attached (Post-1976)	y	y		18.0	$470	0.45	Fail	Full	0%	0%	0%	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
214	DHW Recirculation	2	Attached (New)			y	18.0	$470	0.45	Fail	Full	0%	0%	0%	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
215	DHW Recirculation	2	Mobile (Existing)	y	y		18.0	$470	0.46	Fail	Full	0%	0%	0%	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
216	DHW Recirculation	2	Mobile (New)			y	18.0	$470	0.46	Fail	Full	0%	0%	0%	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
217	ESTAR Dishwashers	2	Detached (Pre-1976)	y	y		11.0	$105	0.27	Fail	Incr.	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
218	ESTAR Dishwashers	2	Detached (Post-1976)	y	y		11.0	$105	0.27	Fail	Incr.	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
219	ESTAR Dishwashers	2	Detached (New)			y	11.0	$105	0.27	Fail	Incr.	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
220	ESTAR Dishwashers	2	Attached (Pre-1976)	y	y		11.0	$105	0.22	Fail	Incr.	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
221	ESTAR Dishwashers	2	Attached (Post-1976)	y	y		11.0	$105	0.22	Fail	Incr.	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
222	ESTAR Dishwashers	2	Attached (New)			y	11.0	$105	0.22	Fail	Incr.	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
223	ESTAR Dishwashers	2	Mobile (Existing)	y	y		11.0	$105	0.22	Fail	Incr.	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
224	ESTAR Dishwashers	2	Mobile (New)			y	11.0	$105	0.22	Fail	Incr.	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
225	ESTAR Clothes Washers	2	Detached (Pre-1976)	y	y		14.0	$300	0.78	Fail	Incr.	0%	0%	0%	7%	0%	0%	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
226	ESTAR Clothes Washers	2	Detached (Post-1976)	y	y		14.0	$300	0.78	Fail	Incr.	0%	0%	0%	7%	0%	0%	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
227	ESTAR Clothes Washers	2	Detached (New)			y	14.0	$300	0.78	Fail	Incr.	0%	0%	0%	7%	0%	0%	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
228	ESTAR Clothes Washers	2	Attached (Pre-1976)	y	y		14.0	$300	0.67	Fail	Incr.	0%	0%	0%	7%	0%	0%	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
229	ESTAR Clothes Washers	2	Attached (Post-1976)	y	y		14.0	$300	0.67	Fail	Incr.	0%	0%	0%	7%	0%	0%	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
230	ESTAR Clothes Washers	2	Attached (New)			y	14.0	$300	0.67	Fail	Incr.	0%	0%	0%	7%	0%	0%	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
231	ESTAR Clothes Washers	2	Mobile (Existing)	y	y		14.0	$300	0.70	Fail	Incr.	0%	0%	0%	7%	0%	0%	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
232	ESTAR Clothes Washers	2	Mobile (New)			y	14.0	$300	0.70	Fail	Incr.	0%	0%	0%	7%	0%	0%	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
233	Gas Clothes Dryers	2	Detached (Pre-1976)	y	y		18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
234	Gas Clothes Dryers	2	Detached (Post-1976)	y	y		18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
235	Gas Clothes Dryers	2	Detached (New)			y	18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
236	Gas Clothes Dryers	2	Attached (Pre-1976)	y	y		18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
237	Gas Clothes Dryers	2	Attached (Post-1976)	y	y		18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
238	Gas Clothes Dryers	2	Attached (New)			y	18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
239	Gas Clothes Dryers	2	Mobile (Existing)	y	y		18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
240	Gas Clothes Dryers	2	Mobile (New)			y	18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
241	Pool Covers	2	Detached (Pre-1976)	y	y		10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	26%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
242	Pool Covers	2	Detached (Post-1976)	y	y		10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	26%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
243	Pool Covers	2	Detached (New)			y	10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	26%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
244	Pool Covers	2	Attached (Pre-1976)	y	y		10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	26%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
245	Pool Covers	2	Attached (Post-1976)	y	y		10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	26%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
246	Pool Covers	2	Attached (New)			y	10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	26%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
247	Pool Covers	2	Mobile (Existing)	y	y		10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	26%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
248	Pool Covers	2	Mobile (New)			y	10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	26%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
249	Heat Pump Pool Heaters	2	Detached (Pre-1976)	y	y		10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
250	Heat Pump Pool Heaters	2	Detached (Post-1976)	y	y		10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
251	Heat Pump Pool Heaters	2	Detached (New)			y	10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
252	Heat Pump Pool Heaters	2	Attached (Pre-1976)	y	y		10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
253	Heat Pump Pool Heaters	2	Attached (Post-1976)	y	y		10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
254	Heat Pump Pool Heaters	2	Attached (New)			y	10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
255	Heat Pump Pool Heaters	2	Mobile (Existing)	y	y		10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
256	Heat Pump Pool Heaters	2	Mobile (New)			y	10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
257	Efficient Pool Heaters	2	Detached (Pre-1976)	y	y		7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
258	Efficient Pool Heaters	2	Detached (Post-1976)	y	y		7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
259	Efficient Pool Heaters	2	Detached (New)			y	7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
260	Efficient Pool Heaters	2	Attached (Pre-1976)	y	y		7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
261	Efficient Pool Heaters	2	Attached (Post-1976)	y	y		7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
262	Efficient Pool Heaters	2	Attached (New)			y	7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
263	Efficient Pool Heaters	2	Mobile (Existing)	y	y		7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
264	Efficient Pool Heaters	2	Mobile (New)			y	7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
265	Solar Pool Heaters	2	Detached (Pre-1976)	y	y		20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
266	Solar Pool Heaters	2	Detached (Post-1976)	y	y		20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
267	Solar Pool Heaters	2	Detached (New)			y	20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
268	Solar Pool Heaters	2	Attached (Pre-1976)	y	y		20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
269	Solar Pool Heaters	2	Attached (Post-1976)	y	y		20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
270	Solar Pool Heaters	2	Attached (New)			y	20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
271	Solar Pool Heaters	2	Mobile (Existing)	y	y		20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
272	Solar Pool Heaters	2	Mobile (New)			y	20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
273	Micro-CHP	2	Detached (Pre-1976)	y	y		20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
274	Micro-CHP	2	Detached (Post-1976)	y	y		20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
275	Micro-CHP	2	Detached (New)			y	20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
276	Micro-CHP	2	Attached (Pre-1976)	y	y		20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
277	Micro-CHP	2	Attached (Post-1976)	y	y		20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
278	Micro-CHP	2	Attached (New)			y	20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
279	Micro-CHP	2	Mobile (Existing)	y	y		20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
280	Micro-CHP	2	Mobile (New)			y	20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Measure Information		Applicability										Savings by End Use																				
Measure #	Technology	Climate Zone	Building Type(s)	Exist	Reno	New	Life	Cost	Benefit/Cost Ratio	Economic Screen	Basis	Space heating	Space cooling	Ventilation and Circulation	Domestic hot water (DHW)	Fireplace	Cooking	Dishwasher	Clothes washer	Clothes dryer	Pool & spa heaters	Other gas uses	Other electrical internal loads									
1	Attic Insulation	2	Detached (Pre-1976)	y	y		30.0	$675	0.94	Fail	Full	0%	3%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2	Attic Insulation	2	Detached (Post-1976)	y	y		30.0	$713	0.64	Fail	Full	0%	2%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3	Attic Insulation	2	Attached (Pre-1976)	y	y		30.0	$450	0.83	Fail	Full	0%	3%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4	Attic Insulation	2	Attached (Post-1976)	y	y		30.0	$488	0.56	Fail	Full	0%	2%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5	Attic Insulation	2	Mobile (Existing)	y	y		30.0	$525	0.68	Fail	Full	0%	2%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6	Wall Insulation	2	Detached (Pre-1976)	y	y		30.0	$2,000	0.77	Fail	Incr.	0%	3%	15%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
7	Wall Insulation	2	Detached (Post-1976)	y	y		30.0	$2,000	0.68	Fail	Incr.	0%	3%	15%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
8	Wall Insulation	2	Attached (Pre-1976)	y	y		30.0	$1,500	0.61	Fail	Incr.	0%	3%	15%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
9	Wall Insulation	2	Attached (Post-1976)	y	y		30.0	$1,500	0.55	Fail	Incr.	0%	3%	15%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
10	Wall Insulation	2	Mobile (Existing)	y	y		30.0	$1,500	0.64	Fail	Incr.	0%	3%	15%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
11	Slab Insulation	2	Detached (Pre-1976)	y	y		30.0	$1,125	0.10	Fail	Incr.	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12	Slab Insulation	2	Detached (Post-1976)	y	y		30.0	$1,275	0.06	Fail	Incr.	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
13	Slab Insulation	2	Attached (Pre-1976)	y	y		30.0	$975	0.07	Fail	Incr.	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
14	Slab Insulation	2	Attached (Post-1976)	y	y		30.0	$1,050	0.05	Fail	Incr.	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
15	Basement Insulation	2	Detached (Pre-1976)	y	y		30.0	$1,400	0.75	Fail	Incr.	0%	0%	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
16	Basement Insulation	2	Detached (Post-1976)	y	y		30.0	$1,500	0.68	Fail	Incr.	0%	0%	12%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
17	Basement Insulation	2	Attached (Pre-1976)	y	y		30.0	$900	0.58	Fail	Incr.	0%	0%	8%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
18	Basement Insulation	2	Attached (Post-1976)	y	y		30.0	$1,000	0.49	Fail	Incr.	0%	0%	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
19	Crawl Space Insul.	2	Detached (Pre-1976)	y	y		30.0	$800	0.27	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
20	Crawl Space Insul.	2	Detached (Post-1976)	y	y		30.0	$800	0.24	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21	Crawl Space Insul.	2	Attached (Pre-1976)	y	y		30.0	$800	0.16	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22	Crawl Space Insul.	2	Attached (Post-1976)	y	y		30.0	$800	0.15	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23	Air Sealing	2	Detached (Pre-1976)	y	y		25.0	$1,800	0.42	Fail	Full	0%	1%	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
24	Air Sealing	2	Detached (Post-1976)	y	y		25.0	$1,800	0.34	Fail	Full	0%	1%	8%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
25	Air Sealing	2	Attached (Pre-1976)	y	y		25.0	$1,800	0.26	Fail	Full	0%	1%	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
26	Air Sealing	2	Attached (Post-1976)	y	y		25.0	$1,800	0.20	Fail	Full	0%	1%	8%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
27	Air Sealing	2	Mobile (Existing)	y	y		25.0	$1,800	0.24	Fail	Full	0%	1%	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
28	Homeowner Air Sealing	2	Detached (Pre-1976)	y	y		10.0	$200	0.78	Fail	Full	0%	0%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
29	Homeowner Air Sealing	2	Detached (Post-1976)	y	y		10.0	$200	0.63	Fail	Full	0%	1%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
30	Homeowner Air Sealing	2	Attached (Pre-1976)	y	y		10.0	$200	0.47	Fail	Full	0%	0%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
31	Homeowner Air Sealing	2	Attached (Post-1976)	y	y		10.0	$200	0.38	Fail	Full	0%	1%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
32	Homeowner Air Sealing	2	Mobile (Existing)	y	y		10.0	$200	0.45	Fail	Full	0%	0%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
33	Sealing & Insul. - Old Homes	2	Detached (Pre-1976)	y	y		25.0	$3,000	0.44	Fail	Full	0%	3%	15%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
34	Sealing & Insul. - Old Homes	2	Attached (Pre-1976)	y	y		25.0	$2,500	0.31	Fail	Full	0%	3%	15%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
35	Zone Up Windows	2	Detached (Pre-1976)	y	y		25.0	$1,000	0.24	Fail	Incr.	0%	1%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
36	Zone Up Windows	2	Detached (Post-1976)	y	y		25.0	$1,200	0.25	Fail	Incr.	0%	1%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
37	Zone Up Windows	2	Detached (New)			y	25.0	$2,600	0.19	Fail	Incr.	0%	2%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
38	Zone Up Windows	2	Attached (Pre-1976)	y	y		25.0	$800	0.18	Fail	Incr.	0%	1%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
39	Zone Up Windows	2	Attached (Post-1976)	y	y		25.0	$960	0.18	Fail	Incr.	0%	1%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
40	Zone Up Windows	2	Attached (New)			y	25.0	$2,080	0.14	Fail	Incr.	0%	2%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
41	Zone Up Windows	2	Mobile (Existing)	y	y		25.0	$720	0.26	Fail	Incr.	0%	1%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
42	Zone Up Windows	2	Mobile (New)			y	25.0	$1,600	0.21	Fail	Incr.	0%	2%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
43	Super Windows	2	Detached (Pre-1976)	y	y		25.0	$1,500	0.66	Fail	Incr.	0%	8%	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
44	Super Windows	2	Detached (Post-1976)	y	y		25.0	$1,800	0.73	Fail	Incr.	0%	10%	13%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
45	Super Windows	2	Detached (New)			y	25.0	$3,900	0.51	Fail	Incr.	0%	17%	19%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
46	Super Windows	2	Attached (Pre-1976)	y	y		25.0	$1,200	0.48	Fail	Incr.	0%	8%	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
47	Super Windows	2	Attached (Post-1976)	y	y		25.0	$1,440	0.53	Fail	Incr.	0%	10%	13%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
48	Super Windows	2	Attached (New)			y	25.0	$3,120	0.37	Fail	Incr.	0%	17%	19%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
49	Super Windows	2	Mobile (Existing)	y	y		25.0	$1,080	0.67	Fail	Incr.	0%	9%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
50	Super Windows	2	Mobile (New)			y	25.0	$2,400	0.56	Fail	Incr.	0%	17%	19%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
51	High-Perf. New Homes	2	Detached (New)			y	30.0	$6,000	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
52	High-Perf. New Homes	2	Attached (New)			y	30.0	$4,800	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
53	High-Perf. New Homes	2	Mobile (New)			y	30.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
54	Net Zero Ready Homes	2	Detached (New)			y	30.0	$14,000	0.21	Fail	Full	0%	0%	30%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
55	Net Zero Ready Homes	2	Attached (New)			y	30.0	$9,800	0.20	Fail	Full	0%	0%	30%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
56	Net Zero Ready Homes	2	Mobile (New)			y	30.0	$9,800	0.23	Fail	Full	0%	0%	30%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
57	Condensing Gas Furnaces	2	Detached (Pre-1976)	y	y		18.0	$1,477	0.25	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
58	Condensing Gas Furnaces	2	Detached (Post-1976)	y	y		18.0	$1,477	0.21	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
59	Condensing Gas Furnaces	2	Detached (New)			y	18.0	$1,477	0.21	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
60	Condensing Gas Furnaces	2	Attached (Pre-1976)	y	y		18.0	$1,477	0.15	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
61	Condensing Gas Furnaces	2	Attached (Post-1976)	y	y		18.0	$1,477	0.13	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
62	Condensing Gas Furnaces	2	Attached (New)			y	18.0	$1,477	0.13	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
63	Condensing Gas Furnaces	2	Mobile (Existing)	y	y		18.0	$1,477	0.17	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
64	Condensing Gas Furnaces	2	Mobile (New)			y	18.0	$1,477	0.17	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
65	Early Retire Gas Furnaces	2	Detached (Pre-1976)	y	y		9.0	$1,864	0.27	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
66	Early Retire Gas Furnaces	2	Detached (Post-1976)	y	y		9.0	$1,864	0.23	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
67	Early Retire Gas Furnaces	2	Attached (Pre-1976)	y	y		9.0	$1,864	0.16	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
68	Early Retire Gas Furnaces	2	Attached (Post-1976)	y	y		9.0	$1,864	0.14	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
69	Early Retire Gas Furnaces	2	Mobile (Existing)	y	y		9.0	$1,864	0.18	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
70	Condensing Gas Boilers	2	Detached (Pre-1976)	y	y		20.0	$3,200	0.21	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
71	Condensing Gas Boilers	2	Detached (Post-1976)	y	y		20.0	$3,200	0.18	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
72	Condensing Gas Boilers	2	Detached (New)			y	20.0	$3,200	0.18	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
73	Condensing Gas Boilers	2	Attached (Pre-1976)	y	y		20.0	$3,200	0.13	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
74	Condensing Gas Boilers	2	Attached (Post-1976)	y	y		20.0	$3,200	0.11	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
75	Condensing Gas Boilers	2	Attached (New)			y	20.0	$3,200	0.11	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
76	Condensing Gas Boilers	2	Mobile (Existing)	y	y		20.0	$3,200	0.14	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
77	Condensing Gas Boilers	2	Mobile (New)			y	20.0	$3,200	0.14	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
78	Gas Fireplaces	2	Detached (Pre-1976)	y	y		15.0	$150	2.63	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
79	Gas Fireplaces	2	Detached (Post-1976)	y	y		15.0	$150	2.63	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
80	Gas Fireplaces	2	Detached (New)			y	15.0	$150	2.63	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
81	Gas Fireplaces	2	Attached (Pre-1976)	y	y		15.0	$150	1.74	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
82	Gas Fireplaces	2	Attached (Post-1976)	y	y		15.0	$150	1.74	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
83	Gas Fireplaces	2	Attached (New)			y	15.0	$150	1.74	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
84	Gas Fireplaces	2	Mobile (Existing)	y	y		15.0	$150	1.74	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
85	Gas Fireplaces	2	Mobile (New)			y	15.0	$150	1.74	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
86	Prog. Thermostats	2	Detached (Pre-1976)	y	y		11.0	$50	6.95	Pass	Full	0%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
87	Prog. Thermostats	2	Detached (Post-1976)	y	y		11.0	$50	6.16	Pass	Full	0%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
88	Prog. Thermostats	2	Detached (New)			y	11.0	$50	6.10	Pass	Full	0%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
89	Prog. Thermostats	2	Attached (Pre-1976)	y	y		11.0	$50	4.06	Pass	Full	0%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
90	Prog. Thermostats	2	Attached (Post-1976)	y	y		11.0	$50	3.70	Pass	Full	0%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
91	Prog. Thermostats	2	Attached (New)			y	11.0	$50	3.67	Pass	Full	0%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
92	Prog. Thermostats	2	Mobile (Existing)	y	y		11.0	$50	4.52	Pass	Full	0%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
93	Prog. Thermostats	2	Mobile (New)			y	11.0	$50	4.49	Pass	Full	0%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
94	Solar Make-Up Air	2	Detached (Pre-1976)	y	y		40.0	$1,300	0.16	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
95	Solar Make-Up Air	2	Detached (Post-1976)	y	y		40.0	$1,300	0.14	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
96	Solar Make-Up Air	2	Detached (New)			y	40.0	$1,300	0.14	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
97	Solar Make-Up Air	2	Attached (Pre-1976)	y	y		40.0	$1,300	0.09	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
98	Solar Make-Up Air	2	Attached (Post-1976)	y	y		40.0	$1,300	0.09	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
99	Solar Make-Up Air	2	Attached (New)			y	40.0	$1,300	0.08	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
100	Solar Make-Up Air	2	Mobile (Existing)	y	y		40.0	$1,300	0.10	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
101	Solar Make-Up Air	2	Mobile (New)			y	40.0	$1,300	0.10	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
102	HRVs	2	Detached (Pre-1976)	y	y		15.0	$600	0.40	Fail	Incr.	0%	3%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
103	HRVs	2	Detached (Post-1976)	y	y		15.0	$600	0.37	Fail	Incr.	0%	3%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
104	HRVs	2	Detached (New)			y	15.0	$600	0.36	Fail	Incr.	0%	3%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
105	HRVs	2	Attached (Pre-1976)	y	y		15.0	$600	0.23	Fail	Incr.	0%	3%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
106	HRVs	2	Attached (Post-1976)	y	y		15.0	$600	0.21	Fail	Incr.	0%	3%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
107	HRVs	2	Attached (New)			y	15.0	$600	0.21	Fail	Incr.	0%	3%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
108	HRVs	2	Mobile (Existing)	y	y		15.0	$600	0.25	Fail	Incr.	0%	3%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
109	HRVs	2	Mobile (New)			y	15.0	$600	0.24	Fail	Incr.	0%	3%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
110	Air Heat Pumps	2	Detached (Pre-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
111	Air Heat Pumps	2	Detached (Post-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
112	Air Heat Pumps	2	Detached (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
113	Air Heat Pumps	2	Attached (Pre-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
114	Air Heat Pumps	2	Attached (Post-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
115	Air Heat Pumps	2	Attached (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
116	Air Heat Pumps	2	Mobile (Existing)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
117	Air Heat Pumps	2	Mobile (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
118	Ground Heat Pumps	2	Detached (Pre-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
119	Ground Heat Pumps	2	Detached (Post-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
120	Ground Heat Pumps	2	Detached (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
121	Ground Heat Pumps	2	Attached (Pre-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
122	Ground Heat Pumps	2	Attached (Post-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
123	Ground Heat Pumps	2	Attached (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
124	Ground Heat Pumps	2	Mobile (Existing)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
125	Ground Heat Pumps	2	Mobile (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
126	Heating & DHW	2	Detached (Pre-1976)	y	y		18.0	$8,506	0.08	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
127	Heating & DHW	2	Detached (Post-1976)	y	y		18.0	$8,506	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
128	Heating & DHW	2	Detached (New)			y	18.0	$3,506	0.18	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
129	Heating & DHW	2	Attached (Pre-1976)	y	y		18.0	$8,506	0.06	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
130	Heating & DHW	2	Attached (Post-1976)	y	y		18.0	$8,506	0.06	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
131	Heating & DHW	2	Attached (New)			y	18.0	$3,506	0.14	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
132	Heating & DHW	2	Mobile (Existing)	y	y		18.0	$8,506	0.06	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
133	Heating & DHW	2	Mobile (New)			y	18.0	$3,506	0.14	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
134	Heating & DHW (Hydronic)	2	Detached (Pre-1976)	y	y		20.0	$8,000	0.15	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
135	Heating & DHW (Hydronic)	2	Detached (Post-1976)	y	y		20.0	$8,000	0.14	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
136	Heating & DHW (Hydronic)	2	Detached (New)			y	20.0	$3,000	0.36	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
137	Heating & DHW (Hydronic)	2	Attached (Pre-1976)	y	y		20.0	$8,000	0.10	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
138	Heating & DHW (Hydronic)	2	Attached (Post-1976)	y	y		20.0	$8,000	0.10	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
139	Heating & DHW (Hydronic)	2	Attached (New)			y	20.0	$3,000	0.26	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
140	Heating & DHW (Hydronic)	2	Mobile (Existing)	y	y		20.0	$8,000	0.11	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
141	Heating & DHW (Hydronic)	2	Mobile (New)			y	20.0	$3,000	0.29	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
142	Condensing Gas DHW	2	Detached (Pre-1976)	y	y		13.0	$1,567	0.18	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
143	Condensing Gas DHW	2	Detached (Post-1976)	y	y		13.0	$1,567	0.18	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
144	Condensing Gas DHW	2	Detached (New)			y	13.0	$1,073	0.26	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
145	Condensing Gas DHW	2	Attached (Pre-1976)	y	y		13.0	$1,567	0.15	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
146	Condensing Gas DHW	2	Attached (Post-1976)	y	y		13.0	$1,567	0.15	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
147	Condensing Gas DHW	2	Attached (New)			y	13.0	$1,073	0.22	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
148	Condensing Gas DHW	2	Mobile (Existing)	y	y		13.0	$1,567	0.14	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
149	Condensing Gas DHW	2	Mobile (New)			y	13.0	$1,073	0.20	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
150	Tankless Gas DHW	2	Detached (Pre-1976)	y	y		20.0	$2,274	0.26	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
151	Tankless Gas DHW	2	Detached (Post-1976)	y	y		20.0	$2,274	0.26	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
152	Tankless Gas DHW	2	Detached (New)			y	20.0	$1,646	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
153	Tankless Gas DHW	2	Attached (Pre-1976)	y	y		20.0	$2,274	0.22	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
154	Tankless Gas DHW	2	Attached (Post-1976)	y	y		20.0	$2,274	0.22	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
155	Tankless Gas DHW	2	Attached (New)			y	20.0	$1,646	0.30	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
156	Tankless Gas DHW	2	Mobile (Existing)	y	y		20.0	$2,274	0.22	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
157	Tankless Gas DHW	2	Mobile (New)			y	20.0	$1,646	0.31	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
158	Solar DHW	2	Detached (Pre-1976)	y	y		25.0	$7,000	0.17	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
159	Solar DHW	2	Detached (Post-1976)	y	y		25.0	$7,000	0.17	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
160	Solar DHW	2	Detached (New)			y	25.0	$7,000	0.17	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
161	Solar DHW	2	Attached (Pre-1976)	y	y		25.0	$7,000	0.16	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
162	Solar DHW	2	Attached (Post-1976)	y	y		25.0	$7,000	0.16	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
163	Solar DHW	2	Attached (New)			y	25.0	$7,000	0.16	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
164	Solar DHW	2	Mobile (Existing)	y	y		25.0	$7,000	0.17	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
165	Solar DHW	2	Mobile (New)			y	25.0	$7,000	0.17	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
166	DHW Tank Insulation	2	Detached (Pre-1976)	y	y		13.0	$35	0.66	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
167	DHW Tank Insulation	2	Detached (Post-1976)	y	y		13.0	$35	0.66	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
168	DHW Tank Insulation	2	Detached (New)			y	13.0	$35	0.66	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
169	DHW Tank Insulation	2	Attached (Pre-1976)	y	y		13.0	$25	0.78	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
170	DHW Tank Insulation	2	Attached (Post-1976)	y	y		13.0	$25	0.78	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
171	DHW Tank Insulation	2	Attached (New)			y	13.0	$25	0.78	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
172	DHW Tank Insulation	2	Mobile (Existing)	y	y		13.0	$25	0.81	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
173	DHW Tank Insulation	2	Mobile (New)			y	13.0	$25	0.81	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
174	DHW Pipe Insulation	2	Detached (Pre-1976)	y	y		15.0	$1	13.29	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
175	DHW Pipe Insulation	2	Detached (Post-1976)	y	y		15.0	$1	13.29	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
176	DHW Pipe Insulation	2	Detached (New)			y	15.0	$1	13.29	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
177	DHW Pipe Insulation	2	Attached (Pre-1976)	y	y		15.0	$1	11.22	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
178	DHW Pipe Insulation	2	Attached (Post-1976)	y	y		15.0	$1	11.22	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
179	DHW Pipe Insulation	2	Attached (New)			y	15.0	$1	11.22	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
180	DHW Pipe Insulation	2	Mobile (Existing)	y	y		15.0	$1	11.57	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
181	DHW Pipe Insulation	2	Mobile (New)			y	15.0	$1	11.57	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
182	DHW Heat Traps	2	Detached (New)			y	13.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
183	DHW Heat Traps	2	Attached (New)			y	13.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
184	DHW Heat Traps	2	Mobile (New)			y	13.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
185	Showerheads	2	Detached (Pre-1976)	y	y		10.0	$13	7.50	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
186	Showerheads	2	Detached (Post-1976)	y	y		10.0	$13	7.50	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
187	Showerheads	2	Detached (New)			y	10.0	$13	7.50	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
188	Showerheads	2	Attached (Pre-1976)	y	y		10.0	$13	6.33	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
189	Showerheads	2	Attached (Post-1976)	y	y		10.0	$13	6.33	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
190	Showerheads	2	Attached (New)			y	10.0	$13	6.33	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
191	Showerheads	2	Mobile (Existing)	y	y		10.0	$13	6.53	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
192	Showerheads	2	Mobile (New)			y	10.0	$13	6.53	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
193	Faucet Aerators	2	Detached (Pre-1976)	y	y		10.0	$15	3.93	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
194	Faucet Aerators	2	Detached (Post-1976)	y	y		10.0	$15	3.93	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
195	Faucet Aerators	2	Detached (New)			y	10.0	$15	3.93	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
196	Faucet Aerators	2	Attached (Pre-1976)	y	y		10.0	$15	3.32	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
197	Faucet Aerators	2	Attached (Post-1976)	y	y		10.0	$15	3.32	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
198	Faucet Aerators	2	Attached (New)			y	10.0	$15	3.32	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
199	Faucet Aerators	2	Mobile (Existing)	y	y		10.0	$15	3.42	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
200	Faucet Aerators	2	Mobile (New)			y	10.0	$15	3.42	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
201	Wastewater Heat Recovery	2	Detached (Pre-1976)	y	y		30.0	$800	0.35	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
202	Wastewater Heat Recovery	2	Detached (Post-1976)	y	y		30.0	$800	0.35	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
203	Wastewater Heat Recovery	2	Detached (New)			y	30.0	$800	0.35	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
204	Wastewater Heat Recovery	2	Attached (Pre-1976)	y	y		30.0	$731	0.32	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
205	Wastewater Heat Recovery	2	Attached (Post-1976)	y	y		30.0	$731	0.32	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
206	Wastewater Heat Recovery	2	Attached (New)			y	30.0	$731	0.32	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
207	Wastewater Heat Recovery	2	Mobile (Existing)	y	y		30.0	$731	0.33	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
208	Wastewater Heat Recovery	2	Mobile (New)			y	30.0	$731	0.33	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
209	DHW Recirculation	2	Detached (Pre-1976)	y	y		18.0	$570	0.44	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

210	DHW Recirculation	2	Detached (Post-1976)	y	y		18.0	$570	0.44	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
211	DHW Recirculation	2	Detached (New)			y	18.0	$570	0.44	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
212	DHW Recirculation	2	Attached (Pre-1976)	y	y		18.0	$470	0.45	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
213	DHW Recirculation	2	Attached (Post-1976)	y	y		18.0	$470	0.45	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
214	DHW Recirculation	2	Attached (New)			y	18.0	$470	0.45	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
215	DHW Recirculation	2	Mobile (Existing)	y	y		18.0	$470	0.46	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
216	DHW Recirculation	2	Mobile (New)			y	18.0	$470	0.46	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
217	ESTAR Dishwashers	2	Detached (Pre-1976)	y	y		11.0	$105	0.27	Fail	Incr.	0%	0%	0%	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
218	ESTAR Dishwashers	2	Detached (Post-1976)	y	y		11.0	$105	0.27	Fail	Incr.	0%	0%	0%	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
219	ESTAR Dishwashers	2	Detached (New)			y	11.0	$105	0.27	Fail	Incr.	0%	0%	0%	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
220	ESTAR Dishwashers	2	Attached (Pre-1976)	y	y		11.0	$105	0.22	Fail	Incr.	0%	0%	0%	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
221	ESTAR Dishwashers	2	Attached (Post-1976)	y	y		11.0	$105	0.22	Fail	Incr.	0%	0%	0%	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
222	ESTAR Dishwashers	2	Attached (New)			y	11.0	$105	0.22	Fail	Incr.	0%	0%	0%	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
223	ESTAR Dishwashers	2	Mobile (Existing)	y	y		11.0	$105	0.22	Fail	Incr.	0%	0%	0%	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
224	ESTAR Dishwashers	2	Mobile (New)			y	11.0	$105	0.22	Fail	Incr.	0%	0%	0%	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
225	ESTAR Clothes Washers	2	Detached (Pre-1976)	y	y		14.0	$300	0.78	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	37%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
226	ESTAR Clothes Washers	2	Detached (Post-1976)	y	y		14.0	$300	0.78	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	37%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
227	ESTAR Clothes Washers	2	Detached (New)			y	14.0	$300	0.78	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	37%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
228	ESTAR Clothes Washers	2	Attached (Pre-1976)	y	y		14.0	$300	0.67	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	37%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
229	ESTAR Clothes Washers	2	Attached (Post-1976)	y	y		14.0	$300	0.67	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	37%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
230	ESTAR Clothes Washers	2	Attached (New)			y	14.0	$300	0.67	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	37%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
231	ESTAR Clothes Washers	2	Mobile (Existing)	y	y		14.0	$300	0.70	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	37%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
232	ESTAR Clothes Washers	2	Mobile (New)			y	14.0	$300	0.70	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	37%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
233	Gas Clothes Dryers	2	Detached (Pre-1976)	y	y		18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
234	Gas Clothes Dryers	2	Detached (Post-1976)	y	y		18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
235	Gas Clothes Dryers	2	Detached (New)			y	18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
236	Gas Clothes Dryers	2	Attached (Pre-1976)	y	y		18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
237	Gas Clothes Dryers	2	Attached (Post-1976)	y	y		18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
238	Gas Clothes Dryers	2	Attached (New)			y	18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
239	Gas Clothes Dryers	2	Mobile (Existing)	y	y		18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
240	Gas Clothes Dryers	2	Mobile (New)			y	18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
241	Pool Covers	2	Detached (Pre-1976)	y	y		10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
242	Pool Covers	2	Detached (Post-1976)	y	y		10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
243	Pool Covers	2	Detached (New)			y	10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
244	Pool Covers	2	Attached (Pre-1976)	y	y		10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
245	Pool Covers	2	Attached (Post-1976)	y	y		10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
246	Pool Covers	2	Attached (New)			y	10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
247	Pool Covers	2	Mobile (Existing)	y	y		10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
248	Pool Covers	2	Mobile (New)			y	10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
249	Heat Pump Pool Heaters	2	Detached (Pre-1976)	y	y		10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
250	Heat Pump Pool Heaters	2	Detached (Post-1976)	y	y		10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
251	Heat Pump Pool Heaters	2	Detached (New)			y	10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
252	Heat Pump Pool Heaters	2	Attached (Pre-1976)	y	y		10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
253	Heat Pump Pool Heaters	2	Attached (Post-1976)	y	y		10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
254	Heat Pump Pool Heaters	2	Attached (New)			y	10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
255	Heat Pump Pool Heaters	2	Mobile (Existing)	y	y		10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
256	Heat Pump Pool Heaters	2	Mobile (New)			y	10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
257	Efficient Pool Heaters	2	Detached (Pre-1976)	y	y		7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
258	Efficient Pool Heaters	2	Detached (Post-1976)	y	y		7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
259	Efficient Pool Heaters	2	Detached (New)			y	7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
260	Efficient Pool Heaters	2	Attached (Pre-1976)	y	y		7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
261	Efficient Pool Heaters	2	Attached (Post-1976)	y	y		7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
262	Efficient Pool Heaters	2	Attached (New)			y	7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
263	Efficient Pool Heaters	2	Mobile (Existing)	y	y		7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
264	Efficient Pool Heaters	2	Mobile (New)			y	7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
265	Solar Pool Heaters	2	Detached (Pre-1976)	y	y		20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
266	Solar Pool Heaters	2	Detached (Post-1976)	y	y		20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
267	Solar Pool Heaters	2	Detached (New)			y	20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
268	Solar Pool Heaters	2	Attached (Pre-1976)	y	y		20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
269	Solar Pool Heaters	2	Attached (Post-1976)	y	y		20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
270	Solar Pool Heaters	2	Attached (New)			y	20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
271	Solar Pool Heaters	2	Mobile (Existing)	y	y		20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
272	Solar Pool Heaters	2	Mobile (New)			y	20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
273	Micro-CHP	2	Detached (Pre-1976)	y	y		20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
274	Micro-CHP	2	Detached (Post-1976)	y	y		20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
275	Micro-CHP	2	Detached (New)			y	20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
276	Micro-CHP	2	Attached (Pre-1976)	y	y		20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
277	Micro-CHP	2	Attached (Post-1976)	y	y		20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
278	Micro-CHP	2	Attached (New)			y	20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
279	Micro-CHP	2	Mobile (Existing)	y	y		20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
280	Micro-CHP	2	Mobile (New)			y	20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Back to Index

Attic Insulation

		References/Notes
Description:	Insulation levels can be increased in attics by blowing insulation into the attic spaces to fill and cover the space within the roof frame. One technique is to make sure loose-fill or batt insulation fills the attic floor joists fully and then add an additional layer of unfaced fibreglass batt insulation across the joists. To reduce cost, it is also possible to blow in cellulose insulation on top of the existing insulation instead.	
Baseline:	A home with average insulation in the attic	
Upgrade:	Improving the attic insulation in an average home by RSI-3.5 (R-20), through the addition of cellulose insulation	

Baseline Reference:	1. Annual consumption, end use
Heating Fuel Type:	All Fuels (Average Fuel Mix)
Main End Use:	Space Heating
Discount Rate:	7.38%
GHG Adder Incl.?	No
Resource Costs:	Baseload

= User Input
= Calculation

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.648	$1.648		$1.648	$1.648		$1.648	
Electricity ($/kW)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	
Natural Gas ($/MJ)	$0.010	$0.139	$0.139		$0.139	$0.139		$0.139	
Oil ($/L)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	
Water ($/1000L)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☐	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☐	Mobile (Existing) ☑	Mobile (New) ☐	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	3,197	3,397		1,785	1,785		1,868		3,181	
	Natural Gas (MJ/yr.)	56,473	47,767		33,756	29,900		37,393		49,117	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Upgrade Consumption	Electricity (kWh/yr.)	3,099	3,322		1,728	1,746		1,824		3,102	
	Natural Gas (MJ/yr.)	53,084	45,378		31,731	28,405		35,337		46,474	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%		0%	0%		0%		0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%		0%	0%		0%		0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-		-	-		-		-	
	Electricity, Cooling (kWh/yr.)	-	-		-	-		-		-	
	Electricity, Total (kWh/yr.)	-	-		-	-		-		-	
	Natural Gas (MJ/yr.)	-	-		-	-		-		-	
	Oil (L/yr.)	-	-		-	-		-		-	
Winter Peak Hours-Use Factor		-	-		-	-		-		-	
Resource Savings	Electricity (kWh/yr.)	98	75		57	39		45		79	
	Electricity (kW peak)	-	-		-	-		-		-	
	Natural Gas (MJ/yr.)	3,388	2,388		2,025	1,495		2,057		2,643	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Cost Parameters	Upgrade, Material ($)	$675.00	$712.50		$450.00	$487.50		$525.00		$680.47	Consultations with utilities and contractors have suggested that an average cost of $0.75/ft^2 (material and installation) is reasonable. Average ceiling areas based on ecoENERGY database data for BC and HOT2000 modelling.
	Upgrade, Installation ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	Installation costs included above
	Baseline, Material ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	
	Baseline, Installation ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	
	Total Measure Cost ($)	$675.00	$712.50		$450.00	$487.50		$525.00		$680.47	
	Basis (Full/Incremental)	Full	Full		Full	Full		Full		Full	
Incremental O&M ($/yr.)		$0	$0		$0	$0		$0		$0	
Lifetimes	Upgrade (yrs.)	30	30		30	30		30		30	Approximate lifetime, based on previous Marbek energy efficiency potential studies
	Baseline (yrs.)	-	-		-	-		-		-	
Cost Savings ($/yr.)		$41	$30		$25	$18		$24		$32	
Simple Payback (yrs.)		16.3	24.1		18.3	27.3		22.0		21.67	
NPV of O&M Costs ($)		$0	$0		$0	$0		$0		$0	
Total Benefits ($)	Electric Energy	$161	$123		$93	$64		$73		$130	
	Electric Demand	$0	$0		$0	$0		$0		$0	
	Natural Gas	$471	$332		$282	$208		$286		$368	
	Oil	$0	$0		$0	$0		$0		$0	
	Water	$0	$0		$0	$0		$0		$0	
Measure TRC ($)		-$42	-$257		-$75	-$216		-$165		-$183	
Benefit/Cost Ratio		0.94	0.64		0.83	0.56		0.68		0.73	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1		1	1		1		
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental		Incremental	Incremental		Incremental		
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	5.5%	4.5%		5.5%	4.5%		5.0%		4.8%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes.
Space Cooling	-	1	1	2.5%	1.5%		2.5%	1.5%		2.0%		1.8%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes.
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	6.0%	5.0%		6.0%	5.0%		5.5%		5.3%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes.
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heater	-	0	0									-	
Pool and Spa Heater	Pool Heaters	0	0									-	
Pool and Spa Heater	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	

Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	5.5%	4.5%		5.5%	4.5%		5.0%		4.8%	
Space Cooling	1	1	2.5%	1.5%		2.5%	1.5%		2.0%		1.8%	
Clothes Washers	0	0	-	-		-	-		-		-	
Dishwashers	0	0	-	-		-	-		-		-	
Other Electric Loads	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	6.0%	5.0%		6.0%	5.0%		5.5%		5.3%	
Domestic Hot Water (DHW)	0	0	-	-		-	-		-		-	
Fireplaces	0	0	-	-		-	-		-		-	
Cooking	0	0	-	-		-	-		-		-	
Clothes Dryers	0	0	-	-		-	-		-		-	
Pool and Spa Heaters	0	0	-	-		-	-		-		-	
Other	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-		-	-		-		-	
Domestic Hot Water (DHW)	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Wall Insulation

		References/Notes
Description:	It can be challenging to retrofit wall insulation in existing homes since the inside surfaces of the exterior walls are already finished. It is sometimes possible to add insulation to a wall by blowing insulating materials into the wall cavity, if sufficient space exists. Alternatively, if the siding is old and due for replacement, rigid foam insulation can be added before the new siding is installed. In this situation, it would also be quite cost-effective to install a more effective vapour and air barrier (e.g., Dupont Tyvek®) to reduce the amount of air leakage through the walls.	
Baseline:	A home with average wall insulation	
Upgrade:	Improving the wall insulation in an average home by RSI-1.76 (R-10) to RSI-4.2 (R-24)	Assumed that the homeowner is replacing the home's siding and improving the wall insulation on an incremental basis.

Baseline Reference:	1. Annual consumption, end use							
Heating Fuel Type:	All Fuels (Average Fuel Mix)							
Main End Use:	Space Heating							
Discount Rate:	7.38%							
GHG Adder Incl.?	No							
Resource Costs:	Baseload							
	Customer Cost	**Avoided Costs (NPV)**						
Electricity ($/kWh)	$0.083	$1.648	$1.648		$1.648	$1.648		$1.648
Electricity ($/kW)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000
Natural Gas ($/MJ)	$0.010	$0.139	$0.139		$0.139	$0.139		$0.139
Oil ($/L)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000
Water ($/1000L)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000

		= User Input
		= Calculation

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☐	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☐	Mobile (Existing) ☑	Mobile (New) ☐	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	3,197	3,397		1,785	1,785		1,868		3,181	
	Natural Gas (MJ/yr.)	56,473	47,767		33,756	29,900		37,393		49,117	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Upgrade Consumption	Electricity (kWh/yr.)	3,029	3,212		1,683	1,690		1,791		3,011	
	Natural Gas (MJ/yr.)	47,437	40,124		28,355	25,116		31,410		41,258	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%		0%	0%		0%		0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%		0%	0%		0%		0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-		-	-		-		-	
	Electricity, Cooling (kWh/yr.)	-	-		-	-		-		-	
	Electricity, Total (kWh/yr.)	-	-		-	-		-		-	
	Natural Gas (MJ/yr.)	-	-		-	-		-		-	
	Oil (L/yr.)	-	-		-	-		-		-	
Winter Peak Hours-Use Factor		-	-		-	-		-		-	
Resource Savings	Electricity (kWh/yr.)	168	185		102	95		77		170	
	Electricity (kW peak)	-	-		-	-		-		-	
	Natural Gas (MJ/yr.)	9,036	7,643		5,401	4,784		5,983		7,859	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Cost Parameters	Upgrade, Material ($)	$2,000.00	$2,000.00		$1,500.00	$1,500.00		$1,500.00		$1,951.27	Approx. material and installation costs, based on private communication with Tony Woods, CanAm Building Envelope Specialists (2009)
	Upgrade, Installation ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	Installation costs included above
	Baseline, Material ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	
	Baseline, Installation ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	
	Total Measure Cost ($)	$2,000.00	$2,000.00		$1,500.00	$1,500.00		$1,500.00		$1,951.27	
	Basis (Full/Incremental)	Incr.	Incr.		Incr.	Incr.		Incr.		Incr.	Forced to incremental because it would be done as part of siding replacement
Incremental O&M ($/yr.)		$0	$0		$0	$0		$0		$0	
Lifetimes	Upgrade (yrs.)	30	30		30	30		30		30	Approximate lifetime, based on previous Marbek energy efficiency potential studies
	Baseline (yrs.)	30	30		30	30		30		30	
Cost Savings ($/yr.)		$102	$90		$61	$55		$65		$91	
Simple Payback (yrs.)		19.5	22.2		24.5	27.4		23.1		21.63	
NPV of O&M Costs ($)		$0	$0		$0	$0		$0		$0	
Total Benefits ($)	Electric Energy	$277	$305		$167	$156		$127		$280	
	Electric Demand	$0	$0		$0	$0		$0		$0	
	Natural Gas	$1,257	$1,063		$751	$665		$832		$1,093	
	Oil	$0	$0		$0	$0		$0		$0	
	Water	$0	$0		$0	$0		$0		$0	
Measure TRC ($)		-$467	-$632		-$581	-$679		-$541		-$578	
Benefit/Cost Ratio		0.77	0.68		0.61	0.55		0.64		0.70	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1		1	1		1		
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental		Incremental	Incremental		Incremental		
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No) Baseline	Applies? (1=Yes; 0=No) Upgrade	Measure Resource Savings (%) Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Ventilation and Circulation	-	1	1	15.0%	15.0%		15.0%	15.0%		15.0%		15.0%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes.
Space Cooling	-	1	1	3.0%	2.5%		3.0%	2.5%		2.5%		2.7%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes.
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No) Baseline	Applies? (1=Yes; 0=No) Upgrade	Measure Resource Savings (%) Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Space Heating	-	1	1	16.0%	16.0%		16.0%	16.0%		16.0%		16.0%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes.
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heater	-	0	0									-	
Pool and Spa Heater	Pool Heaters	0	0									-	
Pool and Spa Heater	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No) Baseline	Applies? (1=Yes; 0=No) Upgrade	Measure Resource Savings (%) Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	

Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	**Sub End Use/Equipment (If Applicable)**	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
		Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Ventilation and Circulation	1	1	15.0%	15.0%		15.0%	15.0%		15.0%		15.0%	
Space Cooling	1	1	3.0%	2.5%		3.0%	2.5%		2.5%		2.7%	
Clothes Washers	0	0	-	-		-	-		-		-	
Dishwashers	0	0	-	-		-	-		-		-	
Other Electric Loads	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Space Heating	1	1	16.0%	16.0%		16.0%	16.0%		16.0%		16.0%	
Domestic Hot Water (DHW)	0	0	-	-		-	-		-		-	
Fireplaces	0	0	-	-		-	-		-		-	
Cooking	0	0	-	-		-	-		-		-	
Clothes Dryers	0	0	-	-		-	-		-		-	
Pool and Spa Heaters	0	0	-	-		-	-		-		-	
Other	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Space Heating	0	0	-	-		-	-		-		-	
Domestic Hot Water (DHW)	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Water	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Slab Insulation (Unfinished Basements)

		References/Notes
Description:	Insulation can be added both under and on top of basement slab floors. However, in existing homes, only the latter is practical. It is assumed that additional insulation is added to the slab floor while the basement is being finished. This can be done by purchasing insulated subfloor panels or laying down extruded polystyrene rigid foam insulation.	
Baseline:	Homes with unfinished basements	
Upgrade:	The addition of slab (basement floor) insulation in homes with unfinished basements. It is assumed that 2" polystyrene rigid foam insulation (RSI-1.76 (R-10)) is being added.	Assumed that the homeowner is finishing their basement and improving the slab/floor insulation on an incremental basis.

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.648	$1.648		$1.648	$1.648			
Electricity ($/kW)	$0.000	$0.000	$0.000		$0.000	$0.000			
Natural Gas ($/MJ)	$0.010	$0.139	$0.139		$0.139	$0.139			
Oil ($/L)	$0.000	$0.000	$0.000		$0.000	$0.000			
Water ($/1000L)	$0.000	$0.000	$0.000		$0.000	$0.000			

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☐	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☐	Mobile (Existing) ☐	Mobile (New) ☐	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	600	800		400	400				714	
	Natural Gas (MJ/yr.)	56,473	47,767		33,756	29,900				49,704	
	Oil (L/yr.)	-	-		-	-				-	
	Water (L/yr.)	-	-		-	-				-	
Upgrade Consumption	Electricity (kWh/yr.)	594	792		396	396				707	
	Natural Gas (MJ/yr.)	55,739	47,289		33,317	29,601				49,151	
	Oil (L/yr.)	-	-		-	-				-	
	Water (L/yr.)	-	-		-	-				-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%		0%	0%				0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%		0%	0%				0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-		-	-				-	
	Electricity, Cooling (kWh/yr.)	-	-		-	-				-	
	Electricity, Total (kWh/yr.)	-	-		-	-				-	
	Natural Gas (MJ/yr.)	-	-		-	-				-	
	Oil (L/yr.)	-	-		-	-				-	
Winter Peak Hours-Use Factor		-	-		-	-				-	
Resource Savings	Electricity (kWh/yr.)	6	8		4	4				7	
	Electricity (kW peak)	-	-		-	-				-	
	Natural Gas (MJ/yr.)	734	478		439	299				553	
	Oil (L/yr.)	-	-		-	-				-	
	Water (L/yr.)	-	-		-	-				-	
Cost Parameters	Upgrade, Material ($)	$1,125.00	$1,275.00		$975.00	$1,050.00				$1,213.74	Based on a retail scan (Home Depot), the cost of this type of insulation is ~$1.50/ft^2 ($16/m^2) (2010). Average basement areas based on ecoENERGY database data for BC and HOT2000 modelling.
	Upgrade, Installation ($)	$0.00	$0.00		$0.00	$0.00				$0.00	Assuming that additional labour costs are minimal since the basement is being finished
	Baseline, Material ($)	$0.00	$0.00		$0.00	$0.00				$0.00	
	Baseline, Installation ($)	$0.00	$0.00		$0.00	$0.00				$0.00	
	Total Measure Cost ($)	$1,125.00	$1,275.00		$975.00	$1,050.00				$1,213.74	
	Basis (Full/Incremental)	Incr.	Incr.		Incr.	Incr.				Incr.	Forced to incremental because it would be done as part of basement reno.
Incremental O&M ($/yr.)		$0	$0		$0	$0				$0	
Lifetimes	Upgrade (yrs.)	30	30		30	30				30	Approximate lifetime, based on previous Marbek energy efficiency potential studies
	Baseline (yrs.)	30	30		30	30				30	
Cost Savings ($/yr.)		$8	$5		$5	$3				$6	
Simple Payback (yrs.)		146.3	238.6		210.5	322.0				212.10	
NPV of O&M Costs ($)		$0	$0		$0	$0				$0	
Total Benefits ($)	Electric Energy	$10	$13		$7	$7				$12	
	Electric Demand	$0	$0		$0	$0				$0	
	Natural Gas	$102	$66		$61	$42				$77	
	Oil	$0	$0		$0	$0				$0	
	Water	$0	$0		$0	$0				$0	
Measure TRC ($)		-$1,013	-$1,195		-$907	-$1,002				-$1,125	
Benefit/Cost Ratio		0.10	0.06		0.07	0.05				0.07	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1		1	1				
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental		Incremental	Incremental				
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	1.0%	1.0%		1.0%	1.0%				1.0%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached homes.
Space Cooling	-	0	0									-	Space cooling savings are negligible, based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC.
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	1.3%	1.0%		1.3%	1.0%				1.1%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached homes.
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	

Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	1.0%	1.0%		1.0%	1.0%				1.0%	
Space Cooling	0	0	-	-		-	-				-	
Clothes Washers	0	0	-	-		-	-				-	
Dishwashers	0	0	-	-		-	-				-	
Other Electric Loads	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	1.3%	1.0%		1.3%	1.0%				1.1%	
Domestic Hot Water (DHW)	0	0	-	-		-	-				-	
Fireplaces	0	0	-	-		-	-				-	
Cooking	0	0	-	-		-	-				-	
Clothes Dryers	0	0	-	-		-	-				-	
Pool and Spa Heaters	0	0	-	-		-	-				-	
Other	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-		-	-				-	
Domestic Hot Water (DHW)	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Basement (Foundation) Insulation

		References/Notes
Description:	In many homes, the basement is often under-insulated or even left uninsulated. Increasing the insulation level in basements can be achieved in a number of ways, including constructing a new insulated frame wall, moving the existing frame wall to increase the insulation level, adding extra insulation to the existing frame wall, adding rigid board insulation to the exterior of the foundation, or using a combination of interior and exterior rigid board insulation. As a lower cost alternative, it is also possible to use polyurethane foam.	
Baseline:	A home with average insulation in the basement (foundation) walls	
Upgrade:	In average homes with basements, improving the foundation wall insulation by RSI-2.12 (R-12)	Assumed that the homeowner is finishing or refinishing the basement and improving the foundation insulation on an incremental basis.

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.648	$1.648		$1.648	$1.648			
Electricity ($/kW)	$0.000	$0.000	$0.000		$0.000	$0.000			
Natural Gas ($/MJ)	$0.010	$0.139	$0.139		$0.139	$0.139			
Oil ($/L)	$0.000	$0.000	$0.000		$0.000	$0.000			
Water ($/1000L)	$0.000	$0.000	$0.000		$0.000	$0.000			

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☐	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☐	Mobile (Existing) ☐	Mobile (New) ☐	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	3,197	3,397		1,785	1,785				3,247	
	Natural Gas (MJ/yr.)	56,473	47,767		33,756	29,900				49,704	
	Oil (L/yr.)	-	-		-	-				-	
	Water (L/yr.)	-	-		-	-				-	
Upgrade Consumption	Electricity (kWh/yr.)	3,131	3,305		1,753	1,751				3,166	
	Natural Gas (MJ/yr.)	49,696	41,557		30,380	26,760				43,468	
	Oil (L/yr.)	-	-		-	-				-	
	Water (L/yr.)	-	-		-	-				-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%		0%	0%				0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%		0%	0%				0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-		-	-				-	
	Electricity, Cooling (kWh/yr.)	-	-		-	-				-	
	Electricity, Total (kWh/yr.)	-	-		-	-				-	
	Natural Gas (MJ/yr.)	-	-		-	-				-	
	Oil (L/yr.)	-	-		-	-				-	
Winter Peak Hours-Use Factor		-	-		-	-				-	
Resource Savings	Electricity (kWh/yr.)	66	92		32	34				80	
	Electricity (kW peak)	-	-		-	-				-	
	Natural Gas (MJ/yr.)	6,777	6,210		3,376	3,139				6,236	
	Oil (L/yr.)	-	-		-	-				-	
	Water (L/yr.)	-	-		-	-				-	
Cost Parameters	Upgrade, Material ($)	$1,400.00	$1,500.00		$900.00	$1,000.00				$1,440.58	~$2.00/ft^2 (material and installation) for addition of R-12 to foundation insulation, based on private communication with Tony Woods, CanAm Building Envelope Specialists (2009), and assuming average foundation wall areas as per HOT2000 models and the ecoENERGY database.
	Upgrade, Installation ($)	$0.00	$0.00		$0.00	$0.00				$0.00	
	Baseline, Material ($)	$0.00	$0.00		$0.00	$0.00				$0.00	
	Baseline, Installation ($)	$0.00	$0.00		$0.00	$0.00				$0.00	
	Total Measure Cost ($)	$1,400.00	$1,500.00		$900.00	$1,000.00				$1,440.58	
	Basis (Full/Incremental)	Incr.	Incr.		Incr.	Incr.				Incr.	Forced to incremental because it would be done as part of basement reno.
Incremental O&M ($/yr.)		$0	$0		$0	$0				$0	
Lifetimes	Upgrade (yrs.)	30	30		30	30				30	Approximate lifetime, based on previous Marbek energy efficiency potential studies
	Baseline (yrs.)	30	30		30	30				30	
Cost Savings ($/yr.)		$72	$68		$36	$34				$68	
Simple Payback (yrs.)		19.5	21.9		25.2	29.8				21.50	
NPV of O&M Costs ($)		$0	$0		$0	$0				$0	
Total Benefits ($)	Electric Energy	$109	$152		$53	$56				$133	
	Electric Demand	$0	$0		$0	$0				$0	
	Natural Gas	$943	$864		$470	$437				$867	
	Oil	$0	$0		$0	$0				$0	
	Water	$0	$0		$0	$0				$0	
Measure TRC ($)		-$349	-$485		-$378	-$507				-$441	
Benefit/Cost Ratio		0.75	0.68		0.58	0.49				0.69	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1		1	1				
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental		Incremental	Incremental				
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No) Baseline	Applies? (1=Yes; 0=No) Upgrade	Measure Resource Savings (%) Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Ventilation and Circulation	-	1	1	11.0%	11.5%		8.0%	8.5%				11.2%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings in attached homes are slightly lower since a smaller percentage of their wall areas is exposed to the outdoors.
Space Cooling	-	1	1									-	Space cooling savings are negligible, based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC.
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No) Baseline	Applies? (1=Yes; 0=No) Upgrade	Measure Resource Savings (%) Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Space Heating	-	1	1	12.0%	13.0%		10.0%	10.5%				12.5%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings in attached homes are slightly lower since a smaller percentage of their wall areas is exposed to the outdoors.
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No) Baseline	Applies? (1=Yes; 0=No) Upgrade	Measure Resource Savings (%) Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	

Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	11.0%	11.5%		8.0%	8.5%				11.2%	
Space Cooling	1	1	-	-		-	-				-	
Clothes Washers	0	0	-	-		-	-				-	
Dishwashers	0	0	-	-		-	-				-	
Other Electric Loads	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	12.0%	13.0%		10.0%	10.5%				12.5%	
Domestic Hot Water (DHW)	0	0	-	-		-	-				-	
Fireplaces	0	0	-	-		-	-				-	
Cooking	0	0	-	-		-	-				-	
Clothes Dryers	0	0	-	-		-	-				-	
Pool and Spa Heaters	0	0	-	-		-	-				-	
Other	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-		-	-				-	
Domestic Hot Water (DHW)	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Crawl Space Insulation

		References/Notes
Description:	Insulation levels remain below code in many homes that include crawlspaces as part of the basement design. If the floor is exposed, it would first be necessary to install a vapour barrier (e.g., 6 mil (600 gauge/0.15 mm) polyurethane barrier). Polyurethane foam could then be applied to the ceiling of the crawlspace (or the outer walls if there are pipes running below the floor). In addition to increasing the insulation of the crawlspace, this would help to eliminate any air leaks. Co-benefits of improved crawlspace insulation include improved thermal comfort, fewer drafts, and less condensation.	
Baseline:	Minimal crawlspace insulation in homes with crawlspaces	
Upgrade:	In homes with crawlspaces, the addition of crawlspace insulation to bring the thermal resistance values up to RSI-2.1 (R-12)	

Baseline Reference:	1. Annual consumption, end use
Heating Fuel Type:	All Fuels (Average Fuel Mix)
Main End Use:	Space Heating
Discount Rate:	7.38%
GHG Adder Incl.?	No
Resource Costs:	Baseload

= User Input
= Calculation

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.648	$1.648		$1.648	$1.648			
Electricity ($/kW)	$0.000	$0.000	$0.000		$0.000	$0.000			
Natural Gas ($/MJ)	$0.010	$0.139	$0.139		$0.139	$0.139			
Oil ($/L)	$0.000	$0.000	$0.000		$0.000	$0.000			
Water ($/1000L)	$0.000	$0.000	$0.000		$0.000	$0.000			

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☐	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☐	Mobile (Existing) ☐	Mobile (New) ☐	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	600	800		400	400				714	
	Natural Gas (MJ/yr.)	56,473	47,767		33,756	29,900				49,704	
	Oil (L/yr.)	-	-		-	-				-	
	Water (L/yr.)	-	-		-	-				-	
Upgrade Consumption	Electricity (kWh/yr.)	588	784		392	392				699	
	Natural Gas (MJ/yr.)	55,061	46,573		32,912	29,152				48,461	
	Oil (L/yr.)	-	-		-	-				-	
	Water (L/yr.)	-	-		-	-				-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%		0%	0%				0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%		0%	0%				0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-		-	-				-	
	Electricity, Cooling (kWh/yr.)	-	-		-	-				-	
	Electricity, Total (kWh/yr.)	-	-		-	-				-	
	Natural Gas (MJ/yr.)	-	-		-	-				-	
	Oil (L/yr.)	-	-		-	-				-	
Winter Peak Hours-Use Factor		-	-		-	-				-	
Resource Savings	Electricity (kWh/yr.)	12	16		8	8				14	
	Electricity (kW peak)	-	-		-	-				-	
	Natural Gas (MJ/yr.)	1,412	1,194		844	747				1,243	
	Oil (L/yr.)	-	-		-	-				-	
	Water (L/yr.)	-	-		-	-				-	
Cost Parameters	Upgrade, Material ($)	$800.00	$800.00		$800.00	$800.00				$800.00	Approx. material and installation costs, based on cost estimates from recent studies (i.e. 40 ft of walls x 4 ft high assumed) (2009)
	Upgrade, Installation ($)	$0.00	$0.00		$0.00	$0.00				$0.00	Installation costs included above
	Baseline, Material ($)	$0.00	$0.00		$0.00	$0.00				$0.00	
	Baseline, Installation ($)	$0.00	$0.00		$0.00	$0.00				$0.00	
	Total Measure Cost ($)	$800.00	$800.00		$800.00	$800.00				$800.00	
	Basis (Full/Incremental)	Full	Full		Full	Full				Full	
Incremental O&M ($/yr.)		$0	$0		$0	$0				$0	
Lifetimes	Upgrade (yrs.)	30	30		30	30				30	
	Baseline (yrs.)	-	-		-	-				-	
Cost Savings ($/yr.)		$15	$13		$9	$8				$13	
Simple Payback (yrs.)		53.9	61.4		89.6	100.2				60.93	
NPV of O&M Costs ($)		$0	$0		$0	$0				$0	
Total Benefits ($)	Electric Energy	$20	$26		$13	$13				$24	
	Electric Demand	$0	$0		$0	$0				$0	
	Natural Gas	$196	$166		$117	$104				$173	
	Oil	$0	$0		$0	$0				$0	
	Water	$0	$0		$0	$0				$0	
Measure TRC ($)		-$584	-$608		-$669	-$683				-$604	
Benefit/Cost Ratio		0.27	0.24		0.16	0.15				0.25	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1		1	1				
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental		Incremental	Incremental				
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	2.0%	2.0%		2.0%	2.0%				2.0%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached homes.
Space Cooling	-	0	0									-	Space cooling savings are negligible, based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC.
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	2.5%	2.5%		2.5%	2.5%				2.5%	Based on HOT2000 modeling results of average single detached homes with crawl spaces (different vintages) in BC. Assuming savings are similar in attached homes.
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heater	-	0	0									-	
Pool and Spa Heater	Pool Heaters	0	0									-	
Pool and Spa Heater	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	

Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	2.0%	2.0%		2.0%	2.0%				2.0%	
Space Cooling	0	0	-	-		-	-				-	
Clothes Washers	0	0	-	-		-	-				-	
Dishwashers	0	0	-	-		-	-				-	
Other Electric Loads	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	2.5%	2.5%		2.5%	2.5%				2.5%	
Domestic Hot Water (DHW)	0	0	-	-		-	-				-	
Fireplaces	0	0	-	-		-	-				-	
Cooking	0	0	-	-		-	-				-	
Clothes Dryers	0	0	-	-		-	-				-	
Pool and Spa Heaters	0	0	-	-		-	-				-	
Other	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-		-	-				-	
Domestic Hot Water (DHW)	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

Professional Air Sealing/Weather Stripping/Caulking

		References/Notes
Description:	Air leakage sealing of building envelopes includes completion of a blower door test to quantify leakage levels and to identify the location of air leaks. Generally, major leakage occurs at window-to-wall interfaces, around doors (especially patio doors), through electrical and plumbing penetrations and at the top of foundation walls. Installation of sealant and gaskets are generally accepted methods for reducing air leakage in buildings. Other sources of air leaks include pot lights, wall-to-floor interfaces (i.e., top and bottom of baseboards) and bathroom and kitchen exhaust piping.	
Baseline:	No action taken	
Upgrade:	A comprehensive air sealing job, which results in an air tightness (ACH @ 50 Pa) improvement of 30%	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.553	$1.553		$1.553	$1.553		$1.553	
Electricity ($/kW)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	
Natural Gas ($/MJ)	$0.010	$0.127	$0.127		$0.127	$0.127		$0.127	
]	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	
Water ($/1000L)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☐	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☐	Mobile (Existing) ☑	Mobile (New) ☐	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	3,197	3,397		1,785	1,785		1,868		3,181	
	Natural Gas (MJ/yr.)	56,473	47,767		33,756	29,900		37,393		49,117	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Upgrade Consumption	Electricity (kWh/yr.)	3,130	3,307		1,742	1,739		1,840		3,103	
	Natural Gas (MJ/yr.)	50,543	43,468		30,212	27,209		33,841		44,421	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%		0%	0%		0%		0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%		0%	0%		0%		0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-		-	-		-		-	
	Electricity, Cooling (kWh/yr.)	-	-		-	-		-		-	
	Electricity, Total (kWh/yr.)	-	-		-	-		-		-	
	Natural Gas (MJ/yr.)	-	-		-	-		-		-	
	Oil (L/yr.)	-	-		-	-		-		-	
Winter Peak Hours-Use Factor		-	-		-	-		-		-	
Resource Savings	Electricity (kWh/yr.)	67	90		43	46		29		78	
	Electricity (kW peak)	-	-		-	-		-		-	
	Natural Gas (MJ/yr.)	5,930	4,299		3,544	2,691		3,552		4,696	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Cost Parameters	Upgrade, Material ($)	$1,800.00	$1,800.00		$1,800.00	$1,800.00		$1,800.00		$1,800.00	Approx. mateial and installation costs, based on personal communication with Tony Woods, CanAm Building Envelope Specialists (material & installation) (2009). Assuming similar cost for all housing types.
	Upgrade, Installation ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	Installation costs included above
	Baseline, Material ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	
	Baseline, Installation ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	
	Total Measure Cost ($)	$1,800.00	$1,800.00		$1,800.00	$1,800.00		$1,800.00		$1,800.00	
	Basis (Full/Incremental)	Full	Full		Full	Full		Full		Full	
Incremental O&M ($/yr.)		$20	$20		$20	$20		$20		$20	Approximate annual cost to maintain weatherstripping, caulking, etc.
Lifetimes	Upgrade (yrs.)	25	25		25	25		25		25	Approximate lifetime, based on previous Marbek energy efficiency potential studies
	Baseline (yrs.)	-	-		-	-		-		-	
Cost Savings ($/yr.)		$44	$30		$18	$10		$17		$32	
Simple Payback (yrs.)		41.2	60.9		98.4	177.0		104.7		62.18	
NPV of O&M Costs ($)		$225	$225		$225	$225		$225		$225	
Total Benefits ($)	Electric Energy	$104	$140		$67	$71		$44		$121	
	Electric Demand	$0	$0		$0	$0		$0		$0	
	Natural Gas	$753	$546		$450	$342		$451		$596	
	Oil	$0	$0		$0	$0		$0		$0	
	Water	$0	$0		$0	$0		$0		$0	
Measure TRC ($)		-$1,168	-$1,340		-$1,508	-$1,612		-$1,530		-$1,308	
Benefit/Cost Ratio		0.42	0.34		0.26	0.20		0.24		0.35	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1		1	1		1		
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental		Incremental	Incremental		Incremental		
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	9.0%	8.0%		9.0%	8.0%		8.5%		8.3%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached homes.
Space Cooling	-	1	1	0.5%	1.0%		0.5%	1.0%		0.5%		0.8%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached homes.
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	10.5%	9.0%		10.5%	9.0%		9.5%		9.5%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached homes.
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	

Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	9.0%	8.0%		9.0%	8.0%		8.5%		8.3%	
Space Cooling	1	1	0.5%	1.0%		0.5%	1.0%		0.5%		0.8%	
Clothes Washers	0	0	-	-		-	-		-		-	
Dishwashers	0	0	-	-		-	-		-		-	
Other Electric Loads	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	10.5%	9.0%		10.5%	9.0%		9.5%		9.5%	
Domestic Hot Water (DHW)	0	0	-	-		-	-		-		-	
Fireplaces	0	0	-	-		-	-		-		-	
Cooking	0	0	-	-		-	-		-		-	
Clothes Dryers	0	0	-	-		-	-		-		-	
Pool and Spa Heaters	0	0	-	-		-	-		-		-	
Other	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-		-	-		-		-	
Domestic Hot Water (DHW)	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

Homeowner Air Sealing/Weather Stripping/Caulking

		References/Notes
Description:	Homeowner air leakage sealing does not include a blower door test to quantify leakage levels and to identify the location of air leaks. Homeowners are likely to identify leakage primarily in more visible areas of the envelope, for example, the major leakage at window-to-wall interfaces, around doors (especially patio doors), through electrical and plumbing penetrations and perhaps at the top of foundation walls. Installation of weather stripping, sealant and gaskets are the most likely methods to be used. Less visible sources of air leaks such as pot lights, wall-to-floor interfaces (i.e., top and bottom of baseboards), bathroom and kitchen exhaust piping, and leaks from the top of walls into the attic are less likely to be addressed by the homeowner.	
Baseline:	No action taken	
Upgrade:	A homeowner air sealing job, which results in an air tightness (ACH @ 50 Pa) improvement of 15-20%	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$0.952	$0.952		$0.952	$0.952		$0.952	
Electricity ($/kW)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	
Natural Gas ($/MJ)	$0.010	$0.067	$0.067		$0.067	$0.067		$0.067	
]	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	
Water ($/1000L)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	

Sub-sector		Detached ☑ (Pre-1976)	Detached ☑ (Post-1976)	Detached ☐ (New)	Attached ☑ (Pre-1976)	Attached ☑ (Post-1976)	Attached ☐ (New)	Mobile ☑ (Existing)	Mobile ☐ (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	3,197	3,397		1,785	1,785		1,868		3,181	
	Natural Gas (MJ/yr.)	56,473	47,767		33,756	29,900		37,393		49,117	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Upgrade Consumption	Electricity (kWh/yr.)	3,158	3,345		1,760	1,759		1,852		3,137	
	Natural Gas (MJ/yr.)	53,084	45,310		31,731	28,362		35,363		46,433	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%		0%	0%		0%		0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%		0%	0%		0%		0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-		-	-		-		-	
	Electricity, Cooling (kWh/yr.)	-	-		-	-		-		-	
	Electricity, Total (kWh/yr.)	-	-		-	-		-		-	
	Natural Gas (MJ/yr.)	-	-		-	-		-		-	
	Oil (L/yr.)	-	-		-	-		-		-	
Winter Peak Hours-Use Factor		-	-		-	-		-		-	
Resource Savings	Electricity (kWh/yr.)	38	51		25	26		16		44	
	Electricity (kW peak)	-	-		-	-		-		-	
	Natural Gas (MJ/yr.)	3,388	2,457		2,025	1,538		2,030		2,684	3800 MJ from Innes Hood report for LiveSmartBC 2010 business case, March 2010
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Cost Parameters	Upgrade, Material ($)	$200.00	$200.00		$200.00	$200.00		$200.00		$200.00	Innes Hood report for LiveSmartBC 2010 business case, March 2010
	Upgrade, Installation ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	Installation costs included above
	Baseline, Material ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	
	Baseline, Installation ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	
	Total Measure Cost ($)	$200.00	$200.00		$200.00	$200.00		$200.00		$200.00	
	Basis (Full/Incremental)	Full	Full		Full	Full		Full		Full	
Incremental O&M ($/yr.)		$20	$20		$20	$20		$20		$20	Approximate annual cost to maintain weatherstripping, caulking, etc.
Lifetimes	Upgrade (yrs.)	10	10		10	10		10		10	Innes Hood report for LiveSmartBC 2010 business case, March 2010
	Baseline (yrs.)	-	-		-	-		-		-	
Cost Savings ($/yr.)		$16	$8		$2	-$3		$1		$10	
Simple Payback (yrs.)		12.2	24.0		106.4	-72.4		160.2		23.03	
NPV of O&M Costs ($)		$138	$138		$138	$138		$138		$138	
Total Benefits ($)	Electric Energy	$36	$49		$23	$25		$16		$42	
	Electric Demand	$0	$0		$0	$0		$0		$0	
	Natural Gas	$227	$165		$136	$103		$136		$180	
	Oil	$0	$0		$0	$0		$0		$0	
	Water	$0	$0		$0	$0		$0		$0	
Measure TRC ($)		-$75	-$125		-$179	-$210		-$187		-$116	
Benefit/Cost Ratio		0.78	0.63		0.47	0.38		0.45		0.66	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1		1	1		1		
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental		Incremental	Incremental		Incremental		
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	5.1%	4.6%		5.1%	4.6%		4.9%		4.8%	Based on ratio of heating savings below to heating savings on Air Sealing tab, times electric savings on Air Sealing tab
Space Cooling	-	1	1	0.3%	0.6%		0.3%	0.6%		0.3%		0.5%	Based on ratio of heating savings below to heating savings on Air Sealing tab, times electric savings on Air Sealing tab
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	6.0%	5.1%		6.0%	5.1%		5.4%		5.4%	3800 MJ from Innes Hood report for LiveSmartBC 2010 business case, March 2010
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	

Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	5.1%	4.6%		5.1%	4.6%		4.9%		4.8%	
Space Cooling	1	1	0.3%	0.6%		0.3%	0.6%		0.3%		0.5%	
Clothes Washers	0	0	-	-		-	-		-		-	
Dishwashers	0	0	-	-		-	-		-		-	
Other Electric Loads	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	6.0%	5.1%		6.0%	5.1%		5.4%		5.4%	
Domestic Hot Water (DHW)	0	0	-	-		-	-		-		-	
Fireplaces	0	0	-	-		-	-		-		-	
Cooking	0	0	-	-		-	-		-		-	
Clothes Dryers	0	0	-	-		-	-		-		-	
Pool and Spa Heaters	0	0	-	-		-	-		-		-	
Other	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-		-	-		-		-	
Domestic Hot Water (DHW)	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

Air Leakage Sealing and Insulation (Old Homes)

		References/Notes
Description:	This measure is targeted at homes that are at least 30 years old, since many of these homes haven't had any work done to improve insulation and air-sealing deficiencies and it is generally most cost-effective to upgrade the insulation and the air sealing at the same time. This includes wall, attic, foundation, and crawlspace retrofits of older homes but, for the purposes of this analysis, it is assumed that a retrofit is being conducted on the attic. The air-sealing portion of the work could be accomplished by segmenting the attic. In each segment, the existing insulation could be moved to one side and polyurethane foam could be sprayed in (serves as an air sealant in addition to its insulating properties). It may also be necessary to install or refurbish top plates to prevent airflow into the attic through exterior wall cavities. Other considerations that would increase the cost of the air-sealing portion of the work and may be present in some homes include sealing pot lights and kitchen or bathroom exhaust piping. When completed, these measures would dramatically improve the air tightness of an older home. The attic insulation could subsequently be cost-effectively improved with cellulose insulation.	
Baseline:	An older home with average air tightness and attic insulation (for that particular vintage)	
Upgrade:	Improve both the attic insulation and the air tightness (ACH@50 Pa) in an old home. It is assumed that the air tightness is improved by 30% and that RSI-3.52 (R-20) of attic insulation is added.	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.553			$1.553				
Electricity ($/kW)	$0.000	$0.000			$0.000				
Natural Gas ($/MJ)	$0.010	$0.127			$0.127				
Oil ($/L)	$0.000	$0.000			$0.000				
Water ($/1000L)	$0.000	$0.000			$0.000				

Sub-sector		Detached (Pre-1976) ✓	Detached (Post-1976)	Detached (New)	Attached (Pre-1976) ✓	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	3,197			1,785					3,172	
	Natural Gas (MJ/yr.)	56,473			33,756					56,073	
	Oil (L/yr.)	-			-					-	
	Water (L/yr.)	-			-					-	
Upgrade Consumption	Electricity (kWh/yr.)	3,042			1,690					3,018	
	Natural Gas (MJ/yr.)	47,155			28,186					46,821	
	Oil (L/yr.)	-			-					-	
	Water (L/yr.)	-			-					-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%			0%					0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%			0%					0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-			-					-	
	Electricity, Cooling (kWh/yr.)	-			-					-	
	Electricity, Total (kWh/yr.)	-			-					-	
	Natural Gas (MJ/yr.)	-			-					-	
	Oil (L/yr.)	-			-					-	
Winter Peak Hours-Use Factor		-			-					-	
Resource Savings	Electricity (kWh/yr.)	155			95					154	
	Electricity (kW peak)	-			-					-	
	Natural Gas (MJ/yr.)	9,318			5,570					9,252	
	Oil (L/yr.)	-			-					-	
	Water (L/yr.)	-			-					-	
Cost Parameters	Upgrade, Material ($)	$3,000.00			$2,500.00					$2,991.21	Cost is variable depending on the approach that is used. Estimate is based on recent communication with air sealing and insulation contractors (2010).
	Upgrade, Installation ($)	$0.00			$0.00					$0.00	
	Baseline, Material ($)	$0.00			$0.00					$0.00	
	Baseline, Installation ($)	$0.00			$0.00					$0.00	
	Total Measure Cost ($)	$3,000.00			$2,500.00					$2,991.21	
	Basis (Full/Incremental)	Full			Full					Full	
Incremental O&M ($/yr.)		$20			$20					$20	Approximate annual cost to maintain weather-stripping, caulking, etc.
Lifetimes	Upgrade (yrs.)	25			25					25	Approximate lifetime, based on previous Marbek energy efficiency potential studies
	Baseline (yrs.)	-			-					-	
Cost Savings ($/yr.)		$84			$42					$83	
Simple Payback (yrs.)		35.7			58.9					36.06	
NPV of O&M Costs ($)		$225			$225					$225	
Total Benefits ($)	Electric Energy	$241			$147					$239	
	Electric Demand	$0			$0					$0	
	Natural Gas	$1,184			$707					$1,175	
	Oil	$0			$0					$0	
	Water	$0			$0					$0	
Measure TRC ($)		-$1,801			-$1,871					-$1,802	
Benefit/Cost Ratio		0.44			0.31					0.44	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1			1					
Cost Flag (i.e. way measure is typically applied)	Incremental			Incremental					
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	15.0%			15.0%					15.0%	Based on HOT2000 modeling results of average pre-1976 single detached homes. Assuming savings are similar in attached homes.
Space Cooling	-	1	1	2.5%			2.5%					2.5%	Based on HOT2000 modeling results of average pre-1976 single detached homes. Assuming savings are similar in attached homes.
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	16.5%			16.5%					16.5%	Based on HOT2000 modeling results of average pre-1976 single detached homes. Assuming savings are similar in attached homes.
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment	Applies? (1=Yes; 0=No)	Measure Resource Savings (%)	References/Notes

Main End Use	Use/Equipment (If Applicable)	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	15.0%			15.0%					15.0%	
Space Cooling	1	1	2.5%			2.5%					2.5%	
Clothes Washers	0	0	-			-					-	
Dishwashers	0	0	-			-					-	
Other Electric Loads	0	0	-			-					-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	16.5%			16.5%					16.5%	
Domestic Hot Water (DHW)	0	0	-			-					-	
Fireplaces	0	0	-			-					-	
Cooking	0	0	-			-					-	
Clothes Dryers	0	0	-			-					-	
Pool and Spa Heaters	0	0	-			-					-	
Other	0	0	-			-					-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-			-					-	
Domestic Hot Water (DHW)	0	0	-			-					-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-			-					-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Zoned-Up Windows: (ENERGY STAR®) Rating for a Colder Zone

		References/Notes
Description:	High-performance windows incorporate a number of additional energy-saving features, including low-E (soft coating), insulating spacers, argon fill and low conductivity frames (which can be sliders, hinged or picture). These windows are certified based on their energy rating (ER), which is based on their tested energy performance, rather than on their specific combination of features. In this case, however, the Energy Star windows for a colder zone are specified instead of the Energy Star windows for the zone where the house is located - for example, Zone C Energy Star windows would be chosen for a house in Zone A. High-performance windows also provide occupant co-benefits, such as reduced interior noise, reduced air leakage, greater thermal comfort, and fewer condensation problems.	
Baseline:	ENERGY STAR windows for Zone B (double glazed, argon fill, low-e coating, insulating spacer, vinyl frame, hinged)	Assuming U-value of at least 1.8 W/m2 K (RSI of 0.56)
Upgrade:	In existing homes, replacing 50% of windows with ENERGY STAR windows from Zone D (double-glazed, argon fill, low-e coating, insulating spacer, vinyl frame, hinged). In hew homes, replacing 100% of windows.	Assuming windows with an approximate U-value of 1.4 W/m2 K (RSI of ~0.71), based on ENERGY STAR requirements for windows.

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.553	$1.553	$1.553	$1.553	$1.553	$1.553	$1.553	$1.553
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.127	$0.127	$0.127	$0.127	$0.127	$0.127	$0.127	$0.127
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	3,197	3,397	3,262	1,785	1,785	1,714	1,868	1,794	3,073	
	Natural Gas (MJ/yr.)	56,473	47,767	47,767	33,756	29,900	29,900	37,393	37,393	46,889	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	3,151	3,338	3,164	1,759	1,755	1,663	1,841	1,747	3,003	
	Natural Gas (MJ/yr.)	55,117	46,143	45,092	32,946	28,883	28,225	36,271	35,299	44,896	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	46	58	98	26	30	51	27	47	70	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	1,355	1,624	2,675	810	1,017	1,674	1,122	2,094	1,993	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$8,000.00	$9,600.00	$20,800.00	$6,400.00	$7,680.00	$16,640.00	$5,760.00	$12,800.00	$14,313.00	BCH program cost estimates are $1000 to $2000 per house, depending on number of windows done and number of Zones up. To match these numbers, we used $64/ft^2.
	Upgrade, Installation ($)	$1,875.00	$2,250.00	$4,875.00	$1,500.00	$1,800.00	$3,900.00	$1,350.00	$3,000.00	$3,354.61	Based on personal communication with SAWDAC (Siding and Window Dealers Association of Canada) in 2010, the installation cost of ENERGY STAR windows is about $15/ft^2
	Baseline, Material ($)	$7,000.00	$8,400.00	$18,200.00	$5,600.00	$6,720.00	$14,560.00	$5,040.00	$11,200.00	$12,523.87	Based on personal communication with SAWDAC (Siding and Window Dealers Association of Canada) in 2010, the material cost of ENERGY STAR windows is about $56/ft^2
	Baseline, Installation ($)	$1,875.00	$2,250.00	$4,875.00	$1,500.00	$1,800.00	$3,900.00	$1,350.00	$3,000.00	$3,354.61	Based on personal communication with SAWDAC (Siding and Window Dealers Association of Canada) in 2010, the installation cost of ENERGY STAR windows is about $15/ft^2
	Total Measure Cost ($)	$1,000.00	$1,200.00	$2,600.00	$800.00	$960.00	$2,080.00	$720.00	$1,600.00	$1,789.12	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	25	25	25	25	25	25	25	25	25	Approximate lifetime, based on previous Marbek energy efficiency potential studies and consistent with the market rate of window replacement
	Baseline (yrs.)	25	25	25	25	25	25	25	25	25	Approximate lifetime, based on previous Marbek energy efficiency potential studies
Cost Savings ($/yr.)		$17	$21	$34	$10	$12	$21	$13	$24	$25	
Simple Payback (yrs.)		58.6	57.8	75.8	79.1	77.0	100.9	54.5	65.5	68.92	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$71	$91	$152	$41	$47	$79	$42	$74	$109	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$172	$206	$340	$103	$129	$213	$142	$266	$253	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$757	-$903	-$2,108	-$656	-$784	-$1,788	-$536	-$1,260	-$1,427	
Benefit/Cost Ratio		0.24	0.25	0.19	0.18	0.18	0.14	0.26	0.21	0.21	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	2.4%	3.4%	5.6%	2.4%	3.4%	5.6%	3.0%	5.6%	4.3%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes. Further assuming that savings would scale with new homes (i.e. 100% of windows being replaced versus 50%). Then scaled down the savings: original figures were based on U-value improvement from 4.2 to 2.0, or 52% lower. This improvement from 2 to 1.6 is 20% lower. Therefore, savings percentage 40% of the original percentage is used.
Space Cooling	-	1	1	1.2%	1.2%	2.2%	1.2%	1.2%	2.2%	1.2%	2.2%	1.7%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes. Further assuming that savings would scale with new homes (i.e. 100% of windows being replaced versus 50%). Then scaled down the savings: original figures were based on U-value improvement from 4.2 to 2.0, or 52% lower. This improvement from 2 to 1.6 is 20% lower. Therefore, savings percentage 40% of the original percentage is used.
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	2.4%	3.4%	5.6%	2.4%	3.4%	5.6%	3.0%	5.6%	4.3%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes. Further assuming that savings would scale with new homes (i.e. 100% of windows being replaced versus 50%). Then scaled down the savings: original figures were based on U-value improvement from 4.2 to 2.0, or 52% lower. This improvement from 2 to 1.6 is 20% lower. Therefore, savings percentage 40% of the original percentage is used.
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	

Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	2.4%	3.4%	5.6%	2.4%	3.4%	5.6%	3.0%	5.6%	4.3%	
Space Cooling	1	1	1.2%	1.2%	2.2%	1.2%	1.2%	2.2%	1.2%	2.2%	1.7%	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	2.4%	3.4%	5.6%	2.4%	3.4%	5.6%	3.0%	5.6%	4.3%	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Super High-Performance Windows

		References/Notes
Description:	In addition to low-E coating, argon fill and insulating spacers, super-high performance windows incorporate features such as triple glazing, transparent insulating films, and fibreglass frames.	
Baseline:	Standard windows (double glazed, air fill, no coating, metal spacer, vinyl frame, slider with sash)	
Upgrade:	In existing homes, replacing 50% of windows with super high-performance windows (triple-glazed, krypton fill, low-e and insulating coatings, insulating spacer, fiberglass frame, hinged). In new homes, replacing all of the windows with super high-performance windows.	

Baseline Reference:	1. Annual consumption, end use
Heating Fuel Type:	All Fuels (Average Fuel Mix)
Main End Use:	Space Heating
Discount Rate:	7.38%
GHG Adder Incl.?	No
Resource Costs:	Baseload

= User Input
= Calculation

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.553	$1.553	$1.553	$1.553	$1.553	$1.553	$1.553	$1.553
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.127	$0.127	$0.127	$0.127	$0.127	$0.127	$0.127	$0.127
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	3,197	3,397	3,262	1,785	1,785	1,714	1,868	1,794	3,073	
	Natural Gas (MJ/yr.)	56,473	47,767	47,767	33,756	29,900	29,900	37,393	37,393	46,889	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	2,951	3,037	2,708	1,647	1,596	1,424	1,706	1,494	2,669	
	Natural Gas (MJ/yr.)	51,672	41,796	38,930	30,887	26,162	24,368	33,654	30,475	40,066	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	246	360	554	138	188	291	162	301	405	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	4,800	5,971	8,837	2,869	3,737	5,531	3,739	6,918	6,823	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$8,250.00	$9,900.00	$21,450.00	$6,600.00	$7,920.00	$17,160.00	$5,940.00	$13,200.00	$14,760.28	Based on personal communication with SAWDAC (Siding and Window Dealers Association of Canada) in 2010, the material cost of super high-performance windows is about $66/ft^2
	Upgrade, Installation ($)	$1,875.00	$2,250.00	$4,875.00	$1,500.00	$1,800.00	$3,900.00	$1,350.00	$3,000.00	$3,354.61	Based on personal communication with SAWDAC (Siding and Window Dealers Association of Canada) in 2010, the installation cost of super high-performance windows is about $15/ft^2
	Baseline, Material ($)	$6,875.00	$8,250.00	$17,875.00	$5,500.00	$6,600.00	$14,300.00	$4,950.00	$11,000.00	$12,300.23	Based on personal communication with SAWDAC (Siding and Window Dealers Association of Canada) in 2010, the material cost of std performance windows is about $55/ft^2
	Baseline, Installation ($)	$1,750.00	$2,100.00	$4,550.00	$1,400.00	$1,680.00	$3,640.00	$1,260.00	$2,800.00	$3,130.97	Based on personal communication with SAWDAC (Siding and Window Dealers Association of Canada) in 2010, the installation cost of std performance windows is about $14/ft^2
	Total Measure Cost ($)	$1,500.00	$1,800.00	$3,900.00	$1,200.00	$1,440.00	$3,120.00	$1,080.00	$2,400.00	$2,683.69	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	25	25	25	25	25	25	25	25	25	Approximate lifetime, based on previous Marbek energy efficiency potential studies
	Baseline (yrs.)	25	25	25	25	25	25	25	25	25	Approximate lifetime, based on previous Marbek energy efficiency potential studies
Cost Savings ($/yr.)		$67	$88	$132	$40	$52	$78	$50	$93	$100	
Simple Payback (yrs.)		22.3	20.4	29.4	30.4	27.6	39.9	21.6	25.9	26.10	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$382	$559	$860	$214	$293	$451	$252	$467	$628	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$610	$758	$1,122	$364	$475	$703	$475	$879	$867	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$509	-$483	-$1,918	-$621	-$673	-$1,966	-$353	-$1,054	-$1,189	
Benefit/Cost Ratio		0.66	0.73	0.51	0.48	0.53	0.37	0.67	0.56	0.59	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	8.5%	12.5%	18.5%	8.5%	12.5%	18.5%	10.0%	18.5%	14.8%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes. Further assuming that savings would scale with new homes (i.e. 100% of windows being replaced versus 50%)
Space Cooling	-	1	1	7.5%	10.0%	16.5%	7.5%	10.0%	16.5%	8.5%	16.5%	12.8%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes. Further assuming that savings would scale with new homes (i.e. 100% of windows being replaced versus 50%)
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	8.5%	12.5%	18.5%	8.5%	12.5%	18.5%	10.0%	18.5%	14.8%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes. Further assuming that savings would scale with new homes (i.e. 100% of windows being replaced versus 50%)
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	8.5%	12.5%	18.5%	8.5%	12.5%	18.5%	10.0%	18.5%	14.8%	
Space Cooling	1	1	7.5%	10.0%	16.5%	7.5%	10.0%	16.5%	8.5%	16.5%	12.8%	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	8.5%	12.5%	18.5%	8.5%	12.5%	18.5%	10.0%	18.5%	14.8%	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

High-Performance Homes (EGH 80/R2000/ENERGY STAR®)

Not used--EGH 80 is now the minimum

		References/Notes
Description:	There are several certification schemes for energy-efficient new homes that incorporate integrated design and multiple envelope measures. An EnerGuide for Houses (EGH) rating is a standard measure of a home's energy performance, calculated by a professional EGH advisor. The rating is based on information on the construction of the home and the results of a blower door test performed once the house has been built. The R2000 standard is one method of achieving an EGH 80 rating. However, R2000 homes are required to achieve an air tightness level of 1.5 ACH@50Pa, install a heat recovery ventilator (HRV), and meet other environmental requirements. This substantially increases the cost of the measure. The ENERGY STAR® for New Homes program has similar requirements and also requires that homes be rated EGH 80. Since these three high performance home standards all result in essentially the same energy performance, the costs assumed for the measure are those of the least expensive of the three. EGH 80 is the lowest cost, since it allows the builder the most flexibitility for achieving the energy performance.	
Baseline:	An average new home (EGH rating of 76 assumed)	
Upgrade:	A high-performance new home (EGH rating of 80 assumed). This option no longer applies as EGH of 80 is now the minimum.	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083			$1.648			$1.648		$1.648
Electricity ($/kW)	$0.000			$0.000			$0.000		$0.000
Natural Gas ($/MJ)	$0.010			$0.139			$0.139		$0.139
Oil ($/L)	$0.000			$0.000			$0.000		$0.000
Water ($/1000L)	$0.000			$0.000			$0.000		$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New) ☑	Attached (Pre-1976)	Attached (Post-1976)	Attached (New) ☑	Mobile (Existing)	Mobile (New) ☑	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)			-			-		-	-	
	Natural Gas (MJ/yr.)			-			-		-	-	
	Oil (L/yr.)			-			-		-	-	
	Water (L/yr.)			-			-		-	-	
Upgrade Consumption	Electricity (kWh/yr.)			-			-		-	-	
	Natural Gas (MJ/yr.)			-			-		-	-	
	Oil (L/yr.)			-			-		-	-	
	Water (L/yr.)			-			-		-	-	
Interactive Effects (Inputs)	Heating Penalty ☐			0%			0%		0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐			0%			0%		0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)			-			-		-	-	
	Electricity, Cooling (kWh/yr.)			-			-		-	-	
	Electricity, Total (kWh/yr.)			-			-		-	-	
	Natural Gas (MJ/yr.)			-			-		-	-	
	Oil (L/yr.)			-			-		-	-	
Winter Peak Hours-Use Factor				-			-		-	-	
Resource Savings	Electricity (kWh/yr.)			-			-		-	-	
	Electricity (kW peak)			-			-		-	-	
	Natural Gas (MJ/yr.)			-			-		-	-	
	Oil (L/yr.)			-			-		-	-	
	Water (L/yr.)			-			-		-	-	
Cost Parameters	Upgrade, Material ($)			$6,000.00			$4,800.00		$0.00	$5,538.34	Based on cost estimates for Saskatchewan homes from Rob Dumont (Dumont and Associates) and Dave Fetsch (Sun Ridge Group). Assuming cost scales to 80% for attached homes. Need value for mobile homes.
	Upgrade, Installation ($)			$0.00			$0.00		$0.00	$0.00	
	Baseline, Material ($)			$0.00			$0.00		$0.00	$0.00	
	Baseline, Installation ($)			$0.00			$0.00		$0.00	$0.00	
	Total Measure Cost ($)			$6,000.00			$4,800.00		$0.00	$5,538.34	
	Basis (Full/Incremental)			Full			Full		Full	Full	
Incremental O&M ($/yr.)				$0			$0		$0	$0	
Lifetimes	Upgrade (yrs.)			30			30		30	30	Approximate lifetime, based on previous Marbek energy efficiency potential studies
	Baseline (yrs.)			30			30		30	30	
Cost Savings ($/yr.)				$0			$0		$0	$0	
Simple Payback (yrs.)				N/A			N/A		N/A	0.00	
NPV of O&M Costs ($)				$0			$0		$0	$0	
Total Benefits ($)	Electric Energy			$0			$0		$0	$0	
	Electric Demand			$0			$0		$0	$0	
	Natural Gas			$0			$0		$0	$0	
	Oil			$0			$0		$0	$0	
	Water			$0			$0		$0	$0	
Measure TRC ($)				-$6,000			-$4,800		$0	-$5,538	
Benefit/Cost Ratio				0.00			0.00		0.00	0.00	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed			1			1		1	
Cost Flag (i.e. way measure is typically applied)			Incremental			Incremental		Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No) Baseline	Upgrade	Measure Resource Savings (%) Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	Standard EGH rating assumes no space cooling
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No) Baseline	Upgrade	Measure Resource Savings (%) Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No) Baseline	Upgrade	Measure Resource Savings (%) Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	

Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	**Sub End Use/Equipment (If Applicable)**	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
		Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Ventilation and Circulation	0	0			-			-		-	-	
Space Cooling	0	0			-			-		-	-	
Clothes Washers	0	0			-			-		-	-	
Dishwashers	0	0			-			-		-	-	
Other Electric Loads	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Space Heating	0	0			-			-		-	-	
Domestic Hot Water (DHW)	0	0			-			-		-	-	
Fireplaces	0	0			-			-		-	-	
Cooking	0	0			-			-		-	-	
Clothes Dryers	0	0			-			-		-	-	
Pool and Spa Heaters	0	0			-			-		-	-	
Other	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Space Heating	0	0			-			-		-	-	
Domestic Hot Water (DHW)	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Water	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

Net-Zero Ready Energy Homes

		References/Notes
Description:	Net-zero energy homes (NZEH) produce at least as much energy as they consume. This is accomplished by incorporating on-site power generation, such as solar PV panels or small wind turbines, to offset electrical loads. However, the energy consumption of a NZEH is significantly lower, due to the addition of a wide array of energy efficiency features. Measures that are typically considered include increased insulation, super high-performance windows, ENERGY STAR® appliances, solar thermal space and/or water heating, heat pumps, and passive solar designs. This measure is designed to produce a highly efficient house that is ready to be turned into a NZEH with the addition of on-site renewable energy generation.	
Baseline:	An average new home (Minimum EGH rating of 80 required)	
Upgrade:	A net-zero energy ready home (EGH rating of 86 assumed)	

Baseline Reference:	1. Annual consumption, end use
Heating Fuel Type:	All Fuels (Average Fuel Mix)
Main End Use:	Space Heating
Discount Rate:	7.38%
GHG Adder Incl.?	No
Resource Costs:	Baseload

= User Input
= Calculation

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083			$1.648			$1.648		$1.648
Electricity ($/kW)	$0.000			$0.000			$0.000		$0.000
Natural Gas ($/MJ)	$0.010			$0.139			$0.139		$0.139
Oil ($/L)	$0.000			$0.000			$0.000		$0.000
Water ($/1000L)	$0.000			$0.000			$0.000		$0.000

Sub-sector		Detached (Pre-1976) ☐	Detached (Post-1976) ☐	Detached (New) ☑	Attached (Pre-1976) ☐	Attached (Post-1976) ☐	Attached (New) ☑	Mobile (Existing) ☐	Mobile (New) ☑	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)			768			384		232	687	
	Natural Gas (MJ/yr.)			62,701			42,509		50,394	59,163	
	Oil (L/yr.)			-			-		-	-	
	Water (L/yr.)			-			-		-	-	
Upgrade Consumption	Electricity (kWh/yr.)			538			269		162	481	
	Natural Gas (MJ/yr.)			43,891			29,756		35,276	41,414	
	Oil (L/yr.)			-			-		-	-	
	Water (L/yr.)			-			-		-	-	
Interactive Effects (Inputs)	Heating Penalty ☐			0%			0%		0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐			0%			0%		0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)			-			-		-	-	
	Electricity, Cooling (kWh/yr.)			-			-		-	-	
	Electricity, Total (kWh/yr.)			-			-		-	-	
	Natural Gas (MJ/yr.)			-			-		-	-	
	Oil (L/yr.)			-			-		-	-	
Winter Peak Hours-Use Factor				-			-		-	-	
Resource Savings	Electricity (kWh/yr.)			230			115		70	206	
	Electricity (kW peak)			-			-		-	-	
	Natural Gas (MJ/yr.)			18,810			12,753		15,118	17,749	
	Oil (L/yr.)			-			-		-	-	
	Water (L/yr.)			-			-		-	-	
Cost Parameters	Upgrade, Material ($)			$14,000.00			$9,800.00		$9,800.00	$13,185.80	Working value of $14,000 based on NRCan's R-2000 renewal work (personal communication with Anil Parekh, Nov. 25, 2010). Assumed that cost scales by 75% for detached and mobile homes.
	Upgrade, Installation ($)			$0.00			$0.00		$0.00	$0.00	
	Baseline, Material ($)			$0.00			$0.00		$0.00	$0.00	
	Baseline, Installation ($)			$0.00			$0.00		$0.00	$0.00	
	Total Measure Cost ($)			$14,000.00			$9,800.00		$9,800.00	$13,185.80	
	Basis (Full/Incremental)			Full			Full		Full	Full	
Incremental O&M ($/yr.)				$0			$0		$0	$0	
Lifetimes	Upgrade (yrs.)			30			30		30	30	Maximum lifetime used in study.
	Baseline (yrs.)			30			30		30	30	
Cost Savings ($/yr.)				$203			$135		$154	$191	
Simple Payback (yrs.)				68.8			72.9		63.7	69.16	
NPV of O&M Costs ($)				$0			$0		$0	$0	
Total Benefits ($)	Electric Energy			$380			$190		$115	$339	
	Electric Demand			$0			$0		$0	$0	
	Natural Gas			$2,616			$1,774		$2,103	$2,469	
	Oil			$0			$0		$0	$0	
	Water			$0			$0		$0	$0	
Measure TRC ($)				-$11,004			-$7,836		-$7,583	-$10,378	
Benefit/Cost Ratio				0.21			0.20		0.23	0.21	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed			1			1		1	
Cost Flag (i.e. way measure is typically applied)			Incremental			Incremental		Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1			30.0%			30.0%		30.0%	30.0%	Going from EGH 80 to EGH 86 represents a savings of 30%. It is assumed that all major end uses are affected equally.
Space Cooling	-	0	0									-	Standard EGH rating assumes no space cooling
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1			30.0%			30.0%		30.0%	30.0%	Going from EGH 80 to EGH 86 represents a savings of 30%. It is assumed that all major end uses are affected equally.
Domestic Hot Water (DHW)	-	1	1			30.0%			30.0%		30.0%	30.0%	Going from EGH 80 to EGH 86 represents a savings of 30%. It is assumed that all major end uses are affected equally.
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	

Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1			30.0%			30.0%		30.0%	30.0%	
Space Cooling	0	0			-			-		-	-	
Clothes Washers	0	0			-			-		-	-	
Dishwashers	0	0			-			-		-	-	
Other Electric Loads	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1			30.0%			30.0%		30.0%	30.0%	
Domestic Hot Water (DHW)	1	1			30.0%			30.0%		30.0%	30.0%	
Fireplaces	0	0			-			-		-	-	
Cooking	0	0			-			-		-	-	
Clothes Dryers	0	0			-			-		-	-	
Pool and Spa Heaters	0	0			-			-		-	-	
Other	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0			-			-		-	-	
Domestic Hot Water (DHW)	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

High Efficiency Condensing Gas Furnaces

		References/Notes
Description:	Federal legislation now requires that all residential furnaces meet the minimum performance standard of 90% AFUE . However, higher efficiency condensing furnaces are available. These furnaces include more advanced heat exchanger designs that extract more heat from the flue gases before they are exhausted.	
Baseline:	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 90%	BC minimum
Upgrade:	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 96%	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	56,473	47,767	47,767	33,756	29,900	29,900	37,393	37,393	46,889	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	52,915	44,758	44,758	31,629	28,016	28,016	35,037	35,037	43,935	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	3,558	3,009	3,009	2,127	1,884	1,884	2,356	2,356	2,954	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$4,667.00	$4,667.00	$4,667.00	$4,667.00	$4,667.00	$4,667.00	$4,667.00	$4,667.00	$4,667.00	Cost of a 96% AFUE gas furnace, based on Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-41, April 16, 2009.
	Upgrade, Installation ($)	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	Approximate installation cost
	Baseline, Material ($)	$3,190.00	$3,190.00	$3,190.00	$3,190.00	$3,190.00	$3,190.00	$3,190.00	$3,190.00	$3,190.00	Cost of a 90% AFUE gas furnace, based on Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-41, April 16, 2009.
	Baseline, Installation ($)	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	Approximate installation cost
	Total Measure Cost ($)	$1,477.00	$1,477.00	$1,477.00	$1,477.00	$1,477.00	$1,477.00	$1,477.00	$1,477.00	$1,477.00	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	18	18	18	18	18	18	18	18	18	Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-41, April 16, 2009.
	Baseline (yrs.)	18	18	18	18	18	18	18	18	18	Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-41, April 16, 2009.
Cost Savings ($/yr.)		$35	$29	$29	$21	$18	$18	$23	$23	$29	
Simple Payback (yrs.)		42.4	50.1	50.1	70.9	80.0	80.0	64.0	64.0	52.45	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$372	$315	$315	$222	$197	$197	$246	$246	$309	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$1,105	-$1,162	-$1,162	-$1,255	-$1,280	-$1,280	-$1,231	-$1,231	-$1,168	
Benefit/Cost Ratio		0.25	0.21	0.21	0.15	0.13	0.13	0.17	0.17	0.21	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	96% AFUE versus 90% AFUE
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	

Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

Early Retirement of Existing Gas Furnaces

		References/Notes
Description:	Federal legislation now requires that all residential furnaces meet the minimum performance standard of 90% AFUE . However, consumers with less efficient furnaces that still work may wait years before replacing them. Early retirement of existing furnaces that are still functional is an option. Energy savings only last until the old furnace would have been replaced, because after that the energy consumption of the base case and upgrade is the same. The consumer has the added peace of mind of having a new furnace that is less likely to break down in winter.	
Baseline:	Keep existing 77% efficient furnace until failure, assumed to be in 9 years; then replace with the same furnace as the upgrade	Calculation of average existing efficiency from the REUS
Upgrade:	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 90%	BC minimum

Baseline Reference:	1. Annual consumption, end use
Heating Fuel Type:	All Fuels (Average Fuel Mix)
Main End Use:	Space Heating
Discount Rate:	7.38%
GHG Adder Incl.?	No
Resource Costs:	Baseload

= User Input
= Calculation

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$0.884	$0.884		$0.884	$0.884		$0.884	
Electricity ($/kW)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	
Natural Gas ($/MJ)	$0.010	$0.061	$0.061		$0.061	$0.061		$0.061	
Oil ($/L)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	
Water ($/1000L)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	

Sub-sector		Detached ☑ (Pre-1976)	Detached ☑ (Post-1976)	Detached ☐ (New)	Attached ☑ (Pre-1976)	Attached ☑ (Post-1976)	Attached ☐ (New)	Mobile ☑ (Existing)	Mobile ☐ (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-		-	-		-		-	
	Natural Gas (MJ/yr.)	56,473	47,767		33,756	29,900		37,393		49,117	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-		-	-		-		-	
	Natural Gas (MJ/yr.)	48,315	40,867		28,880	25,581		31,992		42,022	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%		0%	0%		0%		0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%		0%	0%		0%		0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-		-	-		-		-	
	Electricity, Cooling (kWh/yr.)	-	-		-	-		-		-	
	Electricity, Total (kWh/yr.)	-	-		-	-		-		-	
	Natural Gas (MJ/yr.)	-	-		-	-		-		-	
	Oil (L/yr.)	-	-		-	-		-		-	
Winter Peak Hours-Use Factor		-	-		-	-		-		-	
Resource Savings	Electricity (kWh/yr.)	-	-		-	-		-		-	
	Electricity (kW peak)	-	-		-	-		-		-	
	Natural Gas (MJ/yr.)	8,157	6,900		4,876	4,319		5,401		7,095	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Cost Parameters	Upgrade, Material ($)	$3,190.00	$3,190.00		$3,190.00	$3,190.00		$3,190.00		$3,190.00	Cost of a 90% AFUE gas furnace, based on Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-41, April 16, 2009.
	Upgrade, Installation ($)	$750.00	$750.00		$750.00	$750.00		$750.00		$750.00	Approximate installation cost
	Baseline, Material ($)	$1,680.66	$1,680.66		$1,680.66	$1,680.66		$1,680.66		$1,680.66	Cost of a 90% AFUE gas furnace, based on Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-41, April 16, 2009. Discounted by remaining life.
	Baseline, Installation ($)	$395.14	$395.14		$395.14	$395.14		$395.14		$395.14	Approximate installation cost
	Total Measure Cost ($)	$1,864.20	$1,864.20		$1,864.20	$1,864.20		$1,864.20		$1,864.20	
	Basis (Full/Incremental)	Incr.	Incr.		Incr.	Incr.		Incr.		Incr.	
Incremental O&M ($/yr.)		$0	$0		$0	$0		$0		$0	
Lifetimes	Upgrade (yrs.)	9	9		9	9		9		9	Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-41, April 16, 2009. See calculation at top right. Assumed age of present furnace is subtracted from Navigant's lifetime assumption
	Baseline (yrs.)	9	9		9	9		9		9	Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-41, April 16, 2009. See calculation at top right. Assumed age of present furnace is subtracted from Navigant's lifetime assumption
Cost Savings ($/yr.)		$80	$68		$48	$42		$53		$70	
Simple Payback (yrs.)		23.3	27.6		39.0	44.0		35.2		27.40	
NPV of O&M Costs ($)		$0	$0		$0	$0		$0		$0	
Total Benefits ($)	Electric Energy	$0	$0		$0	$0		$0		$0	
	Electric Demand	$0	$0		$0	$0		$0		$0	
	Natural Gas	$498	$421		$298	$264		$330		$433	
	Oil	$0	$0		$0	$0		$0		$0	
	Water	$0	$0		$0	$0		$0		$0	
Measure TRC ($)		-$1,366	-$1,443		-$1,566	-$1,600		-$1,534		-$1,431	
Benefit/Cost Ratio		0.27	0.23		0.16	0.14		0.18		0.23	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1		1	1		1		
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental		Incremental	Incremental		Incremental		
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	14.4%	14.4%		14.4%	14.4%		14.4%		14.4%	90% AFUE versus 77% AFUE
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	

Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-		-	-		-		-	
Space Cooling	0	0	-	-		-	-		-		-	
Clothes Washers	0	0	-	-		-	-		-		-	
Dishwashers	0	0	-	-		-	-		-		-	
Other Electric Loads	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	14.4%	14.4%		14.4%	14.4%		14.4%		14.4%	
Domestic Hot Water (DHW)	0	0	-	-		-	-		-		-	
Fireplaces	0	0	-	-		-	-		-		-	
Cooking	0	0	-	-		-	-		-		-	
Clothes Dryers	0	0	-	-		-	-		-		-	
Pool and Spa Heaters	0	0	-	-		-	-		-		-	
Other	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-		-	-		-		-	
Domestic Hot Water (DHW)	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

Condensing Gas Boilers

		References/Notes
Description:	High-efficiency condensing boilers feature advanced heat exchanger designs that extract more heat from the flue gases before they are exhausted. So much heat is extracted that the flue gases condense and must be discharged as a condensate rather than a gas. In retrofit applications where condensing boilers are replacing non-condensing units, it may be necessary to modify the radiating system. Otherwise, the units may not actually condense the flue gas and realize their full efficiency potential.	
Baseline:	A non-condensing mid-efficiency natural gas boiler (82% AFUE assumed)	Minimum proposed standard for gas boilers, to take effect on Sept. 1, 2010 - Link.
Upgrade:	A condensing natural gas boiler (92% AFUE assumed)	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	56,473	47,767	47,767	33,756	29,900	29,900	37,393	37,393	46,889	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	50,317	42,560	42,560	30,077	26,641	26,641	33,317	33,317	41,778	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	6,156	5,207	5,207	3,679	3,259	3,259	4,076	4,076	5,111	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$8,200.00	$8,200.00	$8,200.00	$8,200.00	$8,200.00	$8,200.00	$8,200.00	$8,200.00	$8,200.00	Needs to be updated
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Installation costs included above
	Baseline, Material ($)	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	Needs to be updated
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Installation costs included above
	Total Measure Cost ($)	$3,200.00	$3,200.00	$3,200.00	$3,200.00	$3,200.00	$3,200.00	$3,200.00	$3,200.00	$3,200.00	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	20	20	20	20	20	20	20	20	20	Needs to be updated
	Baseline (yrs.)	20	20	20	20	20	20	20	20	20	Needs to be updated
Cost Savings ($/yr.)		$60	$51	$51	$36	$32	$32	$40	$40	$50	
Simple Payback (yrs.)		53.0	62.7	62.7	88.7	100.2	100.2	80.1	80.1	65.68	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$688	$582	$582	$411	$364	$364	$455	$455	$571	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$2,512	-$2,618	-$2,618	-$2,789	-$2,836	-$2,836	-$2,745	-$2,745	-$2,629	
Benefit/Cost Ratio		0.21	0.18	0.18	0.13	0.11	0.11	0.14	0.14	0.18	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	10.9%	10.9%	10.9%	10.9%	10.9%	10.9%	10.9%	10.9%	10.9%	92% AFUE versus 82% AFUE
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	

Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	10.9%	10.9%	10.9%	10.9%	10.9%	10.9%	10.9%	10.9%	10.9%	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

High Efficiency Gas Fireplaces

		References/Notes
Description:	All vented gas fireplaces sold in Canada must now be tested for their energy efficiency using the Canadian Standards Association CSA-P.4.1-02 standard if they are shipped across provincial lines. The energy-efficiency rating of the fireplace is printed on the EnerGuide label. EnerGuide does not set a minimum efficiency level, so savings are possible by using the EnerGuide label to choose the more efficient unit.	
Baseline:	An average efficiency natural gas fireplace (60% assumed)	NRCan data, obtained via personal communication, 2008
Upgrade:	A high efficiency natural gas fireplace (80% assumed)	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.226	$1.226	$1.226	$1.226	$1.226	$1.226	$1.226	$1.226
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.092	$0.092	$0.092	$0.092	$0.092	$0.092	$0.092	$0.092
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	17,121	17,121	17,121	11,300	11,300	11,300	11,300	11,300	16,273	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	12,841	12,841	12,841	8,475	8,475	8,475	8,475	8,475	12,205	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	4,280	4,280	4,280	2,825	2,825	2,825	2,825	2,825	4,068	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$150.00	$150.00	$150.00	$150.00	$150.00	$150.00	$150.00	$150.00	$150.00	Previous analyses have suggested that the cost of gas fireplaces has more to do with "add-ons" (e.g., mantles, etched glass, etc.) than with efficiency. An incremental cost of $150 is assumed for higher-efficiency models, based on a discussion 22 Nov 2010 with Paul Miles of Miles Industries.
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$150.00	$150.00	$150.00	$150.00	$150.00	$150.00	$150.00	$150.00	$150.00	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Set to incremental
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	15	15	15	15	15	15	15	15	15	Lifetime based on previous energy efficiency potential studies conducted by Marbek
	Baseline (yrs.)	15	15	15	15	15	15	15	15	15	Lifetime based on previous energy efficiency potential studies conducted by Marbek
Cost Savings ($/yr.)		$42	$42	$42	$28	$28	$28	$28	$28	$40	
Simple Payback (yrs.)		3.6	3.6	3.6	5.4	5.4	5.4	5.4	5.4	3.84	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$395	$395	$395	$261	$261	$261	$261	$261	$375	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		$245	$245	$245	$111	$111	$111	$111	$111	$225	
Benefit/Cost Ratio		2.63	2.63	2.63	1.74	1.74	1.74	1.74	1.74	2.50	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	1	1	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	Improvement from average efficiency of 60% to 80%.
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	

Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	1	1	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Programmable Thermostats (Central Heating and Cooling)

		References/Notes
Description:	Digital programmable thermostats provide improved temperature setting accuracy and allow occupants to preset temperatures for various time periods. A 4ºC temperature setback is often assumed during night and unoccupied periods. However, utility studies have indicated that a lower average setback value should be used to reflect the fact that the thermostat's setback capabilities do not completely reflect how they are used. For example, some home occupants reliably set back manual thermostats while others do not use the setback features on their electronic thermostats.	
Baseline:	Non-programmable thermostat installed on central forced-air natural gas furnace and electric space cooling system	
Upgrade:	Programmable thermostat installed on central forced-air natural gas furnace and electric space cooling system	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.015	$1.015	$1.015	$1.015	$1.015	$1.015	$1.015	$1.015
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.073	$0.073	$0.073	$0.073	$0.073	$0.073	$0.073	$0.073
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	3,197	3,397	3,262	1,785	1,785	1,714	1,868	1,794	3,073	
	Natural Gas (MJ/yr.)	56,473	47,767	47,767	33,756	29,900	29,900	37,393	37,393	46,889	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	3,116	3,315	3,184	1,741	1,741	1,672	1,819	1,747	2,999	
	Natural Gas (MJ/yr.)	52,802	44,662	44,662	31,562	27,956	27,956	34,963	34,963	43,841	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	80	82	78	43	43	42	49	47	75	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	3,671	3,105	3,105	2,194	1,943	1,943	2,431	2,431	3,048	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	Based on a retail scan of p-stats designed for central space heating and cooling (Home Depot, 2010)
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Assume that homeowners are able to install programmable thermostats on their own
	Baseline, Material ($)	$25.00	$25.00	$25.00	$25.00	$25.00	$25.00	$25.00	$25.00	$25.00	Based on a retail scan of manual thermostats designed for central space heating and cooling (Home Depot, 2010)
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Assume that homeowners are able to install thermostats on their own
	Total Measure Cost ($)	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	11	11	11	11	11	11	11	11	11	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 327, January 2010.
	Baseline (yrs.)	11	11	11	11	11	11	11	11	11	Assume similar lifetime for non-programmable thermostats
Cost Savings ($/yr.)		$43	$37	$37	$25	$23	$22	$28	$28	$36	
Simple Payback (yrs.)		1.2	1.3	1.4	2.0	2.2	2.2	1.8	1.8	1.43	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$81	$83	$80	$44	$44	$42	$50	$48	$76	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$266	$225	$225	$159	$141	$141	$176	$176	$221	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		$298	$258	$255	$153	$135	$133	$176	$174	$247	
Benefit/Cost Ratio		6.95	6.16	6.10	4.06	3.70	3.67	4.52	4.49	5.94	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	Assuming only night setback to 18°C (conservative estimate). Savings based on NRC, "The effects of thermostat set-back and set-up on seasonal energy consumption, surface temperatures and recovery times at the CCHT Twin House Facility", ASHRAE Transactions, v. 113, pt. 1, p. 5, 2007. Savings are conservative because testing was in R-2000 homes.
Space Cooling	-	1	1	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	Assuming day set-up to 25°C and low solar gains (conservative). Savings based on NRC, "The effects of thermostat set-back and set-up on seasonal energy consumption, surface temperatures and recovery times at the CCHT Twin House Facility", ASHRAE Transactions, v. 113, pt. 1, p. 8, 2007.
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	Assuming only night setback to 18°C (conservative estimate). Savings based on NRC, "The effects of thermostat set-back and set-up on seasonal energy consumption, surface temperatures and recovery times at the CCHT Twin House Facility", ASHRAE Transactions, v. 113, pt. 1, p. 5, 2007. Savings are conservative because testing was in R-2000 homes.
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment	Applies? (1=Yes; 0=No)	Measure Resource Savings (%)	References/Notes

Main End Use	Use/Equipment (If Applicable)	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	
Space Cooling	1	1	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Water

											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

Solar Pre-Heated Make-Up Air Systems (e.g., SolarWall®)

		References/Notes
Description:	Solar preheated ventilation systems preheat incoming ventilation air and reduce heat loss through the portion of the building shell covered by them. They consist of perforated steel or aluminum absorber sheets that are mounted vertically on a building's exterior surface and are ideally mounted on southerly facing walls, plus or minus 20 degrees. The dark coloured metal sheets that make up the system are mounted a small distance away from the building's surface, creating an air cavity. A negative pressure is created within the cavity by ventilation fans and air is drawn through small holes in the metal panels. On sunny winter days, these systems can raise incoming air temperatures by 25°C to 35°C. In summer months, ventilation air can be drawn directly from the outside through a bypass damper, while heated air is rejected through vents at the top of the air cavity. These systems are generally used in commercial and industrial applications but they have seen some limited residential use.	
Baseline:	Homes with ducting and heat recovery ventilators (HRVs)	
Upgrade:	A 10 m2 solar pre-heated make-up air system, located on the south side of a home	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.648	$1.648	$1.648	$1.648	$1.648	$1.648	$1.648	$1.648
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.139	$0.139	$0.139	$0.139	$0.139	$0.139	$0.139	$0.139
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	600	800	768	400	400	384	241	232	689	
	Natural Gas (MJ/yr.)	56,473	47,767	47,767	33,756	29,900	29,900	37,393	37,393	46,889	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	586	782	751	391	391	375	236	226	673	
	Natural Gas (MJ/yr.)	55,174	46,668	46,668	32,980	29,212	29,212	36,533	36,533	45,810	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	14	18	18	9	9	9	6	5	16	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	1,299	1,099	1,099	776	688	688	860	860	1,078	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$845.00	$845.00	$845.00	$845.00	$845.00	$845.00	$845.00	$845.00	$845.00	Based on private communication with Conserval, installed cost is about $130/m^2 - asumming 65% for material.
	Upgrade, Installation ($)	$455.00	$455.00	$455.00	$455.00	$455.00	$455.00	$455.00	$455.00	$455.00	Based on private communication with Conserval, installed cost is about $130/m^2 - asumming 35% for labour.
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$1,300.00	$1,300.00	$1,300.00	$1,300.00	$1,300.00	$1,300.00	$1,300.00	$1,300.00	$1,300.00	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	40	40	40	40	40	40	40	40	40	Personal communication, D McClenahan, NRCan, #### (year?)
	Baseline (yrs.)	-	-	-	-	-	-	-	-	-	
Cost Savings ($/yr.)		$14	$12	$12	$8	$8	$7	$9	$9	$12	
Simple Payback (yrs.)		93.7	105.8	106.3	155.3	173.3	174.0	146.3	146.6	112.66	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$23	$30	$29	$15	$15	$15	$9	$9	$26	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$181	$153	$153	$108	$96	$96	$120	$120	$150	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$1,097	-$1,117	-$1,118	-$1,177	-$1,189	-$1,190	-$1,171	-$1,172	-$1,124	
Benefit/Cost Ratio		0.16	0.14	0.14	0.09	0.09	0.08	0.10	0.10	0.14	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	Past Marbek work indicates approximately a 13% savings due to an HRV. An Enermodal paper indicates that a combined Solar Wall and HRV together would have a savings of 15%. This is a 2.3% savings.
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	See note above.
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heater	-	0	0									-	
Pool and Spa Heater	Pool Heaters	0	0									-	
Pool and Spa Heater	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	

Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

High Efficiency Heat Recovery Ventilators (HRVs)

		References/Notes
Description:	Heat recovery ventilators (HRVs) are heat exchangers that are integrated into the centralized ventilation and exhaust systems of many newer homes. In the winter, they allow for incoming fresh air to be heated by outgoing stale air. Conversely, in homes with central air conditioning systems, they allow incoming fresh air to be cooled by outgoing stale air in the summer. High efficiency HRVs incorporate more effective heat exchangers. Some models also include desiccant wheels so that latent heat (i.e. humidity) can be transferred between the two air streams.	
Baseline:	A standard-efficiency (sensible efficiency of approximately 70%) heat recovery ventilator (HRV), in a home with central heating and cooling	
Upgrade:	A high-efficiency heat recovery ventilator (HRV) (sensible efficiency of approximately 85%), in a home with central heating and cooling	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.226	$1.226	$1.226	$1.226	$1.226	$1.226	$1.226	$1.226
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/m^3)	$0.010	$0.092	$0.092	$0.092	$0.092	$0.092	$0.092	$0.092	$0.092
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☑	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☑	Mobile (Existing) ☑	Mobile (New) ☑	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	3,197	3,397	3,262	1,785	1,785	1,714	1,868	1,794	3,073	
	Natural Gas (m3/yr.)	56,473	47,767	47,767	33,756	29,900	29,900	37,393	37,393	46,889	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	3,113	3,308	3,177	1,738	1,738	1,670	1,820	1,748	2,994	
	Natural Gas (m3/yr.)	55,004	46,525	46,525	32,878	29,122	29,122	36,421	36,421	45,670	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	83	88	85	46	46	45	49	47	80	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Nat. Gas (m3/yr.)	1,468	1,242	1,242	878	777	777	972	972	1,219	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$1,600.00	$1,600.00	$1,600.00	$1,600.00	$1,600.00	$1,600.00	$1,600.00	$1,600.00	$1,600.00	Based on 2010 cost estimates for Saskatchewan homes from Rob Dumont (Dumont and Associates) and Dave Fetsch (Sun Ridge Group).
	Upgrade, Installation ($)	$800.00	$800.00	$800.00	$800.00	$800.00	$800.00	$800.00	$800.00	$800.00	Based on 2010 cost estimates for Saskatchewan homes from Rob Dumont (Dumont and Associates) and Dave Fetsch (Sun Ridge Group). Installation cost is very dependant on the home and accessibility within it.
	Baseline, Material ($)	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	Based on 2010 cost estimates for Saskatchewan homes from Rob Dumont (Dumont and Associates) and Dave Fetsch (Sun Ridge Group).
	Baseline, Installation ($)	$800.00	$800.00	$800.00	$800.00	$800.00	$800.00	$800.00	$800.00	$800.00	Based on 2010 cost estimates for Saskatchewan homes from Rob Dumont (Dumont and Associates) and Dave Fetsch (Sun Ridge Group). Installation cost is very dependant on the home and accessibility within it.
	Total Measure Cost ($)	$600.00	$600.00	$600.00	$600.00	$600.00	$600.00	$600.00	$600.00	$600.00	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	15	15	15	15	15	15	15	15	15	E Source Heating Technology Atlas. Also used in previous energy efficiency potential studies by Marbek. Most manufacturers provide limited lifetime warranties on HRV cores.
	Baseline (yrs.)	15	15	15	15	15	15	15	15	15	E Source Heating Technology Atlas. Also used in previous energy efficiency potential studies by Marbek. Most manufacturers provide limited lifetime warranties on HRV cores.
Cost Savings ($/yr.)		$21	$19	$19	$12	$11	$11	$14	$13	$19	
Simple Payback (yrs.)		28.2	30.8	31.3	48.2	52.4	53.1	44.3	44.8	33.39	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$102	$108	$104	$57	$57	$55	$60	$57	$98	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$135	$115	$115	$81	$72	$72	$90	$90	$112	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$363	-$377	-$381	-$462	-$471	-$474	-$451	-$453	-$390	
Benefit/Cost Ratio		0.40	0.37	0.36	0.23	0.21	0.21	0.25	0.24	0.35	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	Based on previous Marbek analyses, standard (~70% efficient) reduce space heating energy use by about 13% (i.e. for a similar ventilation rate). High efficiency models are about 20% more efficient.
Space Cooling	-	1	1	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	See comment for space heating. Similar savings are assumed for this end use.
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	See comment for space heating. Similar savings are assumed for this end use.
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment	Applies? (1=Yes; 0=No)	Measure Resource Savings (%)	References/Notes

Main End Use	Use/Equipment (If Applicable)	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	
Space Cooling	1	1	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Gas-Fired Air-Source Heat Pumps

Not used--not commercially available in residential sizes.

		References/Notes
Description:	Early gas-fired heat pumps, such as the York Triathlon, were unsuccessful due to their bulky size and poor quality design. A new generation of gas absorption heat pumps (GAHPs) is currently available through Robur, an Italian manufacturer. These systems can either be ground-source or air-source (i.e., the heat sink may be either an underground fluid loop or an above ground heat exchanger coil). Air-source systems are substantially less expensive since they don't require drilling to install underground fluid loops. However, they can also be much less efficient than ground-source versions since their efficiency is a function of outside air temperature. Commercial-sized GAHP systems have been available in Canada since mid-2007 but residential-sized systems are rare in North America. It is hoped that residential-sized units will become more available in Canada within the study period, but the current manufacturers do not have specific plans at this time. It is estimated that air-source systems can operate at temperatures as low as -29°C and have annual efficiencies of 105% in cold winter locations. In more moderate winter climates, an efficiency of up to 129% is advertised. Unlike electric heat pump systems, GAHPs do not require any auxiliary heating equipment. In addition, the lack of a mechanical compressor extends their lifetime and allows air-source systems to withstand more extreme temperatures.	
Baseline:	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 90%	
Upgrade:	A gas-fired air-source heat pump. This option is not valid because these units are not available in residential sizes.	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)								
Electricity ($/kWh)	$0.083	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	
Natural Gas ($/MJ)	$0.010	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	-	-	-	-	-	-	-	-	0	
	Baseline (yrs.)	-	-	-	-	-	-	-	-	-	
Cost Savings ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Simple Payback (yrs.)		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Benefit/Cost Ratio		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	

Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

Gas-Fired Ground-Source Heat Pumps

Not used--not yet commercially available in residential sizes.

		References/Notes
Description:	Early gas-fired heat pumps, such as the York Triathlon, were unsuccessful due to their bulky size and poor quality design. A new generation of gas absorption heat pumps (GAHPs) is currently available through Robur, an Italian manufacturer. These systems can either be ground-source or air-source (i.e., the heat sink may be either an underground fluid loop or an above ground heat exchanger coil). Air-source systems are substantially less expensive since they don't require drilling to install underground fluid loops. However, they can also be much less efficient than ground-source versions since their efficiency is a function of outside air temperature. Commercial-sized GAHP systems have been available in Canada since mid-2007 but residential-sized systems are not currently available outside of Europe. It is hoped that residential-sized units will become more available in Canada within the study period, but the current manufacturers do not have specific plans at this time. Ground-source GAHPs have efficiencies (COPs) ranging from 120% to 130% Unlike electric heat pump systems, GAHPs do not require any auxiliary heating equipment. In addition, the lack of a mechanical compressor extends their lifetime.	Need--Installed cost, maintenance costs/year, lifetime, savings (heating, cooling, HVAC)
Baseline:	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 90%	
Upgrade:	A gas-fired ground-source heat pump. This option is not valid because these units are not available in residential sizes.	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/m^3)	$0.010	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	-	-	-	-	-	-	-	-	0	
	Baseline (yrs.)	-	-	-	-	-	-	-	-	-	
Cost Savings ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Simple Payback (yrs.)		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Benefit/Cost Ratio		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	

Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

Integrated Heating and DHW (Forced Air Heating)

		References/Notes
Description:	Integrated mechanical systems combine the most efficient technologies for residential space heating and domestic water heating into one package. For example, the Matrix system by NTI NY Thermal incorporates a condensing furnace, condensing boiler, condensing water heater and HRV all in one unit. Primary benefits of the integrated units include compact construction, lower cost of installation (only one set of gas, water and circulation connections are required), and lower installation and maintenance costs (once the technology is mature). Since the minimum performance standards for furnaces was brought up to 90% efficiency at the end of 2009, the base case system is a 90% efficient forced-air furnace and a standard efficiency natural gas tank-style water heater. With this baseline, the integrated system would offer little in the way of space heating savings, but it does still offer DHW savings because the integrated system would heat domestic water with its high-efficiency, condensing combustion.	
Baseline:	A 90% AFUE efficient forced-air condensing furnace, a standard efficiency natural gas tank-style water heater (EF of 0.62 or 0.64 assumed) and a standard efficiency HRV	
Upgrade:	An integrated heating and DHW system, with a condensing furnace (AFUE of 94), a condensing natural gas water heater (EF of 0.80 assumed), and an HRV with an efficiency similar to that in the base case (72%).	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☑	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☑	Mobile (Existing) ☑	Mobile (New) ☑	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	71,407	62,701	62,701	46,365	42,509	42,509	50,394	50,394	61,503	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	64,946	56,615	56,615	41,509	37,819	37,819	45,536	45,536	55,553	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	6,460	6,086	6,086	4,856	4,690	4,690	4,858	4,858	5,950	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$15,000.00	$15,000.00	$10,000.00	$15,000.00	$15,000.00	$10,000.00	$15,000.00	$10,000.00	$12,500.00	Clifford Paite of Matrix estimates installed cost of $10,000 to $20,000, with the lowest cost in new homes. (2010 estimate)
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Included in cost above
	Baseline, Material ($)	$5,900.00	$5,900.00	$5,900.00	$5,900.00	$5,900.00	$5,900.00	$5,900.00	$5,900.00	$5,900.00	Installed costs of base furnace plus water heater. (Update if base costs are updated.)
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Included in cost above
	Total Measure Cost ($)	$8,505.78	$8,505.78	$3,505.78	$8,505.78	$8,505.78	$3,505.78	$8,505.78	$3,505.78	$6,005.78	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	18	18	18	18	18	18	18	18	18	Lifetime of high efficiency furnace--based on Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-41, April 16, 2009.
	Baseline (yrs.)	15	15	15	15	15	15	15	15	15	Lifetime of base efficiency furnace--based on Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-41, April 16, 2009.
Cost Savings ($/yr.)		$63	$60	$60	$48	$46	$46	$48	$48	$58	
Simple Payback (yrs.)		134.3	142.6	58.8	178.7	185.1	76.3	178.7	73.6	102.94	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$675	$636	$636	$508	$490	$490	$508	$508	$622	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$7,830	-$7,869	-$2,869	-$7,998	-$8,015	-$3,015	-$7,998	-$2,998	-$5,384	
Benefit/Cost Ratio		0.08	0.07	0.18	0.06	0.06	0.14	0.06	0.14	0.12	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	No savings as HRVs in base and proposed case are similar.
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	Difference between AFUE 94 and AFUE 90
Domestic Hot Water (DHW)	-	1	1	27.0%	27.0%	27.0%	27.0%	27.0%	27.0%	25.0%	25.0%	26.9%	Difference between Efs of .85 and .64 or .62.
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	

Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	
Domestic Hot Water (DHW)	1	1	27.0%	27.0%	27.0%	27.0%	27.0%	27.0%	25.0%	25.0%	26.9%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

Integrated Heating and DHW (Hydronic Heating)

		References/Notes
Description:	Integrated mechanical systems combine the most efficient technologies for residential space heating and domestic water heating into one package. For example, the Matrix system by NTI NY Thermal incorporates a condensing furnace, condensing boiler, condensing water heater and HRV all in one unit. Primary benefits of the integrated units include compact construction, lower cost of installation (only one set of gas, water and circulation connections are required), and lower installation and maintenance costs (once the technology is mature). Water heating in the base case is assumed to be provided by a standard efficiency natural gas tank-style water heater (EF of 0.62 or 0.64), while space heating is provided by a non-condensing boiler, assumed to have an AFUE of 82% . The HRV in the base case is assumed to be of similar efficiency to the HRV in the integrated unit.	
Baseline:	A non-condensing boiler with an AFUE of 82% and a standard efficiency natural gas tank-style water heater (EF of 0.62 or 0.64). An HRV of similar efficiency to the integrated unit (72%) is assumed.	
Upgrade:	An integrated heating and DHW system, with a condensing boiler (AFUE 92.7), a condensing natural gas water heater (EF of .85) and an HRV with an efficiency similar to that in the base case (72%).	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/m^3)	$0.010	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	71,407	62,701	62,701	46,365	42,509	42,509	50,394	50,394	61,503	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	60,598	52,937	52,937	38,910	35,516	35,516	42,657	42,657	51,943	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Nat. Gas (m3/yr.)	10,809	9,764	9,764	7,455	6,992	6,992	7,737	7,737	9,560	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$15,000.00	$15,000.00	$10,000.00	$15,000.00	$15,000.00	$10,000.00	$15,000.00	$10,000.00	$12,500.00	Clifford Paite of Matrix estimates installed cost of $10,000 to $20,000, with the lowest cost in new homes. (2010 estimate)
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Included in cost above.
	Baseline, Material ($)	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	Cost of base case boiler and water heater. (Update if base case costs are updated)
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$8,000.00	$8,000.00	$3,000.00	$8,000.00	$8,000.00	$3,000.00	$8,000.00	$3,000.00	$5,500.00	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	20	20	20	20	20	20	20	20	20	lifetime of high-efficiency condensing furnace. (Updated if condensing boiler option updated.)
	Baseline (yrs.)	20	20	20	20	20	20	20	20	20	lifetime of standard efficiency condensing furnace. (Updated if condensing boiler option updated.)
Cost Savings ($/yr.)		$106	$96	$96	$73	$69	$69	$76	$76	$94	
Simple Payback (yrs.)		75.5	83.6	31.4	109.5	116.7	43.8	105.5	39.6	58.65	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$1,208	$1,091	$1,091	$833	$781	$781	$864	$864	$1,068	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$6,792	-$6,909	-$1,909	-$7,167	-$7,219	-$2,219	-$7,136	-$2,136	-$4,432	
Benefit/Cost Ratio		0.15	0.14	0.36	0.10	0.10	0.26	0.11	0.29	0.24	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	No savings as HRVs in base and proposed case are similar.
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	Difference between AFUE 92.7 and AFUE 82
Domestic Hot Water (DHW)	-	1	1	27.0%	27.0%	27.0%	27.0%	27.0%	27.0%	25.0%	25.0%	26.9%	Difference between Efs of .85 and .64 or .62.
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	

Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	
Domestic Hot Water (DHW)	1	1	27.0%	27.0%	27.0%	27.0%	27.0%	27.0%	25.0%	25.0%	26.9%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Condensing Gas Water Heaters

		References/Notes
Description:	Condensing water heaters feature advanced heat exchanger designs that extract more heat from the flue gases before they are exhausted. So much heat is extracted that the flue gases condense and must be discharged as a condensate rather than a gas. As a result, the efficiency of these types of water heaters is significantly higher than standard water heaters.	
Baseline:	A conventional storage natural gas hot water heater (EF of 0.62 or 0.64 assumed)	Current BC hot water heater regulations require an EF of 0.62 for 40 gallon (151 L) tanks and 0.64 for 30 gallon (114 L) tanks.
Upgrade:	A condensing natural gas water heater (EF of 0.80 assumed)	ENERGY STAR requirement for condensing hot water heaters is an EF of 0.80

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.128	$1.128	$1.128	$1.128	$1.128	$1.128	$1.128	$1.128
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.083	$0.083	$0.083	$0.083	$0.083	$0.083	$0.083	$0.083
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	14,934	14,934	14,934	12,609	12,609	12,609	13,001	13,001	14,614	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	11,574	11,574	11,574	9,772	9,772	9,772	10,401	10,401	11,341	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	3,360	3,360	3,360	2,837	2,837	2,837	2,600	2,600	3,273	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$1,500.00	$1,500.00	$1,500.00	$1,500.00	$1,500.00	$1,500.00	$1,500.00	$1,500.00	$1,500.00	Habart & Associates, "Market Transformation: Domestic Water Heaters," July 2010
	Upgrade, Installation ($)	$1,305.00	$1,305.00	$1,333.00	$1,305.00	$1,305.00	$1,333.00	$1,305.00	$1,333.00	$1,319.00	Habart & Associates, "Market Transformation: Domestic Water Heaters," July 2010
	Baseline, Material ($)	$675.00	$675.00	$675.00	$675.00	$675.00	$675.00	$675.00	$675.00	$675.00	Habart & Associates, "Market Transformation: Domestic Water Heaters," July 2010
	Baseline, Installation ($)	$563.00	$563.00	$1,085.00	$563.00	$563.00	$1,085.00	$563.00	$1,085.00	$824.00	Habart & Associates, "Market Transformation: Domestic Water Heaters," July 2010
	Total Measure Cost ($)	$1,567.00	$1,567.00	$1,073.00	$1,567.00	$1,567.00	$1,073.00	$1,567.00	$1,073.00	$1,320.00	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	13	13	13	13	13	13	13	13	13	Assume similar lifetime to conventional tanks. Habart report also makes this assumption.
	Baseline (yrs.)	13	13	13	13	13	13	13	13	13	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 495, January 2010.
Cost Savings ($/yr.)		$33	$33	$33	$28	$28	$28	$25	$25	$32	
Simple Payback (yrs.)		47.6	47.6	32.6	56.4	56.4	38.6	61.5	42.1	41.30	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$279	$279	$279	$235	$235	$235	$216	$216	$271	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$1,288	-$1,288	-$794	-$1,332	-$1,332	-$838	-$1,351	-$857	-$1,049	
Benefit/Cost Ratio		0.18	0.18	0.26	0.15	0.15	0.22	0.14	0.20	0.21	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	1	1	22.5%	22.5%	22.5%	22.5%	22.5%	22.5%	20.0%	20.0%	22.4%	EF of 0.80 versus an EF of 0.62 (40 gal) or 0.64 (30 gal)
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	

Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	**Sub End Use/Equipment (If Applicable)**	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
		Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	22.5%	22.5%	22.5%	22.5%	22.5%	22.5%	20.0%	20.0%	22.4%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

Point-of-Use (Tankless) Water Heaters (Gas)

		References/Notes
Description:	Tankless water heaters heat water on demand, eliminating hot water storage. The absence of hot water storage reduces standby heat losses. The efficiency of tankless water heaters is generally improved by the addition of features such as modulating controls, electric spark ignitions and direct venting. The applicability of tankless gas-fired DHW systems is somewhat limited by venting constraints; the burner is significantly larger than for a standard water heater, so a larger vent is required. Some houses cannot accommodate the larger flue because of requirements for clearance from other structures, windows, etc.	
Baseline:	A conventional storage natural gas hot water heater (EF of 0.60 assumed)	Based on a scan of models certified by the Air Conditioning, Heating, and Refrigeration Institute (AHRI), the average energy factor (EF) for conventional storage natural gas water heaters is ~0.60.
Upgrade:	A tankless natural gas hot water heater (EF of 0.82 assumed)	Based on a scan of models certified by the Air Conditioning, Heating, and Refrigeration Institute (AHRI), the overwhelming majority of tankless gas hot water heaters have an energy factor (EF) of 0.82

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)								
Electricity ($/kWh)	$0.083	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	
Natural Gas ($/MJ)	$0.010	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	14,934	14,934	14,934	12,609	12,609	12,609	13,001	13,001	14,614	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	9,707	9,707	9,707	8,196	8,196	8,196	8,451	8,451	9,499	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	5,227	5,227	5,227	4,413	4,413	4,413	4,550	4,550	5,115	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$1,500.00	$1,500.00	$1,500.00	$1,500.00	$1,500.00	$1,500.00	$1,500.00	$1,500.00	$1,500.00	Habart & Associates, "Market Transformation: Domestic Water Heaters," July 2010
	Upgrade, Installation ($)	$2,331.00	$2,331.00	$2,359.00	$2,331.00	$2,331.00	$2,359.00	$2,331.00	$2,359.00	$2,345.00	Habart & Associates, "Market Transformation: Domestic Water Heaters," July 2010
	Baseline, Material ($)	$675.00	$675.00	$675.00	$675.00	$675.00	$675.00	$675.00	$675.00	$675.00	Habart & Associates, "Market Transformation: Domestic Water Heaters," July 2010
	Baseline, Installation ($)	$563.00	$563.00	$1,085.00	$563.00	$563.00	$1,085.00	$563.00	$1,085.00	$824.00	Habart & Associates, "Market Transformation: Domestic Water Heaters," July 2010
	Total Measure Cost ($)	$2,274.04	$2,274.04	$1,645.56	$2,274.04	$2,274.04	$1,645.56	$2,274.04	$1,645.56	$1,959.80	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	20	20	20	20	20	20	20	20	20	Habart & Associates report: 25 yrs. Navigant Consulting Inc., Measures and Assumptions for Demand Side Management (DSM) Planning, p. C-87, April 16, 2009 indicated 18 yrs. Using 20 years as an intermediate value, after personal communication with J. Habart, Dec 2010.
	Baseline (yrs.)	13	13	13	13	13	13	13	13	13	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 495, January 2010.
Cost Savings ($/yr.)		$51	$51	$51	$43	$43	$43	$45	$45	$50	
Simple Payback (yrs.)		44.4	44.4	32.1	52.6	52.6	38.0	51.0	36.9	39.17	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$584	$584	$584	$493	$493	$493	$508	$508	$571	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$1,690	-$1,690	-$1,062	-$1,781	-$1,781	-$1,152	-$1,766	-$1,137	-$1,388	
Benefit/Cost Ratio		0.26	0.26	0.35	0.22	0.22	0.30	0.22	0.31	0.30	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	1	1	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	Actual use study shows average of 37% savings. We've assumed 35% because conventional EF is slightly higher and instantanoues EF is slightly lower than used in the study.
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	

Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Active Solar Water Heating Systems

		References/Notes
Description:	Solar DHW systems use the energy of the sun to heat water. The primary components of a solar water heating system are a solar collector, a heat transfer fluid and a well-insulated storage tank. Due to Canada's colder climate and the higher likelihood of freezing, active closed-loop systems are generally used. These systems use a pump to circulate a non-freezing heat transfer fluid through the collectors and then through a heat exchanger so that the thermal energy can be transferred to the water. Solar DHW are not generally sized to supply all of the annual requirement for water heating in the home, because if the system is sized for cloudy winter periods it will have enormous excess capacity during sunny summer periods, and will cost far too much to install. The system analyzed here meets approximately 2/3 of the annual requirements	
Baseline:	No solar water heating system installed	
Upgrade:	Solar DHW systems use the energy of the sun to heat water. The primary components of a solar water heating system are a solar collector, a heat transfer fluid and a well-insulated storage tank. Due to Canada's colder climate and the higher likelihood of	System sizes of 5.75 m^2 are assumed .

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.553	$1.553	$1.553	$1.553	$1.553	$1.553	$1.553	$1.553
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.127	$0.127	$0.127	$0.127	$0.127	$0.127	$0.127	$0.127
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	14,934	14,934	14,934	12,609	12,609	12,609	13,001	13,001	14,614	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	5,526	5,526	5,526	4,035	4,035	4,035	3,510	3,510	5,283	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	9,408	9,408	9,408	8,574	8,574	8,574	9,491	9,491	9,331	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	SolarBC incentive program average cost of 100 installed systems
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Costs above are installed.
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	25	25	25	25	25	25	25	25	25	Retscreen default assumption.
	Baseline (yrs.)	-	-	-	-	-	-	-	-	-	
Cost Savings ($/yr.)		$92	$92	$92	$84	$84	$84	$93	$93	$91	
Simple Payback (yrs.)		75.9	75.9	75.9	83.3	83.3	83.3	75.3	75.3	76.61	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$1,195	$1,195	$1,195	$1,089	$1,089	$1,089	$1,205	$1,205	$1,185	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$5,805	-$5,805	-$5,805	-$5,911	-$5,911	-$5,911	-$5,795	-$5,795	-$5,815	
Benefit/Cost Ratio		0.17	0.17	0.17	0.16	0.16	0.16	0.17	0.17	0.17	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	1	1	63.0%	63.0%	63.0%	68.0%	68.0%	68.0%	73.0%	73.0%	64.0%	Based on RETScreen modeling results (Assuming average occupancies for detached, attached and mobile homes are 3.1, 2.4, 1.9 respectively, DHW use of 60 L/day/person, 55°C DHW temperature, southerly directional angle 30° away from optimal (i.e. azimuth)
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	

Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	63.0%	63.0%	63.0%	68.0%	68.0%	68.0%	73.0%	73.0%	64.0%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

DHW Tank Insulation

		References/Notes
Description:	Pre-cut tank jackets/blankets (DHW tank insulation) are readily available and can be installed on hot water storage tanks to reduce standby heat losses. Caution is required to install blankets on gas water heaters, to avoid blocking the flue, the air intake to the burner, or the drain at the bottom. The thermostat should also remain uncovered.	
Baseline:	No additional tank insulation installed on a conventional hot water storage tank	
Upgrade:	An insulating blanket installed on a hot water storage tank to reduce standby losses	

Baseline Reference:	1. Annual consumption, end use
Heating Fuel Type:	All Fuels (Average Fuel Mix)
Main End Use:	Space Heating
Discount Rate:	7.38%
GHG Adder Incl.?	No
Resource Costs:	Baseload

= User Input
= Calculation

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.128	$1.128	$1.128	$1.128	$1.128	$1.128	$1.128	$1.128
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.083	$0.083	$0.083	$0.083	$0.083	$0.083	$0.083	$0.083
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	1,120	1,120	1,120	946	946	946	975	975	1,096	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	840	840	840	709	709	709	731	731	822	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	280	280	280	236	236	236	244	244	274	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$35.00	$35.00	$35.00	$25.00	$25.00	$25.00	$25.00	$25.00	$33.54	Based on a 2010 retail scan of insulating blankets
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Assuming that homeowners are able to install the insulating blankets on their own.
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$35.00	$35.00	$35.00	$25.00	$25.00	$25.00	$25.00	$25.00	$33.54	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	13	13	13	13	13	13	13	13	13	Assuming a lifetime similar to that of a hot water heater (hot water heater lifetime based on OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 495, January 2010.)
	Baseline (yrs.)	-	-	-	-	-	-	-	-	-	
Cost Savings ($/yr.)		$3	$3	$3	$2	$2	$2	$2	$2	$3	
Simple Payback (yrs.)		12.8	12.8	12.8	10.8	10.8	10.8	10.5	10.5	12.45	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$23	$23	$23	$20	$20	$20	$20	$20	$23	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$12	-$12	-$12	-$5	-$5	-$5	-$5	-$5	-$11	
Benefit/Cost Ratio		0.66	0.66	0.66	0.78	0.78	0.78	0.81	0.81	0.68	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	1	1	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	US DOE website suggests that insulating blankets can reduce standby losses by 25-45%. Lower end assumed to be conservative and accounts for fact that newer storage tanks are better insulated
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	

Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	1.9%	1.9%	1.9%	1.9%	1.9%	1.9%	1.9%	1.9%	1.9%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

DHW Pipe Insulation

		References/Notes
Description:	Hot water pipe insulation reduces the distribution losses for DHW. In general, only the first one or two metres of pipe nearest the DHW tank are accessible enough to insulate. However, since the dominant loss is from the pipe transferring heat out of the tank and then losing it to the basement, the first meter of pipe is the most important and only worthwhile section of pipe to insulate. Insulating this section of piping affects both the delivery of hot water and the losses from the tank. Delivery temperature is slightly increased during a hot water draw, and the water in the piping does not lose its stored heat as quickly between draws.	In SaskPower
Baseline:	No insulation installed on the piping leading out of a hot water storage tank	
Upgrade:	Installing pipe insulation on the first meter of piping leading out of a hot water storage tank	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.226	$1.226	$1.226	$1.226	$1.226	$1.226	$1.226	$1.226
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.092	$0.092	$0.092	$0.092	$0.092	$0.092	$0.092	$0.092
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	1,120	1,120	1,120	946	946	946	975	975	1,096	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	1,019	1,019	1,019	861	861	861	887	887	997	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	101	101	101	85	85	85	88	88	99	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$0.70	$0.70	$0.70	$0.70	$0.70	$0.70	$0.70	$0.70	$0.70	Based on OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 492, January 2010.
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Assuming that homeowners are able to install the insulation on their own.
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$0.70	$0.70	$0.70	$0.70	$0.70	$0.70	$0.70	$0.70	$0.70	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	15	15	15	15	15	15	15	15	15	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 495, January 2010.
	Baseline (yrs.)	-	-	-	-	-	-	-	-	-	
Cost Savings ($/yr.)		$1	$1	$1	$1	$1	$1	$1	$1	$1	
Simple Payback (yrs.)		0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.73	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$9	$9	$9	$8	$8	$8	$8	$8	$9	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		$9	$9	$9	$7	$7	$7	$7	$7	$8	
Benefit/Cost Ratio		13.29	13.29	13.29	11.22	11.22	11.22	11.57	11.57	13.00	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	1	1	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	Original number of 15% was used: this was just over 1% of DHW overall and was based on Shipley's engineering calculations for a pipe acting as a fin on the tank. A paper by Andersen, Fan & Furbo called "Heat Losses from Pipes Connected to Hot Water Storage Tanks" estimates a heat trap reduces the losses in the first section of pipe by 40%.
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	

Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

DHW Heat Traps

Not used because many or most new hot water heaters have integral heat traps

		References/Notes
Description:	This measure involves the installation of external "S-type" pre-bent copper pipe heat traps on both of the outlets ofwater heaters. This measure is only being considered during the installation of new tanks since it can be prohibitively expensive to bring in a plumber otherwise.	
Baseline:	No heat trap installed on a new electric storage hot water heater	
Upgrade:	Installing an external "S-type" pre-bent copper pipe heat trap on an gas-fired storage hot water heater. This option no longer applies because most new hot water heaters include an integrated heat trap.	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083			$1.128			$1.128		$1.128
Electricity ($/kW)	$0.000			$0.000			$0.000		$0.000
Natural Gas ($/MJ)	$0.010			$0.083			$0.083		$0.083
Oil ($/L)	$0.000			$0.000			$0.000		$0.000
Water ($/1000L)	$0.000			$0.000			$0.000		$0.000

Sub-sector		Detached (Pre-1976) ☐	Detached (Post-1976) ☐	Detached (New) ☑	Attached (Pre-1976) ☐	Attached (Post-1976) ☐	Attached (New) ☑	Mobile (Existing) ☐	Mobile (New) ☑	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)			-			-		-	-	
	Natural Gas (MJ/yr.)			-			-		-	-	
	Oil (L/yr.)			-			-		-	-	
	Water (L/yr.)			-			-		-	-	
Upgrade Consumption	Electricity (kWh/yr.)			-			-		-	-	
	Natural Gas (MJ/yr.)			-			-		-	-	
	Oil (L/yr.)			-			-		-	-	
	Water (L/yr.)			-			-		-	-	
Interactive Effects (Inputs)	Heating Penalty ☐			0%			0%		0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐			0%			0%		0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)			-			-		-	-	
	Electricity, Cooling (kWh/yr.)			-			-		-	-	
	Electricity, Total (kWh/yr.)			-			-		-	-	
	Natural Gas (MJ/yr.)			-			-		-	-	
	Oil (L/yr.)			-			-		-	-	
Winter Peak Hours-Use Factor				-			-		-	-	
Resource Savings	Electricity (kWh/yr.)			-			-		-	-	
	Electricity (kW peak)			-			-		-	-	
	Natural Gas (MJ/yr.)			-			-		-	-	
	Oil (L/yr.)			-			-		-	-	
	Water (L/yr.)			-			-		-	-	
Cost Parameters	Upgrade, Material ($)			$0.00			$0.00		$0.00	$0.00	
	Upgrade, Installation ($)			$0.00			$0.00		$0.00	$0.00	Minimal labour costs since tank is already being installed
	Baseline, Material ($)			$0.00			$0.00		$0.00	$0.00	
	Baseline, Installation ($)			$0.00			$0.00		$0.00	$0.00	
	Total Measure Cost ($)			$0.00			$0.00		$0.00	$0.00	
	Basis (Full/Incremental)			Full			Full		Full	Full	
Incremental O&M ($/yr.)				$0			$0		$0	$0	
Lifetimes	Upgrade (yrs.)			13			13		13	13	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 495, January 2010.
	Baseline (yrs.)			-			-		-	-	
Cost Savings ($/yr.)				$0			$0		$0	$0	
Simple Payback (yrs.)				N/A			N/A		N/A	0.00	
NPV of O&M Costs ($)				$0			$0		$0	$0	
Total Benefits ($)	Electric Energy			$0			$0		$0	$0	
	Electric Demand			$0			$0		$0	$0	
	Natural Gas			$0			$0		$0	$0	
	Oil			$0			$0		$0	$0	
	Water			$0			$0		$0	$0	
Measure TRC ($)				$0			$0		$0	$0	
Benefit/Cost Ratio				0.00			0.00		0.00	0.00	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed			1			1		1	
Cost Flag (i.e. way measure is typically applied)			Incremental			Incremental		Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No) Baseline	Upgrade	Measure Resource Savings (%) Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No) Baseline	Upgrade	Measure Resource Savings (%) Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0			25.0%			25.0%		25.0%	25.0%	Based on Acker, L. Advanced Conservation Technology Inc. Improving the Efficiency of Hot Water Distribution Systems, ACEEE Forum, p. 12, 2008, installing a heat trap improves the energy factor of a hot water heater by about 0.02 (i.e. 2%) or about 25% of pipe losses.
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No) Baseline	Upgrade	Measure Resource Savings (%) Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	

Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0			-			-		-	-	
Space Cooling	0	0			-			-		-	-	
Clothes Washers	0	0			-			-		-	-	
Dishwashers	0	0			-			-		-	-	
Other Electric Loads	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0			-			-		-	-	
Domestic Hot Water (DHW)	0	0			-			-		-	-	
Fireplaces	0	0			-			-		-	-	
Cooking	0	0			-			-		-	-	
Clothes Dryers	0	0			-			-		-	-	
Pool and Spa Heaters	0	0			-			-		-	-	
Other	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0			-			-		-	-	
Domestic Hot Water (DHW)	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Ultra Low-Flow Showerheads

		References/Notes
Description:	Ultra low-flow showerheads have aerators and flow restrictors to reduce water use. At 4.75 LPM (1.25 GPM), their flow rates are substantially lower than traditional low-flow fixtures, whose flow rates range between 7.6 LPM and 9.5 LPM (2.0-2.5 GPM).	
Baseline:	A low-flow showerhead with a 2.0 GPM (7.6 LPM) flow rate (conservative estimate)	
Upgrade:	An ultra low-flow showerhead with a 1.25 GPM (4.75) flow rate	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☑	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☑	Mobile (Existing) ☑	Mobile (New) ☑	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	3,883	3,883	3,883	3,278	3,278	3,278	3,380	3,380	3,800	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	2,427	2,427	2,427	2,049	2,049	2,049	2,113	2,113	2,375	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	1,456	1,456	1,456	1,229	1,229	1,229	1,268	1,268	1,425	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$13.00	$13.00	$13.00	$13.00	$13.00	$13.00	$13.00	$13.00	$13.00	Incremental cost of $7 based on OPA, OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 193, January 2010.
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Assuming that homeowners are able to install the showerheads on their own
	Baseline, Material ($)	$6.00	$6.00	$6.00	$6.00	$6.00	$6.00	$6.00	$6.00	$6.00	Based on a retail scan of low-flow showerheads (2010)
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Assuming that homeowners are able to install the showerheads on their own
	Total Measure Cost ($)	$13.00	$13.00	$13.00	$13.00	$13.00	$13.00	$13.00	$13.00	$13.00	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	10	10	10	10	10	10	10	10	10	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 193, January 2010.
	Baseline (yrs.)	10	10	10	10	10	10	10	10	10	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 193, January 2010.
Cost Savings ($/yr.)		$14	$14	$14	$12	$12	$12	$12	$12	$14	
Simple Payback (yrs.)		0.9	0.9	0.9	1.1	1.1	1.1	1.0	1.0	0.93	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$98	$98	$98	$82	$82	$82	$85	$85	$95	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		$85	$85	$85	$69	$69	$69	$72	$72	$82	
Benefit/Cost Ratio		7.50	7.50	7.50	6.33	6.33	6.33	6.53	6.53	7.34	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	1	1	37.5%	37.5%	37.5%	37.5%	37.5%	37.5%	37.5%	37.5%	37.5%	1.25 GPM (4.75 LPM) showerhead versus a 2.0 GPM (7.6 LPM) showerhead and assuming that the length of showers does not change
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	

Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	9.8%	9.8%	9.8%	9.8%	9.8%	9.8%	9.8%	9.8%	9.8%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Faucet Aerators

		References/Notes
Description:	Aerators can easily be attached to most faucets to restrict the flow rate of water flowing from them. This can result in savings to both water consumption and DHW energy.	Not in SaskPower
Baseline:	No faucet aerator installed on the kitchen faucet	
Upgrade:	A 1.5 GPM (5.7 LPM) faucet aerator installed on the kitchen faucet	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	2,837	2,837	2,837	2,396	2,396	2,396	2,470	2,470	2,777	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	1,958	1,958	1,958	1,653	1,653	1,653	1,704	1,704	1,916	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	880	880	880	743	743	743	766	766	861	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$15.00	$15.00	$15.00	$15.00	$15.00	$15.00	$15.00	$15.00	$15.00	Based on a 2010 retail scan of faucet aerators and OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 190, January 2010. The cost of faucet aerators is about $5. Assuming 3 aerators per home in order to realize full savings.
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$15.00	$15.00	$15.00	$15.00	$15.00	$15.00	$15.00	$15.00	$15.00	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	10	10	10	10	10	10	10	10	10	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 190, January 2010.
	Baseline (yrs.)	-	-	-	-	-	-	-	-	-	
Cost Savings ($/yr.)		$9	$9	$9	$7	$7	$7	$8	$8	$8	
Simple Payback (yrs.)		1.7	1.7	1.7	2.1	2.1	2.1	2.0	2.0	1.78	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$59	$59	$59	$50	$50	$50	$51	$51	$58	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		$44	$44	$44	$35	$35	$35	$36	$36	$43	
Benefit/Cost Ratio		3.93	3.93	3.93	3.32	3.32	3.32	3.42	3.42	3.84	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	1	1	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 190, January 2010.
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	

Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	5.9%	5.9%	5.9%	5.9%	5.9%	5.9%	5.9%	5.9%	5.9%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Wastewater Heat Recovery Systems

		References/Notes
Description:	Residential wastewater heat recovery systems transfer the waste heat from drains to preheat make-up water. These systems work well only for DHW uses in which the hot water use and the draining of wastewater are simultaneous. Thus, in homes, application to anything other than showers is difficult. Heat recovery systems incorporate shell-and-tube heat exchangers that typically have efficiencies in the range of 40% to 55%, depending on factors such as design, material, overall length, and fluid flow rate.	In SaskPower
Baseline:	No wastewater heat recovery system installed	
Upgrade:	A 60" wastewater heat recovery system	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.648	$1.648	$1.648	$1.648	$1.648	$1.648	$1.648	$1.648
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.139	$0.139	$0.139	$0.139	$0.139	$0.139	$0.139	$0.139
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	3,883	3,883	3,883	3,278	3,278	3,278	3,380	3,380	3,800	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	1,864	1,864	1,864	1,574	1,574	1,574	1,623	1,623	1,824	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	2,019	2,019	2,019	1,705	1,705	1,705	1,758	1,758	1,976	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$680.00	$680.00	$680.00	$611.00	$611.00	$611.00	$611.00	$611.00	$669.95	Based on the cost of a Powerpipe R3-60 (3" diameter, 60" length) model for detached and an R3-48 in attached and mobile homes. Costs from Home Depot (2010).
	Upgrade, Installation ($)	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	Assuming 2 hours of labour @ $60/hr
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$800.00	$800.00	$800.00	$731.00	$731.00	$731.00	$731.00	$731.00	$789.95	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	30	30	30	30	30	30	30	30	30	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 498, January 2010.
	Baseline (yrs.)	-	-	-	-	-	-	-	-	-	
Cost Savings ($/yr.)		$20	$20	$20	$17	$17	$17	$17	$17	$19	
Simple Payback (yrs.)		40.4	40.4	40.4	43.8	43.8	43.8	42.4	42.4	40.85	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$281	$281	$281	$237	$237	$237	$244	$244	$275	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$519	-$519	-$519	-$494	-$494	-$494	-$487	-$487	-$515	
Benefit/Cost Ratio		0.35	0.35	0.35	0.32	0.32	0.32	0.33	0.33	0.35	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	1	1	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	Avg efficiency is ~52% for 2.0 GPM flow rates and a 60" model, based on RenewABILITY Energy Inc., "Power-Pipe: Backgrounder for Homes" (Note: Estimate may be high since there would be heat losses between the showerhead and the top of the HEX)
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heater	-	0	0									-	
Pool and Spa Heater	Pool Heaters	0	0									-	
Pool and Spa Heater	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	

Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

DHW Recirculation Systems (e.g. Metlund D'MAND®)

		References/Notes
Description:	When turning on the hot water tap, it often takes a long time before hot water begins to flow. DHW recirculation systems can be used to pump hot water to a faucet at the demand of a user, getting hot water to the fixture four to five times quicker than traditional systems. Water that is in the hot water lines is pumped back to the water heater either through the cold water lines or through a dedicated line. This pumping continues until the temperature of the hot water at the point of use reaches a specified value. In retrofit situations, this pumping system is generally installed at the faucet that is furthest away from the water heater and the system is enabled by remote activation from the other points of use. Along with improved convenience and water savings (since water isn't flushed down the drain), energy savings are achieved since the water that is pumped back to the water heater is generally warmer than city water. In addition, since the pump gets water to the fixture more quickly, there is an overall reduction of hot water use.	
Baseline:	A home with no DHW recirculation system	
Upgrade:	A home with a DHW recirculation system installed on the point-of-use farthest away from the hot water tank	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	14,934	14,934	14,934	12,609	12,609	12,609	13,001	13,001	14,614	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	12,544	12,544	12,544	10,592	10,592	10,592	10,921	10,921	12,276	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	2,389	2,389	2,389	2,017	2,017	2,017	2,080	2,080	2,338	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$450.00	$450.00	$450.00	$350.00	$350.00	$350.00	$350.00	$350.00	$435.43	Material cost varies from $250 to $500, depending on pump size (based on an online retail scan of these systems (2010))
	Upgrade, Installation ($)	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	Assuming 2 hours of labour @ $60/hr
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$570.00	$570.00	$570.00	$470.00	$470.00	$470.00	$470.00	$470.00	$555.43	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	18	18	18	18	18	18	18	18	18	High lifetime assumed since the systems are fairly simple (i.e. lifetime of a pump is fairly high)
	Baseline (yrs.)	-	-	-	-	-	-	-	-	-	
Cost Savings ($/yr.)		$23	$23	$23	$20	$20	$20	$20	$20	$23	
Simple Payback (yrs.)		24.3	24.3	24.3	23.8	23.8	23.8	23.1	23.1	24.22	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$250	$250	$250	$211	$211	$211	$217	$217	$244	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$320	-$320	-$320	-$259	-$259	-$259	-$253	-$253	-$311	
Benefit/Cost Ratio		0.44	0.44	0.44	0.45	0.45	0.45	0.46	0.46	0.44	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	1	1	16.0%	16.0%	16.0%	16.0%	16.0%	16.0%	16.0%	16.0%	16.0%	Oak Ridge National Laboratory, "Water and Energy Savings using Demand Hot Water Recirculating Systems in Residential Homes: A Case Study of Five Homes in Palo Alto, California", Sept. 2002, suggests 16-32% savings on DHW. Lower end assumed since very little research is available on these devices and savings are uncertain.
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	

Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	**Sub End Use/Equipment (If Applicable)**	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
		Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	16.0%	16.0%	16.0%	16.0%	16.0%	16.0%	16.0%	16.0%	16.0%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

High-Efficiency (ENERGY STAR®) Dishwashers

		References/Notes
Description:	ENERGY STAR® dishwashers save energy by using improved technology for the primary wash cycle and by using less hot water to clean. Features include more effective washing action, energy-efficient motors, and sensors that determine the length of the wash cycle and the temperature of the water necessary to clean the dishes. In addition, some advanced dishwashers can sense and adjust for the amount of soil on dishes, using only as much water as necessary. These savings affect both the energy used for heating the water and the mechanical energy of the dishwasher.	
Baseline:	A standard-sized new dishwasher	Link to bulletin on performance standards (new standards took effect on Jan. 1, 2010).
Upgrade:	An ENERGY STAR® certified, standard-sized new dishwasher	ENERGY STAR® standard for dishwashers to improve to 307 kWh/yr by July 1, 2011 (assumed here)

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.015	$1.015	$1.015	$1.015	$1.015	$1.015	$1.015	$1.015
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.073	$0.073	$0.073	$0.073	$0.073	$0.073	$0.073	$0.073
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	75	75	75	58	58	58	60	60	73	
	Natural Gas (MJ/yr.)	1,792	1,792	1,792	1,513	1,513	1,513	1,560	1,560	1,754	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	65	65	65	50	50	50	52	52	63	
	Natural Gas (MJ/yr.)	1,550	1,550	1,550	1,309	1,309	1,309	1,350	1,350	1,517	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	10	10	10	8	8	8	8	8	10	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	242	242	242	204	204	204	211	211	237	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$395.00	$395.00	$395.00	$395.00	$395.00	$395.00	$395.00	$395.00	$395.00	Incr. cost of $45 indicated in OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 34, January 2010.
	Upgrade, Installation ($)	$60.00	$60.00	$60.00	$60.00	$60.00	$60.00	$60.00	$60.00	$60.00	Assuming 1 hour of labour @ $60/hr
	Baseline, Material ($)	$350.00	$350.00	$350.00	$350.00	$350.00	$350.00	$350.00	$350.00	$350.00	Based on a retail scan of dishwashers offered by Sears (lowest cost models by reliable manufacturers) (2010)
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Assuming 1 hour of labour @ $60/hr
	Total Measure Cost ($)	$105.00	$105.00	$105.00	$105.00	$105.00	$105.00	$105.00	$105.00	$105.00	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	11	11	11	11	11	11	11	11	11	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 34, January 2010.
	Baseline (yrs.)	11	11	11	11	11	11	11	11	11	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 34, January 2010.
Cost Savings ($/yr.)		$3	$3	$3	$3	$3	$3	$3	$3	$3	
Simple Payback (yrs.)		32.7	32.7	32.7	39.7	39.7	39.7	38.4	38.4	33.67	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$10	$10	$10	$8	$8	$8	$8	$8	$10	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$18	$18	$18	$15	$15	$15	$15	$15	$17	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$77	-$77	-$77	-$82	-$82	-$82	-$81	-$81	-$78	
Benefit/Cost Ratio		0.27	0.27	0.27	0.22	0.22	0.22	0.22	0.22	0.26	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	1	1	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%		
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	1	1	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	ENERGY STAR® standard for dishwashers to improve to 307 kWh/yr by July 1, 2011
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heater	-	0	0									-	
Pool and Spa Heater	Pool Heaters	0	0									-	
Pool and Spa Heater	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	

Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	1	1	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	1	1	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

High-Efficiency (ENERGY STAR®) Clothes Washers

		References/Notes
Description:	In January 2011, the ENERGY STAR® standard for clothes washers will be increased once again. As a result, very few top loading washers will meet ENERGY STAR® requirements. Instead, the overwhelming majority of ENERGY STAR® models will be front loading (horizontal axis) models. Compared to standard models, front loading washing machines use less hot water, less mechanical energy, and result in dryer energy savings due to faster spin cycle speeds.	
Baseline:	A standard 3.2 cu. ft. (90.6 L) top loading clothes washer	Link to minimum energy performance standards, which took effect on Jan. 1, 2007. Note: Top loading washer assumed since very few front loading models do not meet ENERGY STAR requirements
Upgrade:	An ENERGY STAR® certified, 3.2 cu. ft. (90.6 L) front loading clothes washer	Link to ENERGY STAR® standards -- new standards to take effect on Jan. 1, 2011

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.179	$1.179	$1.179	$1.179	$1.179	$1.179	$1.179	$1.179
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/m^3)	$0.010	$0.088	$0.088	$0.088	$0.088	$0.088	$0.088	$0.088	$0.088
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	64	64	64	48	48	48	51	51	62	
	Natural Gas (MJ/yr.)	6,389	6,389	6,389	5,573	5,573	5,573	5,823	5,823	6,282	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	40	40	40	30	30	30	32	32	39	
	Natural Gas (MJ/yr.)	4,025	4,025	4,025	3,511	3,511	3,511	3,668	3,668	3,958	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	24	24	24	18	18	18	19	19	23	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	2,364	2,364	2,364	2,062	2,062	2,062	2,154	2,154	2,324	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 25, January 2010.
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Material ($)	$450.00	$450.00	$450.00	$450.00	$450.00	$450.00	$450.00	$450.00	$450.00	Based on a scan of non-ENERGY STAR top-loading models available from various retailers (Note: Current ENERGY STAR models may not meet new standards) (2010). Top loading washer assumed since very few front loading models do not meet ENERGY STAR requirements.
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$300.00	$300.00	$300.00	$300.00	$300.00	$300.00	$300.00	$300.00	$300.00	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	14	14	14	14	14	14	14	14	14	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 24, January 2010.
	Baseline (yrs.)	14	14	14	14	14	14	14	14	14	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 24, January 2010.
Cost Savings ($/yr.)		$25	$25	$25	$22	$22	$22	$23	$23	$25	
Simple Payback (yrs.)		11.9	11.9	11.9	13.8	13.8	13.8	13.2	13.2	12.19	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$28	$28	$28	$21	$21	$21	$22	$22	$27	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$207	$207	$207	$181	$181	$181	$189	$189	$204	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$65	-$65	-$65	-$98	-$98	-$98	-$89	-$89	-$69	
Benefit/Cost Ratio		0.78	0.78	0.78	0.67	0.67	0.67	0.70	0.70	0.77	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	1	1	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	Link to ENERGY STAR® standards -- new standards to take effect on Jan. 1, 2011 (these stds assumed)
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	1	1	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	Assuming water savings increase is approx. proportional to increase in mechanical energy savings with new standards (DHW savings included in MEF (Modified Energy Factor)).
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	1	1	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	Savings due to higher spin speeds (dryer savings are incorporated into MEF (Modified Energy Factor)). Assuming savings are proportional to the mechanical energy savings.
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	

Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	1	1	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	6.7%	6.7%	6.7%	6.7%	6.7%	6.7%	6.7%	6.7%	6.7%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	1	1	20.4%	20.4%	20.4%	20.4%	20.4%	20.4%	20.4%	20.4%	20.4%	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

High-Efficiency Gas Clothes Dryers

Not used--moisture sensors have become common.

		References/Notes
Description:	The major distinction with energy-efficient gas clothes dryer models is that they incorporate termination controls to sense dryness and turn off automatically. The most efficient models have moisture sensors in the drum for sensing dryness, while other lower-cost and slightly less efficient models infer dryness by sensing the temperature of the exhaust air. The majority of the retail models currently available employ some type of dryness sensing technology but it is unclear how often these controls are used by homeowners.	
Baseline:	A gas clothes dryer with a temperature sensor	
Upgrade:	A gas clothes dryer with a moisture sensor. This option is no longer valid because almost all new gas dryers have moisture sensors.	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$500.00	$500.00	$500.00	$500.00	$500.00	$500.00	$500.00	$500.00	$500.00	Based on a retail scan of low-cost gas dryers with moisture sensors (2009)
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Material ($)	$450.00	$450.00	$450.00	$450.00	$450.00	$450.00	$450.00	$450.00	$450.00	Based on a retail scan of low-cost gas dryers without moisture sensors (2009)
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	18	18	18	18	18	18	18	18	18	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 58, January 2010.
	Baseline (yrs.)	18	18	18	18	18	18	18	18	18	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 58, January 2010.
Cost Savings ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Simple Payback (yrs.)		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$50	-$50	-$50	-$50	-$50	-$50	-$50	-$50	-$50	
Benefit/Cost Ratio		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	Savings for moisture sensor relative to temperature sensor, according to Citizen Gas, "Buyer's Guide: Natural Gas Clothes Dryers"
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	

Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Insulating Pool Covers

		References/Notes
Description:	Between 30% and 50% of the heat loss from a swimming pool is due to evaporation. In an outdoor pool, this heat loss either adds to the cost of heating the pool or shortens the swimming season. Evaporation also increases the quantity of chemicals that must be added to the pool. A pool cover can reduce evaporation and other heat losses but can also reduce heat gains depending on the design. An insulating vinyl pool cover is assumed for this analysis. Although substantially more expensive than the bubble type covers, insulating vinyl pool covers are much more robust and, thus, have much longer lifetimes. They are also more effective at trapping heat.	In SaskPower
Baseline:	A pool with no insulating cover	
Upgrade:	Installing a pool cover to reduce the heat loss from a heated pool	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	23,096	23,096	23,096	23,096	23,096	23,096	23,096	23,096	23,096	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	15,397	15,397	15,397	15,397	15,397	15,397	15,397	15,397	15,397	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$1,200.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00	Based on quotes from suppliers for a 50 m^2 pool with a manual reel. Cost also used in several previous studies, particularly TG 2005, when this cost was endorsed by TG staff.
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Installation cost included above
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$1,200.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	10	10	10	10	10	10	10	10	10	Reasonable lifetime assumed
	Baseline (yrs.)	-	-	-	-	-	-	-	-	-	
Cost Savings ($/yr.)		$151	$151	$151	$151	$151	$151	$151	$151	$151	
Simple Payback (yrs.)		8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	7.95	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$1,031	$1,031	$1,031	$1,031	$1,031	$1,031	$1,031	$1,031	$1,031	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$169	-$169	-$169	-$169	-$169	-$169	-$169	-$169	-$169	
Benefit/Cost Ratio		0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	1	1	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	CanREN, "How Can I best Manage My Pool's Energy Use?", 2002., mid range of 30-50% savings estimate used
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	

Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	1	1	26.4%	26.4%	26.4%	26.4%	26.4%	26.4%	26.4%	26.4%	26.4%	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

Heat Pump Pool Heaters

Not used--this is a fuel-switching measure.

		References/Notes
Description:	Air source heat pumps can be used to replace electric or gas-fired pool heaters. The principal of operation for these types of heat pumps is very similar to refrigerators and air conditioning units, in that they are used to transfer heat from one place to another. This allows them to be significantly more efficient than electric or gas-fired pool heaters, since these types of heaters generate heat rather than transferring it.	
Baseline:	A standard efficiency gas-fired pool heater	
Upgrade:	A heat pump pool heater. This option is not valid in this study because it is a fuel-switching measure.	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/m^3)	$0.010	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☑	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☑	Mobile (Existing) ☑	Mobile (New) ☑	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Nat. Gas (m3/yr.)	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	Approximate cost of an 80,000 BTU heat pump pool heater, based on a scan of models available from online retailers
	Upgrade, Installation ($)	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	Assuming 2 hours of labour @ $60/hr
	Baseline, Material ($)	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	Based on Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-81, April 16, 2009.
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Included in cost above
	Total Measure Cost ($)	$524.65	$524.65	$524.65	$524.65	$524.65	$524.65	$524.65	$524.65	$524.65	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	Assuming no incremental O&M
Lifetimes	Upgrade (yrs.)	10	10	10	10	10	10	10	10	10	Lifetime based on a US DOE website on heat pump pool heaters
	Baseline (yrs.)	7	7	7	7	7	7	7	7	7	US DOE suggests lifetime of 5 years or longer.
Cost Savings ($/yr.)		$377	$377	$377	$377	$377	$377	$377	$377	$377	
Simple Payback (yrs.)		1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.39	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$2,578	$2,578	$2,578	$2,578	$2,578	$2,578	$2,578	$2,578	$2,578	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		$2,053	$2,053	$2,053	$2,053	$2,053	$2,053	$2,053	$2,053	$2,053	
Benefit/Cost Ratio		4.91	4.91	4.91	4.91	4.91	4.91	4.91	4.91	4.91	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	This is where electricity increase would go, in fuel switching analysis.

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	1	1	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	Heat pump pool heater replaces all gas use for pool heating
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	

Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	1	1	66.1%	66.1%	66.1%	66.1%	66.1%	66.1%	66.1%	66.1%	66.1%	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

High-Efficiency Gas-Fired Pool Heaters

		References/Notes
Description:	High-efficiency pool heaters incorporate advanced heat exchangers, forced draft combustion systems, pilot-less ignitions and innovations in hydraulics, which results in performance efficiencies that range between 90% and 95%, compared to efficiencies of 80% to 85% for standard models.	
Baseline:	A standard efficiency gas-fired pool heater (82.5% efficiency assumed)	
Upgrade:	A high efficiency gas-fired pool heater (92.5% efficiency assumed)	

Baseline Reference:	1. Annual consumption, end use
Heating Fuel Type:	All Fuels (Average Fuel Mix)
Main End Use:	Space Heating
Discount Rate:	7.38%
GHG Adder Incl.?	No
Resource Costs:	Baseload

= User Input
= Calculation

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$0.733	$0.733	$0.733	$0.733	$0.733	$0.733	$0.733	$0.733
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/m^3)	$0.010	$0.048	$0.048	$0.048	$0.048	$0.048	$0.048	$0.048	$0.048
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☑	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☑	Mobile (Existing) ☑	Mobile (New) ☑	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	34,259	34,259	34,259	34,259	34,259	34,259	34,259	34,259	34,259	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Nat. Gas (m3/yr.)	4,234	4,234	4,234	4,234	4,234	4,234	4,234	4,234	4,234	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$2,900.00	$2,900.00	$2,900.00	$2,900.00	$2,900.00	$2,900.00	$2,900.00	$2,900.00	$2,900.00	Personal communication with Jandy pool heater manufacturers, 2008<-- consider updating
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	installation costs included above
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Cost of upgrade is incremental cost
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	installation costs included above
	Total Measure Cost ($)	$2,900.00	$2,900.00	$2,900.00	$2,900.00	$2,900.00	$2,900.00	$2,900.00	$2,900.00	$2,900.00	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Set to incremental since cost above is incremental
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	7	7	7	7	7	7	7	7	7	US DOE suggests lifetime of 5 years or longer for a conventional heater. No evidence that high efficiency lifetimes are different.
	Baseline (yrs.)	7	7	7	7	7	7	7	7	7	US DOE suggests lifetime of 5 years or longer.
Cost Savings ($/yr.)		$41	$41	$41	$41	$41	$41	$41	$41	$41	
Simple Payback (yrs.)		69.9	69.9	69.9	69.9	69.9	69.9	69.9	69.9	69.89	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$204	$204	$204	$204	$204	$204	$204	$204	$204	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$2,696	-$2,696	-$2,696	-$2,696	-$2,696	-$2,696	-$2,696	-$2,696	-$2,696	
Benefit/Cost Ratio		0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	1	1	11.0%	11.0%	11.0%	11.0%	11.0%	11.0%	11.0%	11.0%	11.0%	Difference between energy use of 82.5% and 92.5% heaters.
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	

Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	1	1	7.3%	7.3%	7.3%	7.3%	7.3%	7.3%	7.3%	7.3%	7.3%	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Solar Pool Heaters

		References/Notes
Description:	Unlike other types of solar hot water systems, solar pool heaters do not include storage tanks or heat exchangers, and, since they are only used in warmer weather, they generally employ unglazed solar collectors that are composed of a polymer. These collectors are mounted of the roofs of homes or in an unshaded part of the yard. The heat transfer fluid is usually pool water that is pumped directly into the array of collectors and flows within the polymer in a serpentine array in order to pick up heat. Although solar DHW systems do require a pump, its consumption is similar to that used in electric and gas-fired pool heaters. Solar pool heaters can completely offset the energy requirements of conventional pool heaters. And, since they are much simpler than solar DHW systems, they are also much more affordable.	
Baseline:	A standard efficiency gas-fired pool heater	
Upgrade:	A solar pool heater with an unglazed collector	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$3,450.00	$3,450.00	$3,450.00	$3,450.00	$3,450.00	$3,450.00	$3,450.00	$3,450.00	$3,450.00	Based on Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-81, April 16, 2009.
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Installation costs included above
	Baseline, Material ($)	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	Based on Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-81, April 16, 2009.
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Installation costs included above
	Total Measure Cost ($)	$3,450.00	$3,450.00	$3,450.00	$3,450.00	$3,450.00	$3,450.00	$3,450.00	$3,450.00	$3,450.00	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	20	20	20	20	20	20	20	20	20	Based on Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-81, April 16, 2009.
	Baseline (yrs.)	7	7	7	7	7	7	7	7	7	US DOE suggests lifetime of 5 years or longer.
Cost Savings ($/yr.)		$377	$377	$377	$377	$377	$377	$377	$377	$377	
Simple Payback (yrs.)		9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.15	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$4,301	$4,301	$4,301	$4,301	$4,301	$4,301	$4,301	$4,301	$4,301	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		$851	$851	$851	$851	$851	$851	$851	$851	$851	
Benefit/Cost Ratio		1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	1	1	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	

Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	**Sub End Use/Equipment (If Applicable)**	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
		Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	1	1	66.1%	66.1%	66.1%	66.1%	66.1%	66.1%	66.1%	66.1%	66.1%	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

Micro-Combined Heat and Power (CHP)

		References/Notes
Description:	Several types of micro-combustion heat and power (micro CHP) systems are either available or under development. These units all generate electrical power and capture the resulting "waste" heat for space and/or water heating. Reciprocating engine units such as the Honda Freewatt use a well-developed technology and can be scaled to a residential size. Power generate efficiencies range from 20-40% and up to 90% of the waste heat can be captured. Various sizing and control strategies can be used: for example, the amount of heat can be maximized or the amount of electricity can be maximized. This example assumes a unit such as the Honda Freewatt hydronic system, which has a 1.2 kW maximum electrical output and a 3.5 kW thermal output. Heat load following control is assumed to avoid fuel-switching, however power load following control is usually more economically attractive for applications involving seasonally varying loads. A back-up boiler is included in the Honda Freewatt package. Net-metering is assumed.	
Baseline:	Condensing gas-fired boiler (92% AFUE)	
Upgrade:	Installing a microturbine system in an average home, offsetting both the electric consumption from the grid and the amount of space and water heating that must be provided by a boiler. Note that this technology is not currently available in Canada.	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)								
Electricity ($/kWh)	$0.083	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	
Natural Gas ($/m^3)	$0.010	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☑	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☑	Mobile (Existing) ☑	Mobile (New) ☑	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-2,000	-2,000	-2,000	-2,000	-2,000	-2,000	-2,000	-2,000	-2,000	
	Natural Gas (m3/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Nat. Gas (m3/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$13,000.00	$13,000.00	$13,000.00	$13,000.00	$13,000.00	$13,000.00	$13,000.00	$13,000.00	$13,000.00	Cost is anecdotal, gleaned from websites. Waiting for confirmation from Honda. This technology is not available in Canada and is not expected to be soon.
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Above cost includes installation
	Baseline, Material ($)	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	Cost is base case cost of 82 AFUE boiler. Update if base case for condensing boiler is updated.
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Above cost includes installation
	Total Measure Cost ($)	$8,000.00	$8,000.00	$8,000.00	$8,000.00	$8,000.00	$8,000.00	$8,000.00	$8,000.00	$8,000.00	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	20	20	20	20	20	20	20	20	20	Lifetime not well established--lifetime of base case boiler assumed.
	Baseline (yrs.)	20	20	20	20	20	20	20	20	20	
Cost Savings ($/yr.)		$166	$166	$166	$166	$166	$166	$166	$166	$166	
Simple Payback (yrs.)		48.3	48.3	48.3	48.3	48.3	48.3	48.3	48.3	48.31	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$2,837	$2,837	$2,837	$2,837	$2,837	$2,837	$2,837	$2,837	$2,837	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$5,163	-$5,163	-$5,163	-$5,163	-$5,163	-$5,163	-$5,163	-$5,163	-$5,163	
Benefit/Cost Ratio		0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	-1									-	RETSreen run indicates that mCHP delivers about 7200 MJ per year with heat following control

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	RETScreen run indicates heat load following strategy uses about the same amount of gas a 92 AFUE boiler would use.
Domestic Hot Water (DHW)	-	0	0										RETScreen run indicates heat load following strategy uses about the same amount of gas a 92 AFUE boiler would use.
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	

Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	-1	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

INDEX

Tab Name	Measure Description	Average B/C Ratio
HEATING: SHELL MEASURES		
Attic Insulation	Improving the attic insulation in an average home by RSI-3.5 (R-20), through the addition of cellulose insulation	0.61
Wall Insulation	Improving the wall insulation in an average home by RSI-1.76 (R-10) to RSI-4.2 (R-24)	0.62
Slab Insulation	The addition of slab (basement floor) insulation in homes with unfinished basements. It is assumed that 2" polystyrene rigid foam insulation (RSI-1.76 (R-10)) is being added.	0.07
Basement Insulation	In average homes with basements, improving the foundation wall insulation by RSI-2.12 (R-12)	0.66
Crawl Space Insul.	In homes with crawlspaces, the addition of crawlspace insulation to bring the thermal resistance values up to RSI-2.1 (R-12)	0.23
Air Sealing	A comprehensive air sealing job, which results in an air tightness (ACH @ 50 Pa) improvement of 30%	0.33
Homeowner Air Sealing	A homeowner air sealing job, which results in an air tightness (ACH @ 50 Pa) improvement of 15-20%	0.60
Sealing & Insul. - Old Homes	Improve both the attic insulation and the air tightness (ACH@50 Pa) in an old home. It is assumed that the air tightness is improved by 30% and that RSI-3.52 (R-20) of attic insulation is added.	0.40
ESTAR Windows	In existing homes, replacing 50% of windows with ENERGY STAR windows from Zone C (double-glazed, argon fill, low-e coating, insulating spacer, vinyl frame, hinged). In hew homes, replacing 100% of windows.	0.17
Super Windows	In existing homes, replacing 50% of windows with super high-performance windows (triple-glazed, krypton fill, low-e and insulating coatings, insulating spacer, fiberglass frame, hinged). In new homes, replacing all of the windows with super high-performance windows.	0.39
HEATING: SHELL MEASURES (NEW HOMES)		
High-Perf. New Homes	A high-performance new home (EGH rating of 80 assumed). This option no longer applies as EGH of 80 is now the minimum.	0.00
Net Zero Ready Homes	A net-zero energy ready home (EGH rating of 86 assumed)	0.20
HEATING: EQUIPMENT		
Condensing Gas Furnaces	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 96%	0.19
Early Retire Gas Furnaces	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 90%	0.14
Condensing Gas Boilers	A condensing natural gas boiler (92% AFUE assumed)	0.16
Gas Fireplaces	A high efficiency natural gas fireplace (80% assumed)	2.42
Prog. Thermostats	Programmable thermostat installed on central forced-air natural gas furnace and electric space cooling system	4.31
Solar Make-Up Air	A 10 m2 solar pre-heated make-up air system, located on the south side of a home	0.13
HRVs	A high-efficiency heat recovery ventilator (HRV) (sensible efficiency of approximately 85%), in a home with central heating and cooling	0.22
Air Heat Pumps	A gas-fired air-source heat pump. This option is not valid because these units are not available in residential sizes.	0.00
Ground Heat Pumps	A gas-fired ground-source heat pump. This option is not valid because these units are not available in residential sizes.	0.00
Heating & DHW	An integrated heating and DHW system, with a condensing furnace (AFUE of 94), a condensing natural gas water heater (EF of 0.80 assumed), and an HRV with an efficiency similar to that in the base case (72%).	0.12
Heating & DHW (Hydronic)	An integrated heating and DHW system, with a condensing boiler (AFUE 92.7), a condensing natural gas water heater (EF of .85) and an HRV with an efficiency similar to that in the base case (72%).	0.23
WATER HEATING		
Condensing Gas DHW	A condensing natural gas water heater (EF of 0.80 assumed)	0.22
Tankless Gas DHW	A tankless natural gas hot water heater (EF of 0.82 assumed)	0.31
Solar DHW	Solar DHW systems use the energy of the sun to heat water. The primary components of a solar water heating system are a solar collector, a heat transfer fluid and a well-insulated storage tank. Due to Canada's colder climate and the higher likelihood of	0.17
DHW Tank Insulation	An insulating blanket installed on a hot water storage tank to reduce standby losses	0.70
DHW Pipe Insulation	Installing pipe insulation on the first meter of piping leading out of a hot water storage tank	13.27
DHW Heat Traps	Installing an external "S-type" pre-bent copper pipe heat trap on an gas-fired storage hot water heater. This option no longer applies because most new hot water heaters include an integrated heat trap.	0.00
Showerheads	An ultra low-flow showerhead with a 1.25 GPM (4.75) flow rate	7.49
Faucet Aerators	A 1.5 GPM (5.7 LPM) faucet aerator installed on the kitchen faucet	3.92
Wastewater Heat Recovery	A 60" wastewater heat recovery system	0.36
DHW Recirculation	A home with a DHW recirculation system installed on the point-of-use farthest away from the hot water tank	0.45
APPLIANCES		
ESTAR Dishwashers	An ENERGY STAR® certified, standard-sized new dishwasher	0.26
ESTAR Clothes Washers	An ENERGY STAR® certified, 3.2 cu. ft. (90.6 L) front loading clothes washer	0.77
Gas Clothes Dryers	A gas clothes dryer with a moisture sensor. This option is no longer valid because almost all new gas dryers have moisture sensors.	0.00
OTHER		
Pool Covers	Installing a pool cover to reduce the heat loss from a heated pool	0.86
Heat Pump Pool Heaters	A heat pump pool heater. This option is not valid in this study because it is a fuel-switching measure.	4.91
Efficient Pool Heaters	A high efficiency gas-fired pool heater (92.5% efficiency assumed)	0.07
Solar Pool Heaters	A solar pool heater with an unglazed collector	1.25
Micro-CHP	Installing a microturbine system in an average home, offsetting both the electric consumption from the grid and the amount of space and water heating that must be provided by a boiler. Note that this technology is not currently available in Canada.	0.35

Measure Name	Basis (Full/ Incremental)	Weighted Average	
		B/C Ratio	Measure TRC ($)
DHW Pipe Insulation	Full	13.27	$9
Ultra Low-Flow Showerheads	Full	7.49	$84
Programmable Thermostats (Central Heating and Cooling)	Full	4.31	$166
Faucet Aerators	Full	3.92	$44
Solar Pool Heaters	Full	1.25	$851
Insulating Pool Covers	Full	0.86	-$169
DHW Tank Insulation	Full	0.70	-$10
Attic Insulation	Full	0.61	-$262
Homeowner Air Sealing/Weather Stripping/Caulking	Full	0.60	-$134
DHW Recirculation Systems (e.g. Metlund D'MAND®)	Full	0.45	-$304
Air Leakage Sealing and Insulation (Old Homes)	Full	0.40	-$1,941
Wastewater Heat Recovery Systems	Full	0.36	-$508
Professional Air Sealing/Weather Stripping/Caulking	Full	0.33	-$1,362
Crawl Space Insulation	Full	0.23	-$614
Net-Zero Ready Energy Homes	Full	0.20	-$10,380
Active Solar Water Heating Systems	Full	0.17	-$5,790
Solar Pre-Heated Make-Up Air Systems (e.g., SolarWall®)	Full	0.13	-$1,137
High-Performance Homes (EGH 80/R2000/ENERGY STAR®)	Full	0.00	-$5,600
High Efficiency Gas Fireplaces	Incr.	2.42	$213
High-Efficiency (ENERGY STAR®) Clothes Washers	Incr.	0.77	-$68
Basement (Foundation) Insulation	Incr.	0.66	-$485
Wall Insulation	Incr.	0.62	-$741
Super High-Performance Windows	Incr.	0.39	-$1,686
Micro-Combined Heat and Power (CHP)	Incr.	0.35	-$5,163
Point-of-Use (Tankless) Water Heaters (Gas)	Incr.	0.31	-$1,377
High-Efficiency (ENERGY STAR®) Dishwashers	Incr.	0.26	-$77
Integrated Heating and DHW (Hydronic Heating)	Incr.	0.23	-$4,475
High Efficiency Heat Recovery Ventilators (HRVs)	Incr.	0.22	-$467
Condensing Gas Water Heaters	Incr.	0.22	-$1,042
High Efficiency Condensing Gas Furnaces	Incr.	0.19	-$1,194
Zoned-Up Windows: (ENERGY STAR®) Rating for a Colder Zone	Incr.	0.17	-$1,499
Condensing Gas Boilers	Incr.	0.16	-$2,677
Early Retirement of Existing Gas Furnaces	Incr.	0.14	-$1,612
Integrated Heating and DHW (Forced Air Heating)	Incr.	0.12	-$5,392
Slab Insulation (Unfinished Basements)	Incr.	0.07	-$1,113
High-Efficiency Gas-Fired Pool Heaters	Incr.	0.07	-$2,696

Back to Index

Tab Name	Measure Name (Full)	General Measure Description	Baseline Description	Upgrade Description	
Attic Insulation	Attic Insulation	Insulation levels can be increased in attics by blowing insulation into the attic spaces to fill and cover the space within the roof frame. One technique is to make sure loose-fill or batt insulation fills the attic floor joists fully and then add an additional layer of unfaced fibreglass batt insulation across the joists. To reduce cost, it is also possible to blow in cellulose insulation on top of the existing insulation instead.	A home with average insulation in the attic	Improving the attic insulation in an average home by RSI-3.5 (R-20), through the addition of cellulose insulation	Cool
Wall Insulation	Wall Insulation	It can be challenging to retrofit wall insulation in existing homes since the inside surfaces of the exterior walls are already finished. It is sometimes possible to add insulation to a wall by blowing insulating materials into the wall cavity, if sufficient space exists. Alternatively, if the siding is old and due for replacement, rigid foam insulation can be added before the new siding is installed. In this situation, it would also be quite cost-effective to install a more effective vapour and air barrier (e.g., Dupont Tyvek®) to reduce the amount of air leakage through the walls.	A home with average wall insulation	Improving the wall insulation in an average home by RSI-1.76 (R-10) to RSI-4.2 (R-24)	Cool
Slab Insulation	Slab Insulation (Unfinished Basements)	Insulation can be added both under and on top of basement slab floors. However, in existing homes, only the latter is practical. It is assumed that additional insulation is added to the slab floor while the basement is being finished. This can be done by purchasing insulated subfloor panels or laying down extruded polystyrene rigid foam insulation.	Homes with unfinished basements	The addition of slab (basement floor) insulation in homes with unfinished basements. It is assumed that 2" polystyrene rigid foam insulation (RSI-1.76 (R-10)) is being added.	Cool
Basement Insulation	Basement (Foundation) Insulation	In many homes, the basement is often under-insulated or even left uninsulated. Increasing the insulation level in basements can be achieved in a number of ways, including constructing a new insulated frame wall, moving the existing frame wall to increase the insulation level, adding extra insulation to the existing frame wall, adding rigid board insulation to the exterior of the foundation, or using a combination of interior and exterior rigid board insulation. As a lower cost alternative, it is also possible to use polyurethane foam	A home with average insulation in the basement (foundation) walls	In average homes with basements, improving the foundation wall insulation by RSI-2.12 (R-12)	Cool
Crawl Space Insul.	Crawl Space Insulation	Insulation levels remain below code in many homes that include crawlspaces as part of the basement design. If the floor is exposed, it would first be necessary to install a vapour barrier (e.g., 6 mil (600 gauge/0.15 mm) polyurethane barrier). Polyurethane foam could then be applied to the ceiling of the crawlspace (or the outer walls if there are pipes running below the floor). In addition to increasing the insulation of the crawlspace, this would help to eliminate any air leaks. Co-benefits of improved crawlspace insulation include improved thermal comfort, fewer drafts, and less condensation.	Minimal crawlspace insulation in homes with crawlspaces	In homes with crawlspaces, the addition of crawlspace insulation to bring the thermal resistance values up to RSI-2.1 (R-12)	Cool
Air Sealing	Professional Air Sealing/Weather Stripping/Caulking	Air leakage sealing of building envelopes includes completion of a blower door test to quantify leakage levels and to identify the location of air leaks. Generally, major leakage occurs at window-to-wall interfaces, around doors (especially patio doors), through electrical and plumbing penetrations and at the top of foundation walls. Installation of sealant and gaskets are generally accepted methods for reducing air leakage in buildings. Other sources of air leaks include pot lights, wall-to-floor interfaces (i.e., top and bottom of baseboards) and bathroom and kitchen exhaust piping.	No action taken	A comprehensive air sealing job, which results in an air tightness (ACH @ 50 Pa) improvement of 30%	Cool
Homeowner Air Sealing	Homeowner Air Sealing/Weather Stripping/Caulking	Homeowner air leakage sealing does not include a blower door test to quantify leakage levels and to identify the location of air leaks. Homeowners are likely to identify leakage primarily in more visible areas of the envelope, for example, the major leakage at window-to-wall interfaces, around doors (especially patio doors), through electrical and plumbing penetrations and perhaps at the top of foundation walls. Installation of weather stripping, sealant and gaskets are the most likely methods to be used. Less visible sources of air leaks such as pot lights, wall-to-floor interfaces (i.e., top and bottom of baseboards), bathroom and kitchen exhaust piping, and leaks from the top of walls into the attic are less likely to be addressed by the homeowner	No action taken	A homeowner air sealing job, which results in an air tightness (ACH @ 50 Pa) improvement of 15-20%	Cool
Sealing & Insul. - Old Homes	Air Leakage Sealing and Insulation (Old Homes)	This measure is targeted at homes that are at least 30 years old, since many of these homes haven't had any work done to improve insulation and air-sealing deficiencies and it is generally most cost-effective to upgrade the insulation and the air sealing at the same time. This includes wall, attic, foundation, and crawlspace retrofits of older homes but, for the purposes of this analysis, it is assumed that a retrofit is being conducted on the attic. The air-sealing portion of the work could be accomplished by segmenting the attic. In each segment, the existing insulation could be moved to one side and polyurethane foam could be sprayed in (serves as an air sealant in addition to its insulating properties). It may also be necessary to install or refurbish top plates to prevent airflow into the attic through exterior wall cavities. Other considerations that would increase the cost of the air-sealing portion of the work and may be present in some homes include sealing pot lights and kitchen or bathroom exhaust piping. When completed, these measures would dramatically improve the air tightness of an older home. The attic insulation could subsequently be cost-effectively improved with cellulose insulation.	An older home with average air tightness and attic insulation (for that particular vintage)	Improve both the attic insulation and the air tightness (ACH@50 Pa) in an old home. It is assumed that the air tightness is improved by 30% and that RSI-3.52 (R-20) of attic insulation is added.	Cool
Zone Up Windows	Zoned-Up Windows: (ENERGY STAR®) Rating for a Colder Zone	High-performance windows incorporate a number of additional energy-saving features, including low-E (soft coating), insulating spacers, argon fill and low conductivity frames (which can be sliders, hinged or picture). These windows are certified based on their energy rating (ER), which is based on their tested energy performance, rather than on their specific combination of features. In this case, however, the Energy Star windows for a colder zone are specified instead of the Energy Star windows for the zone where the house is located - for example, Zone C Energy Star windows would be chosen for a house in Zone A. High-performance windows also provide occupant co-benefits, such as reduced interior noise, reduced air leakage, greater thermal comfort, and fewer condensation problems.	ENERGY STAR windows for Zone A (double glazed, argon fill, low-e coating, insulating spacer, vinyl frame, hinged)	In existing homes, replacing 50% of windows with ENERGY STAR windows from Zone C (double-glazed, argon fill, low-e coating, insulating spacer, vinyl frame, hinged). In hew homes, replacing 100% of windows.	Not cool
Super Windows	Super High-Performance Windows	In addition to low-E coating, argon fill and insulating spacers, super-high performance windows incorporate features such as triple glazing, transparent insulating films, and fibreglass frames.	Standard windows (double glazed, air fill, no coating, metal spacer, vinyl frame, slider with sash)	In existing homes, replacing 50% of windows with super high-performance windows (triple-glazed, krypton fill, low-e and insulating coatings, insulating spacer, fiberglass frame, hinged). In new homes, replacing all of the windows with super high-performance windows.	Cool
High-Perf. New Homes	High-Performance Homes (EGH 80/R2000/ENERGY STAR®)	There are several certification schemes for energy-efficient new homes that incorporate integrated design and multiple envelope measures. An EnerGuide for Houses (EGH) rating is a standard measure of a home's energy performance, calculated by a professional EGH advisor. The rating is based on information on the construction of the home and the results of a blower door test performed once the house has been built. The R2000 standard is one method of achieving an EGH 80 rating. However, R2000 homes are required to achieve an air tightness level of 1.5 ACH@50Pa, install a heat recovery ventilator (HRV), and meet other environmental requirements. This substantially increases the cost of the measure. The ENERGY STAR® for New Homes program has similar requirements and also requires that homes be rated EGH 80. Since these three high performance home standards all result in essentially the same energy performance, the costs assumed for the measure are those of the least expensive of the three. EGH 80 is the lowest cost, since it allows the builder the most flexibitility for achieving the energy performance.	An average new home (EGH rating of 76 assumed)	A high-performance new home (EGH rating of 80 assumed). This option no longer applies as EGH of 80 is now the minimum.	Cool
Net Zero Ready Homes	Net-Zero Ready Energy Homes	Net-zero energy homes (NZEH) produce at least as much energy as they consume. This is accomplished by incorporating on-site power generation, such as solar PV panels or small wind turbines, to offset electrical loads. However, the energy consumption of a NZEH is significantly lower, due to the addition of a wide array of energy efficiency features. Measures that are typically considered include increased insulation, super high-performance windows, ENERGY STAR® appliances, solar thermal space and/or water heating, heat pumps, and passive solar designs. This measure is designed to produce a highly efficient house that is ready to be turned into a NZEH with the addition of on-site renewable energy generation.	An average new home (Minimum EGH rating of 80 required)	A net-zero energy ready home (EGH rating of 86 assumed)	Cool
Condensing Gas Furnaces	High Efficiency Condensing Gas Furnaces	Federal legislation now requires that all residential furnaces meet the minimum performance standard of 90% AFUE . However, higher efficiency condensing furnaces are available. These furnaces include more advanced heat exchanger designs that extract more heat from the flue gases before they are exhausted.	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 90%	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 96%	Cool
Early Retire Gas Furnaces	Early Retirement of Existing Gas Furnaces	Federal legislation now requires that all residential furnaces meet the minimum performance standard of 90% AFUE . However, consumers with less efficient furnaces that still work may wait years before replacing them. Early retirement of existing furnaces that are still functional is an option. Energy savings only last until the old furnace would have been replaced, because after that the energy consumption of the base case and upgrade is the same. The consumer has the added peace of mind of having a new furnace that is less likely to break down in winter	Keep existing 82% efficient furnace until failure, assumed to be in 9 years; then replace with the same furnace as the upgrade	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 90%	Cool
Condensing Gas Boilers	Condensing Gas Boilers	High-efficiency condensing boilers feature advanced heat exchanger designs that extract more heat from the flue gases before they are exhausted. So much heat is extracted that the flue gases condense and must be discharged as a condensate rather than a gas. In retrofit applications where condensing boilers are replacing non-condensing units, it may be necessary to modify the radiating system. Otherwise, the units may not actually condense the flue gas and realize their full efficiency potential.	A non-condensing mid-efficiency natural gas boiler (82% AFUE assumed)	A condensing natural gas boiler (92% AFUE assumed)	Cool
Gas Fireplaces	High Efficiency Gas Fireplaces	All vented gas fireplaces sold in Canada must now be tested for their energy efficiency using the Canadian Standards Association CSA-P.4.1-02 standard if they are shipped across provincial lines. The energy-efficiency rating of the fireplace is printed on the EnerGuide label. EnerGuide does not set a minimum efficiency level, so savings are possible by using the EnerGuide label to choose the more efficient unit.	An average efficiency natural gas fireplace (60% assumed)	A high efficiency natural gas fireplace (80% assumed)	Cool
Prog. Thermostats	Programmable Thermostats (Central Heating and Cooling)	Digital programmable thermostats provide improved temperature setting accuracy and allow occupants to preset temperatures for various time periods. A 4ºC temperature setback is often assumed during night and unoccupied periods. However, utility studies have indicated that a lower average setback value should be used to reflect the fact that the thermostat's setback capabilities do not completely reflect how they are used. For example, some home occupants reliably set back manual thermostats while others do not use the setback features on their electronic thermostats.	Non-programmable thermostat installed on central forced-air natural gas furnace and electric space cooling system	Programmable thermostat installed on central forced-air natural gas furnace and electric space cooling system	Cool
Solar Make-Up Air	Solar Pre-Heated Make-Up Air Systems (e.g., SolarWall®)	Solar preheated ventilation systems preheat incoming ventilation air and reduce heat loss through the portion of the building shell covered by them. They consist of perforated steel or aluminum absorber sheets that are mounted vertically on a building's exterior surface and are ideally mounted on southerly facing walls, plus or minus 20 degrees. The dark coloured metal sheets that make up the system are mounted a small distance away from the building's surface, creating an air cavity. A negative pressure is created within the cavity by ventilation fans and air is drawn through small holes in the metal panels. On sunny winter days, these systems can raise incoming air temperatures by 25°C to 35°C. In summer months, ventilation air can be drawn directly from the outside through a bypass damper, while heated air is rejected through vents at the top of the air cavity. These systems are generally used in commercial and industrial applications but they have seen some limited residential use.	Homes with ducting and heat recovery ventilators (HRVs)	A 10 m2 solar pre-heated make-up air system, located on the south side of a home	Cool
HRVs	High Efficiency Heat Recovery Ventilators (HRVs)	Heat recovery ventilators (HRVs) are heat exchangers that are integrated into the centralized ventilation and exhaust systems of many newer homes. In the winter, they allow for incoming fresh air to be heated by outgoing stale air. Conversely, in homes with central air conditioning systems, they allow incoming fresh air to be cooled by outgoing stale air in the summer. High efficiency HRVs incorporate more effective heat exchangers. Some models also include desiccant wheels so that latent heat (i.e. humidity) can be transferred between the two air streams	A standard-efficiency (sensible efficiency of approximately 70%) heat recovery ventilator (HRV), in a home with central heating and cooling	A high-efficiency heat recovery ventilator (HRV) (sensible efficiency of approximately 85%), in a home with central heating and cooling	Cool
Air Heat Pumps	Gas-Fired Air-Source Heat Pumps	Early gas-fired heat pumps, such as the York Triathlon, were unsuccessful due to their bulky size and poor quality design. A new generation of gas absorption heat pumps (GAHPs) is currently available through Robur, an Italian manufacturer. These systems can either be ground-source or air-source (i.e., the heat sink may be either an underground fluid loop or an above ground heat exchanger coil). Air-source systems are substantially less expensive since they don't require drilling to install underground fluid loops. However, they can also be much less efficient than ground-source versions since their efficiency is a function of outside air temperature. Commercial-sized GAHP systems have been available in Canada since mid-2007 but residential-sized systems are rare in North America. It is hoped that residential-sized units will become more available in Canada within the study period, but the current manufacturers do not have specific plans at this time. It is estimated that air-source systems can operate at temperatures as low as -29°C and have annual efficiencies of 105% in cold winter locations. In more moderate winter climates, an efficiency of up to 129% is advertised. Unlike electric heat pump systems, GAHPs do not require any auxiliary heating equipment. In addition, the lack of a mechanical compressor extends their lifetime and allows air-source systems to withstand	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 90%	A gas-fired air-source heat pump. This option is not valid because these units are not available in residential sizes.	Cool

Ground Heat Pumps	Gas-Fired Ground-Source Heat Pumps	Early gas-fired heat pumps, such as the York Triathlon, were unsuccessful due to their bulky size and poor quality design. A new generation of gas absorption heat pumps (GAHPs) is currently available through Robur, an Italian manufacturer. These systems can either be ground-source or air-source (i.e., the heat sink may be either an underground fluid loop or an above ground heat exchanger coil). Air-source systems are substantially less expensive since they don't require drilling to install underground fluid loops. However, they can also be much less efficient than ground-source versions since their efficiency is a function of outside air temperature. Commercial-sized GAHP systems have been available in Canada since mid-2007 but residential-sized systems are not currently available outside of Europe. It is hoped that residential-sized units will become more available in Canada within the study period, but the current manufacturers do not have specific plans at this time. Ground-source GAHPs have efficiencies (COPs) ranging from 120% to 130% Unlike electric heat pump systems, GAHPs do not require any auxiliary heating equipment. In addition, the lack of a mechanical compressor extends their lifetime.	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 90%	A gas-fired ground-source heat pump. This option is not valid because these units are not available in residential sizes.	Cool
Heating & DHW	Integrated Heating and DHW (Forced Air Heating)	Integrated mechanical systems combine the most efficient technologies for residential space heating and domestic water heating into one package. For example, the Matrix system by NTI NY Thermal incorporates a condensing furnace, condensing boiler, condensing water heater and HRV all in one unit. Primary benefits of the integrated units include compact construction, lower cost of installation (only one set of gas, water and circulation connections are required), and lower installation and maintenance costs (once the technology is mature). Since the minimum performance standards for furnaces was brought up to 90% efficiency at the end of 2009, the base case system is a 90% efficient forced-air furnace and a standard efficiency natural gas tank-style water heater. With this baseline, the integrated system would offer little in the way of space heating savings, but it does still offer DHW savings because the integrated system would heat domestic water with	A 90% AFUE efficient forced-air condensing furnace, a standard efficiency natural gas tank-style water heater (EF of 0.62 or 0.64 assumed) and a standard efficiency HRV	An integrated heating and DHW system, with a condensing furnace (AFUE of 94), a condensing natural gas water heater (EF of 0.80 assumed), and an HRV with an efficiency similar to that in the base case (72%).	Cool
Heating & DHW (Hydronic)	Integrated Heating and DHW (Hydronic Heating)	Integrated mechanical systems combine the most efficient technologies for residential space heating and domestic water heating into one package. For example, the Matrix system by NTI NY Thermal incorporates a condensing furnace, condensing boiler, condensing water heater and HRV all in one unit. Primary benefits of the integrated units include compact construction, lower cost of installation (only one set of gas, water and circulation connections are required), and lower installation and maintenance costs (once the technology is mature). Water heating in the base case is assumed to be provided by a standard efficiency natural gas tank-style water heater (EF of 0.62 or 0.64), while space heating is provided by a non-condensing boiler, assumed to have an AFUE of 82% . The HRV in the base case is assumed to be of similar efficiency to the HRV in the	A non-condensing boiler with an AFUE of 82% and a standard efficiency natural gas tank-style water heater (EF of 0.62 or 0.64). An HRV of similar efficiency to the integrated unit (72%) is assumed.	An integrated heating and DHW system, with a condensing boiler (AFUE 92.7), a condensing natural gas water heater (EF of .85) and an HRV with an efficiency similar to that in the base case (72%).	Cool
Condensing Gas DHW	Condensing Gas Water Heaters	Condensing water heaters feature advanced heat exchanger designs that extract more heat from the flue gases before they are exhausted. So much heat is extracted that the flue gases condense and must be discharged as a condensate rather than a gas. As a result, the efficiency of these types of water heaters is significantly higher than standard water heaters.	A conventional storage natural gas hot water heater (EF of 0.62 or 0.64 assumed)	A condensing natural gas water heater (EF of 0.80 assumed)	Cool
Tankless Gas DHW	Point-of-Use (Tankless) Water Heaters (Gas)	Tankless water heaters heat water on demand, eliminating hot water storage. The absence of hot water storage reduces standby heat losses. The efficiency of tankless water heaters is generally improved by the addition of features such as modulating controls, electric spark ignitions and direct venting. The applicability of tankless gas-fired DHW systems is somewhat limited by venting constraints; the burner is significantly larger than for a standard water heater, so a larger vent is required. Some houses cannot accommodate the larger flue because of requirements for clearance from other structures, windows, etc.	A conventional storage natural gas hot water heater (EF of 0.60 assumed)	A tankless natural gas hot water heater (EF of 0.82 assumed)	Cool
Solar DHW	Active Solar Water Heating Systems	Solar DHW systems use the energy of the sun to heat water. The primary components of a solar water heating system are a solar collector, a heat transfer fluid and a well-insulated storage tank. Due to Canada's colder climate and the higher likelihood of freezing, active closed-loop systems are generally used. These systems use a pump to circulate a non-freezing heat transfer fluid through the collectors and then through a heat exchanger so that the thermal energy can be transferred to the water. Solar DHW are not generally sized to supply all of the annual requirement for water heating in the home, because if the system is sized for cloudy winter periods it will have enormous excess capacity during sunny summer periods, and will cost far too much to install. The system analyzed here meets approximately 2/3 of the annual requirements.	No solar water heating system installed	Solar DHW systems use the energy of the sun to heat water. The primary components of a solar water heating system are a solar collector, a heat transfer fluid and a well-insulated storage tank. Due to Canada's colder climate and the higher likelihood of	Cool
DHW Tank Insulation	DHW Tank Insulation	Pre-cut tank jackets/blankets (DHW tank insulation) are readily available and can be installed on hot water storage tanks to reduce standby heat losses. Caution is required to install blankets on gas water heaters, to avoid blocking the flue, the air intake to the burner, or the drain at the bottom. The thermostat should also remain uncovered.	No additional tank insulation installed on a conventional hot water storage tank	An insulating blanket installed on a hot water storage tank to reduce standby losses	Cool
DHW Pipe Insulation	DHW Pipe Insulation	Hot water pipe insulation reduces the distribution losses for DHW. In general, only the first one or two metres of pipe nearest the DHW tank are accessible enough to insulate. However, since the dominant loss is from the pipe transferring heat out of the tank and then losing it to the basement, the first meter of pipe is the most important and only worthwhile section of pipe to insulate. Insulating this section of piping affects both the delivery of hot water and the losses from the tank. Delivery temperature is slightly increased during a hot water draw, and the water in the piping does not lose its stored heat as quickly between draws	No insulation installed on the piping leading out of a hot water storage tank	Installing pipe insulation on the first meter of piping leading out of a hot water storage tank	Cool
DHW Heat Traps	DHW Heat Traps	This measure involves the installation of external "S-type" pre-bent copper pipe heat traps on both of the outlets ofwater heaters. This measure is only being considered during the installation of new tanks since it can be prohibitively expensive to bring in a plumber otherwise.	No heat trap installed on a new electric storage hot water heater	Installing an external "S-type" pre-bent copper pipe heat trap on an gas-fired storage hot water heater. This option no longer applies because most new hot water heaters include an integrated heat trap.	Cool
Showerheads	Ultra Low-Flow Showerheads	Ultra low-flow showerheads have aerators and flow restrictors to reduce water use. At 4.75 LPM (1.25 GPM), their flow rates are substantially lower than traditional low-flow fixtures, whose flow rates range between 7.6 LPM and 9.5 LPM (2.0-2.5 GPM).	A low-flow showerhead with a 2.0 GPM (7.6 LPM) flow rate (conservative estimate)	An ultra low-flow showerhead with a 1.25 GPM (4.75) flow rate	Cool
Faucet Aerators	Faucet Aerators	Aerators can easily be attached to most faucets to restrict the flow rate of water flowing from them. This can result in savings to both water consumption and DHW energy.	No faucet aerator installed on the kitchen faucet	A 1.5 GPM (5.7 LPM) faucet aerator installed on the kitchen faucet	Cool
Wastewater Heat Recovery	Wastewater Heat Recovery Systems	Residential wastewater heat recovery systems transfer the waste heat from drains to preheat make-up water. These systems work well only for DHW uses in which the hot water use and the draining of wastewater are simultaneous. Thus, in homes, application to anything other than showers is difficult. Heat recovery systems incorporate shell-and-tube heat exchangers that typically have efficiencies in the range of 40% to 55%, depending on factors such as design, material, overall length, and fluid flow rate.	No wastewater heat recovery system installed	A 60" wastewater heat recovery system	Cool
DHW Recirculation	DHW Recirculation Systems (e.g. Metlund D'MAND®)	When turning on the hot water tap, it often takes a long time before hot water begins to flow. DHW recirculation systems can be used to pump hot water to a faucet at the demand of a user, getting hot water to the fixture four to five times quicker than traditional systems. Water that is in the hot water lines is pumped back to the water heater either through the cold water lines or through a dedicated line. This pumping continues until the temperature of the hot water at the point of use reaches a specified value. In retrofit situations, this pumping system is generally installed at the faucet that is furthest away from the water heater and the system is enabled by remote activation from the other points of use. Along with improved convenience and water savings (since water isn't flushed down the drain), energy savings are achieved since the water that is pumped back to the water heater is generally warmer than city water. In addition, since the pump gets water to the fixture more quickly, there is an overall reduction of hot water use.	A home with no DHW recirculation system	A home with a DHW recirculation system installed on the point-of-use farthest away from the hot water tank	Cool
ESTAR Dishwashers	High-Efficiency (ENERGY STAR®) Dishwashers	ENERGY STAR® dishwashers save energy by using improved technology for the primary wash cycle and by using less hot water to clean. Features include more effective washing action, energy-efficient motors, and sensors that determine the length of the wash cycle and the temperature of the water necessary to clean the dishes. In addition, some advanced dishwashers can sense and adjust for the amount of soil on dishes, using only as much water as necessary. These savings affect both the energy used for heating the water and the mechanical energy of the dishwasher	A standard-sized new dishwasher	An ENERGY STAR® certified, standard-sized new dishwasher	Cool
ESTAR Clothes Washers	High-Efficiency (ENERGY STAR®) Clothes Washers	In January 2011, the ENERGY STAR® standard for clothes washers will be increased once again. As a result, very few top loading washers will meet ENERGY STAR® requirements. Instead, the overwhelming majority of ENERGY STAR® models will be front loading (horizontal axis) models. Compared to standard models, front loading washing machines use less hot water, less mechanical energy, and result in dryer energy savings due to faster spin cycle speeds	A standard 3.2 cu. ft. (90.6 L) top loading clothes washer	An ENERGY STAR® certified, 3.2 cu. ft. (90.6 L) front loading clothes washer	Cool
Gas Clothes Dryers	High-Efficiency Gas Clothes Dryers	The major distinction with energy-efficient gas clothes dryer models is that they incorporate termination controls to sense dryness and turn off automatically. The most efficient models have moisture sensors in the drum for sensing dryness, while other lower-cost and slightly less efficient models infer dryness by sensing the temperature of the exhaust air. The majority of the retail models currently available employ some type of dryness sensing technology but it is unclear how often these controls are used by homeowners	A gas clothes dryer with a temperature sensor	A gas clothes dryer with a moisture sensor. This option is no longer valid because almost all new gas dryers have moisture sensors.	Cool
Pool Covers	Insulating Pool Covers	Between 30% and 50% of the heat loss from a swimming pool is due to evaporation. In an outdoor pool, this heat loss either adds to the cost of heating the pool or shortens the swimming season. Evaporation also increases the quantity of chemicals that must be added to the pool. A pool cover can reduce evaporation and other heat losses but can also reduce heat gains depending on the design. An insulating vinyl pool cover is assumed for this analysis. Although substantially more expensive than the bubble type covers, insulating vinyl pool covers are much more robust and, thus, have much longer lifetimes. They are also more effective at trapping heat	A pool with no insulating cover	Installing a pool cover to reduce the heat loss from a heated pool	Cool
Heat Pump Pool Heaters	Heat Pump Pool Heaters	Air source heat pumps can be used to replace electric or gas-fired pool heaters. The principal of operation for these types of heat pumps is very similar to refrigerators and air conditioning units, in that they are used to transfer heat from one place to another. This allows them to be significantly more efficient than electric or gas-fired pool heaters, since these types of heaters generate heat rather than transferring it.	A standard efficiency gas-fired pool heater	A heat pump pool heater. This option is not valid in this study because it is a fuel-switching measure.	Cool
Efficient Pool Heaters	High-Efficiency Gas-Fired Pool Heaters	High-efficiency pool heaters incorporate advanced heat exchangers, forced draft combustion systems, pilot-less ignitions and innovations in hydraulics, which results in performance efficiencies that range between 90% and 95%, compared to efficiencies of 80% to 85% for standard models.	A standard efficiency gas-fired pool heater (82.5% efficiency assumed)	A high efficiency gas-fired pool heater (92.5% efficiency assumed)	Cool
Solar Pool Heaters	Solar Pool Heaters	Unlike other types of solar hot water systems, solar pool heaters do not include storage tanks or heat exchangers, and, since they are only used in warmer weather, they generally employ unglazed solar collectors that are composed of a polymer. These collectors are mounted of the roofs of homes or in an unshaded part of the yard. The heat transfer fluid is usually pool water that is pumped directly into the array of collectors and flows within the polymer in a serpentine array in order to pick up heat. Although solar DHW systems do require a pump, its consumption is similar to that used in electric and gas-fired pool heaters. Solar pool heaters can completely offset the energy requirements of conventional pool heaters. And,	A standard efficiency gas-fired pool heater	A solar pool heater with an unglazed collector	Cool
Micro-CHP	Micro-Combined Heat and Power (CHP)	Several types of micro-combustion heat and power (micro CHP) systems are either available or under development. These units all generate electrical power and capture the resulting "waste" heat for space and/or water heating. Reciprocating engine units such as the Honda Freewatt use a well-developed technology and can be scaled to a residential size. Power generate efficiencies range from 20-40% and up to 90% of the waste heat can be captured. Various sizing and control strategies can be used: for example, the amount of heat can be maximized or the amount of electricity can be maximized. This example assumes a unit such as the Honda Freewatt hydronic system, which has a 1.2 kW maximum electrical output and a 3.5 kW thermal output. Heat load following control is assumed to avoid fuel-switching, however power load following control is usually more economically attractive for applications involving seasonally varying loads. A back-up boiler is included in the Honda Freewatt package. Net-metering is	Condensing gas-fired boiler (92% AFUE)	Installing a microturbine system in an average home, offsetting both the electric consumption from the grid and the amount of space and water heating that must be provided by a boiler. Note that this technology is not currently available in Canada.	Cool

MISCELLANEOUS INPUTS

Back to Index

Measure Sheet Title: TERASEN GAS: RESIDENTIAL SECTOR, VANCOUVER ISLAND - NATURAL GAS EFFICIENCY

Number of Sub-Sectors (1 to 15): 8

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Average
Sub-Sector Names:	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	9	10	11	12	13	14	15	Weighted Avg.

FUEL MIX

Space Heating

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	9	10	11	12	13	14	15	Weighted Avg.	References/Notes
Electricity	24.9%	24.9%	24.9%	27.0%	27.0%	27.0%	24.9%	24.9%								25.2%	
Natural Gas	72.3%	72.3%	72.3%	72.3%	72.3%	72.3%	72.3%	72.3%								72.3%	
Oil																0.0%	Not used
Wood																0.0%	Not used
Total	**97.2%**	**97.2%**	**97.2%**	**99.3%**	**99.3%**	**99.3%**	**97.2%**	**97.2%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**97.5%**	

DHW

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	9	10	11	12	13	14	15	Weighted Avg.	References/Notes
Electricity	13.5%	13.5%	79.3%	13.9%	13.9%	79.1%	13.7%	79.5%								46.4%	
Natural Gas	85.8%	85.8%	20.0%	85.2%	85.2%	20.0%	85.8%	20.0%								52.9%	
Oil																0.0%	Not used
Total	**99.3%**	**99.3%**	**99.3%**	**99.1%**	**99.1%**	**99.1%**	**99.5%**	**99.5%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**99.3%**	

Cooking

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	9	10	11	12	13	14	15	Weighted Avg.	References/Notes
Electricity	72.8%	72.8%	72.8%	79.8%	79.8%	79.8%	73.3%	73.3%								73.8%	
Natural Gas	27.2%	27.2%	27.2%	20.2%	20.2%	20.2%	26.7%	26.7%								26.2%	
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**100.0%**	

Clothes Dryers

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	9	10	11	12	13	14	15	Weighted Avg.	References/Notes
Electricity	85.6%	85.6%	85.6%	90.9%	90.9%	90.9%	86.0%	86.0%								86.4%	
Natural Gas	14.4%	14.4%	14.4%	9.1%	9.1%	9.1%	14.0%	14.0%								13.6%	
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**100.0%**	

Pools and Spas

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	9	10	11	12	13	14	15	Weighted Avg.	References/Notes
Electricity	87.7%	87.7%	87.7%	87.7%	87.7%	87.7%	87.7%	87.7%								87.7%	
Natural Gas	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%								8.1%	
Total	**95.8%**	**95.8%**	**95.8%**	**95.8%**	**95.8%**	**95.8%**	**95.8%**	**95.8%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**95.8%**	

HEATING PENALTY/ COOLING BENEFITS

Mix of Heating Fuels (for heating penalty and cooling benefits calculations)

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	9	10	11	12	13	14	15	Weighted Avg.	References/Notes
Electricity	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%								0.0%	Not used
Natural Gas	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%								0.0%	Not used
Oil	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%								0.0%	Not used
Wood	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%								0.0%	Not used
Total	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	

Average Heating System Efficiency by Fuel

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	9	10	11	12	13	14	15	Weighted Avg.	References/Notes
Electricity	110.0%	110.0%	110.0%	110.0%	110.0%	110.0%	100.0%	100.0%								109.8%	Not used
Natural Gas	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%								85.0%	Not used
Oil	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%								75.0%	Not used

Average Cooling System Efficiency by Fuel

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	9	10	11	12	13	14	15	Weighted Avg.	References/Notes
Electricity	300.0%	300.0%	300.0%	300.0%	300.0%	300.0%	300.0%	300.0%								300.0%	Not used

HOUSING STOCK

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	9	10	11	12	13	14	15	Weighted Avg.	References/Notes
Occupancy Rates	3.1	3.1	3.1	2.4	2.4	2.4	1.9	1.9								3.0	Stats Canada, values for Vancouver
Distribution of Housing Types	39.0%	51.9%	75.5%	1.0%	5.9%	22.2%	2.2%	2.2%								N/A	

ECONOMIC PARAMETERS

Back to Index

Customer Resource Costs

Electric Energy ($/kWh)	$0.083
Electric Demand ($/kW)	
Natural Gas ($/MJ)	$0.010
Oil ($/L)	
Water ($/1000L)	

Sources:

Electricity: Residential retail cost of electricity and demand taken from the spreadsheet "20100111_Planning Tool with Partners_TGVI_Res.xlsx" provided by Terasen

Gas: TGI rate taken from the spreadsheet "20100111_Planning Tool with Partners_TGVI_Res.xlsx" provided by Terasen

Oil: Cost not used

Water: Cost not used

GHG Adder Inputs

	Electricity (kWh)	Natural Gas (m^3)	Fuel Oil (L)	Water (1000L)	
			Not used	Not used	
GHG Cost, 2010 ($/tonne CO_2e)					Not used--GHG costs already in avoided cost
GHG Cost, 2011 ($/tonne CO_2e)					Not used--GHG costs already in avoided cost
GHG Cost, 2012+ ($/tonne CO_2e)					Not used--GHG costs already in avoided cost
Emissions Coefficient (tonnes CO_2e/unit)	0.0000	0			Not used--GHG costs already in avoided cost
GHG Adder, 2010 ($/unit)	0.0000	0	0.0000	0.0000	Not used--GHG costs already in avoided cost
GHG Adder, 2011 ($/unit)	0.0000	0	0.0000	0.0000	Not used--GHG costs already in avoided cost
GHG Adder, 2012+ ($/unit)	0.0000	0	0.0000	0.0000	Not used--GHG costs already in avoided cost

- Electricity emissions factors based on BC emission factors presented on http://www.ec.gc.ca/ges-ghg/default.asp?lang=En&n=EAF0E96A-1#section11, from Environment Canada; *National Inventory Report (1990-2008): Greenhouse Gas Sources and Sinks in Canada* , May 2008.

- Natural gas emissions factors based on BC emission factors presented on http://www.ec.gc.ca/ges-ghg/default.asp?lang=En&n=AC2B7641-1 from Environment Canada; *National Inventory Report (1990-2008): Greenhouse Gas Sources and Sinks in Canada* , May 2008.

Other Economic Parameters

Discount Rate	7.38%

AVOIDED COSTS (2009)

Back to Index

GHG Adder	No	**Note:** GHG adders already added to avoided costs
Inflation Factor	N/A	**Note:** Not currently being used
Discount Rate	7.38%	

YEAR	ELECTRICITY (ENERGY) ☑				ELECTRICITY (DEMAND) ☐				NATURAL GAS ☑				FUEL OIL ☐		WATER ☐	
	Baseload		Peak		Baseload		Peak		Baseload		Weather Sensitive		Rates	NPV	Rates	NPV
	Rates	NPV	Rates	NPV	Rates	NPV	Rates	NPV	Rates	NPV	Rates	NPV				
1	0.1284	0.1284	0.1584	0.1584	0.0000	0.0000	0.0000	0.0000	0.0065	0.0065	0.3407	0.3407	0.00000	0.00000	0.00000	0.00000
2	0.1284	0.2480	0.1584	0.3059	0.0000	0.0000	0.0000	0.0000	0.0070	0.0130	0.3251	0.6434	0.00000	0.00000	0.00000	0.00000
3	0.1284	0.3593	0.1584	0.4433	0.0000	0.0000	0.0000	0.0000	0.0080	0.0200	0.3324	0.9317	0.00000	0.00000	0.00000	0.00000
4	0.1284	0.4630	0.1584	0.5712	0.0000	0.0000	0.0000	0.0000	0.0090	0.0272	0.3265	1.1954	0.00000	0.00000	0.00000	0.00000
5	0.1284	0.5596	0.1584	0.6904	0.0000	0.0000	0.0000	0.0000	0.0096	0.0344	0.3408	1.4517	0.00000	0.00000	0.00000	0.00000
6	0.1284	0.6496	0.1584	0.8013	0.0000	0.0000	0.0000	0.0000	0.0101	0.0415	0.3535	1.6993	0.00000	0.00000	0.00000	0.00000
7	0.1284	0.7333	0.1584	0.9046	0.0000	0.0000	0.0000	0.0000	0.0105	0.0483	0.3599	1.9341	0.00000	0.00000	0.00000	0.00000
8	0.1284	0.8113	0.1584	1.0009	0.0000	0.0000	0.0000	0.0000	0.0108	0.0548	0.3557	2.1501	0.00000	0.00000	0.00000	0.00000
9	0.1284	0.8840	0.1584	1.0905	0.0000	0.0000	0.0000	0.0000	0.0110	0.0611	0.3626	2.3553	0.00000	0.00000	0.00000	0.00000
10	0.1284	0.9516	0.1584	1.1739	0.0000	0.0000	0.0000	0.0000	0.0112	0.0670	0.3697	2.5500	0.00000	0.00000	0.00000	0.00000
11	0.1284	1.0146	0.1584	1.2517	0.0000	0.0000	0.0000	0.0000	0.0114	0.0726	0.3769	2.7349	0.00000	0.00000	0.00000	0.00000
12	0.1284	1.0733	0.1584	1.3240	0.0000	0.0000	0.0000	0.0000	0.0116	0.0779	0.3842	2.9105	0.00000	0.00000	0.00000	0.00000
13	0.1284	1.1279	0.1584	1.3914	0.0000	0.0000	0.0000	0.0000	0.0119	0.0829	0.3917	3.0771	0.00000	0.00000	0.00000	0.00000
14	0.1284	1.1788	0.1584	1.4542	0.0000	0.0000	0.0000	0.0000	0.0121	0.0877	0.3993	3.2354	0.00000	0.00000	0.00000	0.00000
15	0.1284	1.2262	0.1584	1.5127	0.0000	0.0000	0.0000	0.0000	0.0123	0.0923	0.4071	3.3856	0.00000	0.00000	0.00000	0.00000
16	0.1284	1.2703	0.1584	1.5671	0.0000	0.0000	0.0000	0.0000	0.0125	0.0966	0.4150	3.5282	0.00000	0.00000	0.00000	0.00000
17	0.1284	1.3114	0.1584	1.6178	0.0000	0.0000	0.0000	0.0000	0.0128	0.1007	0.4231	3.6636	0.00000	0.00000	0.00000	0.00000
18	0.1284	1.3497	0.1584	1.6650	0.0000	0.0000	0.0000	0.0000	0.0130	0.1045	0.4313	3.7922	0.00000	0.00000	0.00000	0.00000
19	0.1284	1.3853	0.1584	1.7090	0.0000	0.0000	0.0000	0.0000	0.0133	0.1082	0.4397	3.9143	0.00000	0.00000	0.00000	0.00000
20	0.1284	1.4185	0.1584	1.7499	0.0000	0.0000	0.0000	0.0000	0.0135	0.1117	0.4483	4.0302	0.00000	0.00000	0.00000	0.00000
21	0.1284	1.4494	0.1584	1.7881	0.0000	0.0000	0.0000	0.0000	0.0139	0.1151	0.4570	4.1402	0.00000	0.00000	0.00000	0.00000
22	0.1284	1.4782	0.1584	1.8236	0.0000	0.0000	0.0000	0.0000	0.0143	0.1183	0.4659	4.2446	0.00000	0.00000	0.00000	0.00000
23	0.1284	1.5050	0.1584	1.8566	0.0000	0.0000	0.0000	0.0000	0.0146	0.1213	0.4750	4.3438	0.00000	0.00000	0.00000	0.00000
24	0.1284	1.5300	0.1584	1.8874	0.0000	0.0000	0.0000	0.0000	0.0150	0.1242	0.4843	4.4380	0.00000	0.00000	0.00000	0.00000
25	0.1284	1.5532	0.1584	1.9161	0.0000	0.0000	0.0000	0.0000	0.0154	0.1270	0.4937	4.5274	0.00000	0.00000	0.00000	0.00000
26	0.1284	1.5749	0.1584	1.9428	0.0000	0.0000	0.0000	0.0000	0.0157	0.1297	0.5033	4.6122	0.00000	0.00000	0.00000	0.00000
27	0.1284	1.5950	0.1584	1.9677	0.0000	0.0000	0.0000	0.0000	0.0161	0.1322	0.5131	4.6928	0.00000	0.00000	0.00000	0.00000
28	0.1284	1.6138	0.1584	1.9909	0.0000	0.0000	0.0000	0.0000	0.0165	0.1346	0.5231	4.7693	0.00000	0.00000	0.00000	0.00000
29	0.1284	1.6313	0.1584	2.0124	0.0000	0.0000	0.0000	0.0000	0.0168	0.1369	0.5333	4.8419	0.00000	0.00000	0.00000	0.00000
30	0.1284	1.6476	0.1584	2.0325	0.0000	0.0000	0.0000	0.0000	0.0172	0.1391	0.5419	4.9107	0.00000	0.00000	0.00000	0.00000

AVOIDED COSTS (2009) - RAW INPUTS

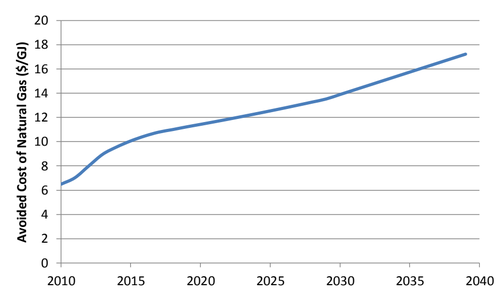
Back to Index

GHG Adder	N/A	**Note:** Not to be modified here
Inflation Factor	N/A	**Note:** Not currently being used
Discount Rate	7.38%	

Units are $/MJ

YEAR	ELECTRICITY (ENERGY)				ELECTRICITY (DEMAND)				NATURAL GAS				FUEL OIL		WATER	
	Baseload		Peak		Baseload		Peak		Baseload		Weather Sensitive					
	Rates	NPV	Rates	NPV	Rates	NPV	Rates	NPV	Rates	NPV	Rates	NPV	Rates	NPV	Rates	NPV
			Not used		Not used		Not used				Not used		Not used		Not used	
1	0.1284	0.1284	0.1584	0.1584	15.0000	15.0000	15.0000	15.0000	0.0065	0.0065	0.3407	0.3407	0.75000	0.75000	1.68504	1.68504
2	0.1284	0.2480	0.1584	0.3059	15.1000	29.0622	15.1000	29.0622	0.0070	0.0130	0.3251	0.6434	0.76000	1.45777	1.71705	3.28408
3	0.1284	0.3593	0.1584	0.4433	15.2000	42.2447	15.2000	42.2447	0.0080	0.0200	0.3324	0.9317	0.77000	2.12556	1.74967	4.80151
4	0.1284	0.4630	0.1584	0.5712	15.3000	54.6019	15.3000	54.6019	0.0090	0.0272	0.3265	1.1954	0.78000	2.75554	1.78292	6.24151
5	0.1284	0.5596	0.1584	0.6904	15.4000	66.1851	15.4000	66.1851	0.0096	0.0344	0.3408	1.4517	0.79000	3.34974	1.81679	7.60802
6	0.1284	0.6496	0.1584	0.8013	15.5000	77.0422	15.5000	77.0422	0.0101	0.0415	0.3535	1.6993	0.80000	3.91011	1.85131	8.90479
7	0.1284	0.7333	0.1584	0.9046	15.6000	87.2184	15.6000	87.2184	0.0105	0.0483	0.3599	1.9341	0.81000	4.43849	1.88649	10.13538
8	0.1284	0.8113	0.1584	1.0009	15.7000	96.7559	15.7000	96.7559	0.0108	0.0548	0.3557	2.1501	0.82000	4.93662	1.92233	11.30317
9	0.1284	0.8840	0.1584	1.0905	15.8000	105.6945	15.8000	105.6945	0.0110	0.0611	0.3626	2.3553	0.83000	5.40618	1.95886	12.41136
10	0.1284	0.9516	0.1584	1.1739	15.9000	114.0715	15.9000	114.0715	0.0112	0.0670	0.3697	2.5500	0.84000	5.84874	1.99607	13.46300
11	0.1284	1.0146	0.1584	1.2517	16.0000	121.9218	16.0000	121.9218	0.0114	0.0726	0.3769	2.7349	0.85000	6.26579	2.03400	14.46096
12	0.1284	1.0733	0.1584	1.3240	16.1000	129.2782	16.1000	129.2782	0.0116	0.0779	0.3842	2.9105	0.86000	6.65874	2.07265	15.40800
13	0.1284	1.1279	0.1584	1.3914	16.2000	136.1716	16.2000	136.1716	0.0119	0.0829	0.3917	3.0771	0.87000	7.02894	2.11203	16.30671
14	0.1284	1.1788	0.1584	1.4542	16.3000	142.6309	16.3000	142.6309	0.0121	0.0877	0.3993	3.2354	0.88000	7.37766	2.15215	17.15955
15	0.1284	1.2262	0.1584	1.5127	16.4000	148.6831	16.4000	148.6831	0.0123	0.0923	0.4071	3.3856	0.89000	7.70611	2.19304	17.96887
16	0.1284	1.2703	0.1584	1.5671	16.5000	154.3538	16.5000	154.3538	0.0125	0.0966	0.4150	3.5282	0.90000	8.01542	2.23471	18.73689
17	0.1284	1.3114	0.1584	1.6178	16.6000	159.6667	16.6000	159.6667	0.0128	0.1007	0.4231	3.6636	0.91000	8.30667	2.27717	19.46571
18	0.1284	1.3497	0.1584	1.6650	16.7000	164.6443	16.7000	164.6443	0.0130	0.1045	0.4313	3.7922	0.92000	8.58088	2.32044	20.15734
19	0.1284	1.3853	0.1584	1.7090	16.8000	169.3075	16.8000	169.3075	0.0133	0.1082	0.4397	3.9143	0.93000	8.83903	2.36453	20.81367
20	0.1284	1.4185	0.1584	1.7499	16.9000	173.6761	16.9000	173.6761	0.0135	0.1117	0.4483	4.0302	0.94000	9.08201	2.40945	21.43651
21	0.1284	1.4494	0.1584	1.7881	17.0000	177.7686	17.0000	177.7686	0.0139	0.1151	0.4570	4.1402	0.95000	9.31071	2.45523	22.02756
22	0.1284	1.4782	0.1584	1.8236	17.1000	181.6021	17.1000	181.6021	0.0143	0.1183	0.4659	4.2446	0.96000	9.52593	2.50188	22.58844
23	0.1284	1.5050	0.1584	1.8566	17.2000	185.1931	17.2000	185.1931	0.0146	0.1213	0.4750	4.3438	0.97000	9.72844	2.54942	23.12071
24	0.1284	1.5300	0.1584	1.8874	17.3000	188.5568	17.3000	188.5568	0.0150	0.1242	0.4843	4.4380	0.98000	9.91898	2.59786	23.62581
25	0.1284	1.5532	0.1584	1.9161	17.4000	191.7073	17.4000	191.7073	0.0154	0.1270	0.4937	4.5274	0.99000	10.09824	2.64722	24.10513
26	0.1284	1.5749	0.1584	1.9428	17.5000	194.6582	17.5000	194.6582	0.0157	0.1297	0.5033	4.6122	1.00000	10.26686	2.69751	24.55999
27	0.1284	1.5950	0.1584	1.9677	17.6000	197.4220	17.6000	197.4220	0.0161	0.1322	0.5131	4.6928	1.01000	10.42546	2.74877	24.99164
28	0.1284	1.6138	0.1584	1.9909	17.7000	200.0105	17.7000	200.0105	0.0165	0.1346	0.5231	4.7693	1.02000	10.57463	2.80099	25.40126
29	0.1284	1.6313	0.1584	2.0124	17.8000	202.4346	17.8000	202.4346	0.0168	0.1369	0.5333	4.8419	1.03000	10.71490	2.85421	25.78997
30	0.1284	1.6476	0.1584	2.0325	17.9000	204.7049	17.9000	204.7049	0.0172	0.1391	0.5419	4.9107	1.04000	10.84681	2.90844	26.15885

2010	6.490252		1	
2011	7.025272	0.53502	2	
2012	8.005337	0.980065	3	
2013	8.966252	0.960915	4	
2014	9.567327	0.601075	5	
2015	10.06053	0.493207	6	
2016	10.46367	0.403134	7	
2017	10.78438	0.320707	8	
2018	10.99733	0.212952	9	
2019	11.22083	0.223501	10	
2020	11.42842	0.207588	11	
2021	11.64064	0.212223	12	
2022	11.8576	0.216965	13	
2023	12.07942	0.221816	14	
2024	12.3062	0.22678	15	
2025	12.53806	0.23186	16	
2026	12.77512	0.237057	17	
2027	13.01749	0.242375	18	
2028	13.26531	0.247816	19	
2029	13.51869	0.253384	20	
2030	13.88861	0.369918	21	
2031	14.25853	0.369918	22	
2032	14.62845	0.369918	23	
2033	14.99836	0.369918	24	
2034	15.36828	0.369918	25	
2035	15.7382	0.369918	26	df
2036	16.10812	0.369918	27	
2037	16.47803	0.369918	28	
2038	16.84795	0.369918	29	
2039	17.21787	0.369918	30	
2040	17.58779	0.369918	31	
2041	17.95771	0.369918	32	
2042	18.32762	0.369918	33	
2043	18.69754	0.369918	34	
2044	19.06746	0.369918	35	
2045	19.43738	0.369918	36	
2046	19.8073	0.369918	37	
2047	20.17721	0.369918	38	
2048	20.54713			



	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Avoided commodity and Mindstream cost($/GJ)	$ 5.59	$ 5.88	$ 6.61	$ 7.32	$ 7.92	$ 8.41	$ 8.82	$ 9.14	$ 9.35	$ 9.57	$ 9.78	$ 9.99	$ 10.21	$ 10.43	$ 10.66	$ 10.89	$ 11.13	$ 11.37	$ 11.62	$ 11.87
Distributi	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
CARBOI	*0.75*	*1.00*	*1.25*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*
Total	$ 6.49	$ 7.03	$ 8.01	$ 8.97	$ 9.57	$ 10.06	$ 10.46	$ 10.78	$ 11.00	$ 11.22	$ 11.43	$ 11.64	$ 11.86	$ 12.08	$ 12.31	$ 12.54	$ 12.78	$ 13.02	$ 13.27	$ 13.52

Baseline Consumption (Case 1)

Back to Index

BASIS/TAG: 1. Annual consumption, end use
DESCRIPTION: Annual energy consumption, at the end use level
UNIT: /yr.

CONVERSION FACTORS:

Electricity (kWh to MJ):	3.60	
Natural Gas (m^3 to MJ):	39.62	Not used
Fuel Oil (L to MJ):	36.74	Not used

NATURAL UNITS:

Electricity

#	Main End Use	Sub End Use/Equipment (If Applicable)	% of Main End-Use (Default)	Average Consumption (kWh/yr.)									References/Notes
				Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
1	Ventilation and Circulation		100.0%	600.0	800.0	768.3	400.0	400.0	384.2	183.2	175.9	675.3	
2	Space Cooling		100.0%	277.6	277.6	266.6	165.2	165.2	158.6	176.0	169.0	254.0	
3	Clothes Washers		100.0%	67.0	67.0	67.0	53.1	53.1	53.1	61.0	61.0	64.8	
4	Dishwashers		100.0%	77.0	77.0	77.0	63.0	63.0	63.0	63.0	63.0	74.7	
5	Other Electric Loads		100.0%	2,000.0	2,000.0	2,000.0	2,000.0	2,000.0	2,000.0	2,000.0	2,000.0	2,000.0	Value based on electricity generated by micro-CHP measure
6			100.0%									0.0	
7			100.0%									0.0	
8			100.0%									0.0	
9			100.0%									0.0	
10			100.0%									0.0	
11			100.0%									0.0	
12			100.0%									0.0	
13			100.0%									0.0	
14			100.0%									0.0	
15			100.0%									0.0	
16			100.0%									0.0	
17			100.0%									0.0	
18			100.0%									0.0	
19			100.0%									0.0	
20			100.0%									0.0	
21			100.0%									0.0	
22			100.0%									0.0	
23			100.0%									0.0	
24			100.0%									0.0	
25			100.0%									0.0	
26			100.0%									0.0	
27			100.0%									0.0	
28			100.0%									0.0	
29			100.0%									0.0	
30			100.0%									0.0	
31			100.0%									0.0	
32			100.0%									0.0	
33			100.0%									0.0	
34			100.0%									0.0	
35			100.0%									0.0	
36			100.0%									0.0	
37			100.0%									0.0	
38			100.0%									0.0	
39			100.0%									0.0	
40			100.0%									0.0	

Natural Gas

#	Main End Use	Sub End Use/Equipment (If Applicable)	% of Main End-Use (Default)	Average Consumption (m3/yr.)									References/Notes
				Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
1	Space Heating		100.0%	54,195.1	44,259.1	44,259.1	29,495.9	24,103.6	24,103.6	28,549.4	28,549.4	42,938.8	
2	Domestic Hot Water (DHW)		100.0%	15,214.1	15,214.1	15,214.1	13,473.8	13,473.8	13,473.8	13,179.0	13,179.0	14,915.5	
3	Domestic Hot Water (DHW)	Clothes Washers	18.0%	2,738.5	2,738.5	2,738.5	2,425.3	2,425.3	2,425.3	2,372.2	2,372.2	2,684.8	DHW end-use breakdown based on several studies, as outlined in baseline report
4	Domestic Hot Water (DHW)	Showers	26.0%	3,955.7	3,955.7	3,955.7	3,503.2	3,503.2	3,503.2	3,426.5	3,426.5	3,878.0	DHW end-use breakdown based on several studies, as outlined in baseline report
5	Domestic Hot Water (DHW)	Faucets	19.0%	2,890.7	2,890.7	2,890.7	2,560.0	2,560.0	2,560.0	2,504.0	2,504.0	2,833.9	DHW end-use breakdown based on several studies, as outlined in baseline report
6	Domestic Hot Water (DHW)	Baths	4.0%	608.6	608.6	608.6	539.0	539.0	539.0	527.2	527.2	596.6	DHW end-use breakdown based on several studies, as outlined in baseline report
7	Domestic Hot Water (DHW)	Dishwashers	12.0%	1,825.7	1,825.7	1,825.7	1,616.9	1,616.9	1,616.9	1,581.5	1,581.5	1,789.9	DHW end-use breakdown based on several studies, as outlined in baseline report
8	Domestic Hot Water (DHW)	Leaks	6.0%	912.8	912.8	912.8	808.4	808.4	808.4	790.7	790.7	894.9	DHW end-use breakdown based on several studies, as outlined in baseline report
9	Domestic Hot Water (DHW)	Tank (Standby) Losses	7.5%	1,141.1	1,141.1	1,141.1	1,010.5	1,010.5	1,010.5	988.4	988.4	1,118.7	DHW end-use breakdown based on several studies, as outlined in baseline report
10	Domestic Hot Water (DHW)	Pipe Losses	7.5%	1,141.1	1,141.1	1,141.1	1,010.5	1,010.5	1,010.5	988.4	988.4	1,118.7	DHW end-use breakdown based on several studies, as outlined in baseline report
11	Fireplaces		100.0%	16,836.4	16,836.4	16,836.4	10,253.3	10,253.3	10,253.3	10,253.3	10,253.3	15,731.7	
12	Cooking		100.0%	4,510.3	4,510.3	4,510.3	4,002.1	4,002.1	4,002.1	3,902.3	3,902.3	4,422.8	
13	Cooking	Cooktops	40.0%	1,804.1	1,804.1	1,804.1	1,600.8	1,600.8	1,600.8	1,560.9	1,560.9	1,769.1	
14	Cooking	Ovens	55.0%	2,480.7	2,480.7	2,480.7	2,201.2	2,201.2	2,201.2	2,146.2	2,146.2	2,432.5	
15	Clothes Dryers		55.0%	3,636.4	3,636.4	3,636.4	3,243.6	3,243.6	3,243.6	3,644.5	3,644.5	3,579.4	
16	Pool and Spa Heaters		100.0%	27,693.2	27,693.2	27,693.2	27,693.2	27,693.2	27,693.2	27,693.2	27,693.2	27,693.2	
17	Pool and Spa Heaters	Pool Heaters	139.0%	38,493.5	38,493.5	38,493.5	38,493.5	38,493.5	38,493.5	38,493.5	38,493.5	38,493.5	
18	Pool and Spa Heaters	Spa Heaters	71.5%	19,800.6	19,800.6	19,800.6	19,800.6	19,800.6	19,800.6	19,800.6	19,800.6	19,800.6	
19	Other		100.0%									0.0	
20			100.0%									0.0	
21			100.0%									0.0	
22			100.0%									0.0	
23			100.0%									0.0	
24			100.0%									0.0	
25			100.0%									0.0	
26			100.0%									0.0	
27			100.0%									0.0	
28			100.0%									0.0	
29			100.0%									0.0	
30			100.0%									0.0	
31			100.0%									0.0	
32			100.0%									0.0	
33			100.0%									0.0	
34			100.0%									0.0	
35			100.0%									0.0	
36			100.0%									0.0	
37			100.0%									0.0	
38			100.0%									0.0	
39			100.0%									0.0	
40			100.0%									0.0	

Oil

#	Main End Use	Sub End Use/Equipment (If Applicable)	% of Main End-Use (Default)	Average Consumption (L/yr.)									References/Notes
				Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
1	Space Heating		100.0%									0.0	
2	Domestic Hot Water (DHW)		100.0%									0.0	
3	Domestic Hot Water (DHW)	Clothes Washer	18.0%									0.0	DHW end-use breakdown based on several studies, as outlined in baseline report
4	Domestic Hot Water (DHW)	Showers	26.0%									0.0	DHW end-use breakdown based on several studies, as outlined in baseline report
5	Domestic Hot Water (DHW)	Faucets	19.0%									0.0	DHW end-use breakdown based on several studies, as outlined in baseline report
6	Domestic Hot Water (DHW)	Baths	4.0%									0.0	DHW end-use breakdown based on several studies, as outlined in baseline report
7	Domestic Hot Water (DHW)	Dishwasher	12.0%									0.0	DHW end-use breakdown based on several studies, as outlined in baseline report
8	Domestic Hot Water (DHW)	Leaks	6.0%									0.0	DHW end-use breakdown based on several studies, as outlined in baseline report
9	Domestic Hot Water (DHW)	Tank (Standby) Losses	7.5%									0.0	DHW end-use breakdown based on several studies, as outlined in baseline report
10	Domestic Hot Water (DHW)	Pipe Losses	7.5%									0.0	DHW end-use breakdown based on several studies, as outlined in baseline report
11			100.0%									0.0	
12			100.0%									0.0	
13			100.0%									0.0	
14			100.0%									0.0	
15			100.0%									0.0	
16			100.0%									0.0	
17			100.0%									0.0	
18			100.0%									0.0	
19			100.0%									0.0	
20			100.0%									0.0	
21			100.0%									0.0	
22			100.0%									0.0	
23			100.0%									0.0	
24			100.0%									0.0	
25			100.0%									0.0	
26			100.0%									0.0	
27			100.0%									0.0	
28			100.0%									0.0	
29			100.0%									0.0	
30			100.0%									0.0	
31			100.0%									0.0	
32			100.0%									0.0	
33			100.0%									0.0	
34			100.0%									0.0	
35			100.0%									0.0	
36			100.0%									0.0	
37			100.0%									0.0	
38			100.0%									0.0	
39			100.0%									0.0	
40			100.0%									0.0	

Water

#	Main End Use	Sub End Use/Equipment (If Applicable)	Approx. DHW % (Default)	Average Consumption (L/yr.)									References/Notes
				Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
1	Water	Clothes Washer	40.0%									0.0	Based on averaging overall water consumption (per capita, per day) values from two studies: - Resource Management Strategies Inc., "Regional Municipality of York:
2	Water	Showers	70.0%									0.0	

3	Water	Faucets	40.0%									0.0	Water Efficiency Master Plan Update, Final Report", pg. 15, April 27, 2007 - Canadian sites in American Water Works Association (AWWA) Research Foundation, "Residential End Uses of Water", pg. 107, 1999.
4	Water	Baths	70.0%									0.0	
5	Water	Dishwasher	100.0%									0.0	
6	Water	Leaks	25.0%									0.0	
7	Water	Tank (Standby) Losses	100.0%									0.0	
8	Water	Pipe Losses	100.0%									0.0	
9			**100.0%**									0.0	
10			**100.0%**									0.0	
11			**100.0%**									0.0	
12			**100.0%**									0.0	
13			**100.0%**									0.0	
14			**100.0%**									0.0	
15			**100.0%**									0.0	
16			**100.0%**									0.0	
17			**100.0%**									0.0	
18			**100.0%**									0.0	
19			**100.0%**									0.0	
20			**100.0%**									0.0	

COMMON UNITS: **Note:** Used since it may be more convenient to enter values in their natural units and then convert using the conversion factors above

Electricity

#	Main End Use	% of Main End-Use (Default)	Average Consumption (MJ/yr.)									References/Notes
			Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
1	**Ventilation and Circulation**		2,160.0	2,880.0	2,766.0	1,440.0	1,440.0	1,383.0	659.5	633.4	2,430.9	
2	**Space Cooling**		999.5	999.5	959.9	594.7	594.7	571.1	633.5	608.4	914.6	
3	**Clothes Washers**		241.2	241.2	241.2	191.2	191.2	191.2	219.6	219.6	233.4	
4	**Dishwashers**		277.2	277.2	277.2	226.8	226.8	226.8	226.8	226.8	268.7	
5	**Other Electric Loads**		7,200.0	7,200.0	7,200.0	7,200.0	7,200.0	7,200.0	7,200.0	7,200.0	7,200.0	Value based on electricity generated by micro-CHP measure
6											0.0	
7											0.0	
8											0.0	
9											0.0	
10											0.0	
11											0.0	
12											0.0	
13											0.0	
14											0.0	
15											0.0	
16											0.0	
17											0.0	
18											0.0	
19											0.0	
20											0.0	

Natural Gas

#	Main End Use	% of Main End-Use (Default)	Average Consumption (MJ/yr.)									References/Notes
			Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
1	**Space Heating**		54,195.1	44,259.1	44,259.1	29,495.9	24,103.6	24,103.6	28,549.4	28,549.4	42,938.8	
2	**Domestic Hot Water (DHW)**		15,214.1	15,214.1	15,214.1	13,473.8	13,473.8	13,473.8	13,179.0	13,179.0	14,915.5	
3	**Fireplaces**		16,836.4	16,836.4	16,836.4	10,253.3	10,253.3	10,253.3	10,253.3	10,253.3	15,731.7	
4	**Cooking**		4,510.3	4,510.3	4,510.3	4,002.1	4,002.1	4,002.1	3,902.3	3,902.3	4,422.8	
5	**Clothes Dryers**		3,636.4	3,636.4	3,636.4	3,243.6	3,243.6	3,243.6	3,644.5	3,644.5	3,579.4	
6	**Pools and Spa Heaters**		27,693.2	27,693.2	27,693.2	27,693.2	27,693.2	27,693.2	27,693.2	27,693.2	27,693.2	
7	**Other**										0.0	
8											0.0	
9											0.0	
10											0.0	
11											0.0	
12											0.0	
13											0.0	
14											0.0	
15											0.0	
16											0.0	
17											0.0	
18											0.0	
19											0.0	
20											0.0	

Oil

#	Main End Use	% of Main End-Use (Default)	Average Consumption (MJ/yr.)									References/Notes
			Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
1	**Space Heating**										0.0	
2	**Domestic Hot Water (DHW)**										0.0	
3											0.0	
4											0.0	
5											0.0	
6											0.0	
7											0.0	
8											0.0	
9											0.0	
10											0.0	
11											0.0	
12											0.0	
13											0.0	
14											0.0	
15											0.0	
16											0.0	
17											0.0	
18											0.0	
19											0.0	
20											0.0	

Baseline Consumption (Case 2)

Back to Index

BASIS/TAG: 2. Annual consumption, equip.
DESCRIPTION: Annual energy consumption, at the equipment level
UNIT: /yr.

CONVERSION FACTORS:

Electricity (kWh to MJ):	3.60
Natural Gas (m^3 to MJ):	39.62
Fuel Oil (L to MJ):	36.74

U.S. Department of Energy (DOE) Energy Information Administration (EIA), *International Energy Annual 1997,* DOE/EIA-0219 (97), 1997

NATURAL UNITS:

Electricity

#	Main End Use	Sub End Use/Equipment (If Applicable)	% of Main End-Use (Default)	Average Consumption (kWh/yr.)									References/Notes
				Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
1			100.0%									0.0	
2			100.0%									0.0	
3			100.0%									0.0	
4			100.0%									0.0	
5			100.0%									0.0	
6			100.0%									0.0	
7			100.0%									0.0	
8			100.0%									0.0	
9			100.0%									0.0	
10			100.0%									0.0	
11			100.0%									0.0	
12			100.0%									0.0	
13			100.0%									0.0	
14			100.0%									0.0	
15			100.0%									0.0	
16			100.0%									0.0	
17			100.0%									0.0	
18			100.0%									0.0	
19			100.0%									0.0	
20			100.0%									0.0	
21			100.0%									0.0	
22			100.0%									0.0	
23			100.0%									0.0	
24			100.0%									0.0	
25			100.0%									0.0	
26			100.0%									0.0	
27			100.0%									0.0	
28			100.0%									0.0	
29			100.0%									0.0	
30			100.0%									0.0	
31			100.0%									0.0	
32			100.0%									0.0	
33			100.0%									0.0	
34			100.0%									0.0	
35			100.0%									0.0	
36			100.0%									0.0	
37			100.0%									0.0	
38			100.0%									0.0	
39			100.0%									0.0	
40			100.0%									0.0	

Natural Gas

#	Main End Use	Sub End Use/Equipment (If Applicable)	% of Main End-Use (Default)	Average Consumption (m3/yr.)									References/Notes
				Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
1			100.0%									0.0	
2			100.0%									0.0	
3			100.0%									0.0	
4			100.0%									0.0	
5			100.0%									0.0	
6			100.0%									0.0	
7			100.0%									0.0	
8			100.0%									0.0	
9			100.0%									0.0	
10			100.0%									0.0	
11			100.0%									0.0	
12			100.0%									0.0	
13			100.0%									0.0	
14			100.0%									0.0	
15			100.0%									0.0	
16			100.0%									0.0	
17			100.0%									0.0	
18			100.0%									0.0	
19			100.0%									0.0	
20			100.0%									0.0	
21			100.0%									0.0	
22			100.0%									0.0	
23			100.0%									0.0	
24			100.0%									0.0	
25			100.0%									0.0	
26			100.0%									0.0	
27			100.0%									0.0	
28			100.0%									0.0	
29			100.0%									0.0	
30			100.0%									0.0	
31			100.0%									0.0	
32			100.0%									0.0	
33			100.0%									0.0	
34			100.0%									0.0	
35			100.0%									0.0	
36			100.0%									0.0	
37			100.0%									0.0	
38			100.0%									0.0	
39			100.0%									0.0	
40			100.0%									0.0	

Oil

#	Main End Use	Sub End Use/Equipment (If Applicable)	% of Main End-Use (Default)	Average Consumption (L/yr.)									References/Notes
				Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
1			100.0%									0.0	
2			100.0%									0.0	
3			100.0%									0.0	
4			100.0%									0.0	
5			100.0%									0.0	
6			100.0%									0.0	
7			100.0%									0.0	
8			100.0%									0.0	
9			100.0%									0.0	
10			100.0%									0.0	
11			100.0%									0.0	
12			100.0%									0.0	
13			100.0%									0.0	
14			100.0%									0.0	
15			100.0%									0.0	
16			100.0%									0.0	
17			100.0%									0.0	
18			100.0%									0.0	
19			100.0%									0.0	
20			100.0%									0.0	
21			100.0%									0.0	
22			100.0%									0.0	
23			100.0%									0.0	
24			100.0%									0.0	
25			100.0%									0.0	
26			100.0%									0.0	
27			100.0%									0.0	
28			100.0%									0.0	
29			100.0%									0.0	
30			100.0%									0.0	
31			100.0%									0.0	
32			100.0%									0.0	
33			100.0%									0.0	
34			100.0%									0.0	
35			100.0%									0.0	
36			100.0%									0.0	
37			100.0%									0.0	
38			100.0%									0.0	
39			100.0%									0.0	
40			100.0%									0.0	

Water

#	Main End Use	Sub End Use/Equipment (If Applicable)	Approx. DHW % (Default)	Average Consumption (L/yr.)									References/Notes
				Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
1			100.0%									0.0	
2			100.0%									0.0	
3			100.0%									0.0	
4			100.0%									0.0	
5			100.0%									0.0	
6			100.0%									0.0	
7			100.0%									0.0	
8			100.0%									0.0	
9			100.0%									0.0	
10			100.0%									0.0	
11			100.0%									0.0	
12			100.0%									0.0	
13			100.0%									0.0	
14			100.0%									0.0	
15			100.0%									0.0	
16			100.0%									0.0	
17			100.0%									0.0	
18			100.0%									0.0	
19			100.0%									0.0	
20			100.0%									0.0	

COMMON UNITS: **Note:** Used since it may be more convenient to enter values in their natural units and then convert using the conversion factors above

Electricity

#	Main End Use	% of Main End-Use (Default)	Average Consumption (kWh/yr.)									References/Notes
			Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
1	0										0.0	
2	0										0.0	
3	0										0.0	
4	0										0.0	
5	0										0.0	
6	0										0.0	
7	0										0.0	
8	0										0.0	
9	0										0.0	
10	0										0.0	
11	0										0.0	
12	0										0.0	
13	0										0.0	
14	0										0.0	
15	0										0.0	
16	0										0.0	
17	0										0.0	
18	0										0.0	
19	0										0.0	
20	0										0.0	

Natural Gas

#	Main End Use	% of Main End-Use (Default)	Average Consumption (kWh/yr.)									References/Notes
			Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
1	0										0.0	
2	0										0.0	
3	0										0.0	
4	0										0.0	
5	0										0.0	
6											0.0	
7											0.0	
8											0.0	
9											0.0	
10											0.0	
11											0.0	
12											0.0	
13											0.0	
14											0.0	
15											0.0	
16											0.0	
17											0.0	
18											0.0	
19											0.0	
20											0.0	

Oil

#	Main End Use	% of Main End-Use (Default)	Average Consumption (kWh/yr.)									References/Notes
			Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
1	0										0.0	
2	0										0.0	
3											0.0	
4											0.0	
5											0.0	
6											0.0	
7											0.0	
8											0.0	
9											0.0	
10											0.0	
11											0.0	
12											0.0	
13											0.0	
14											0.0	
15											0.0	
16											0.0	
17											0.0	
18											0.0	
19											0.0	
20											0.0	

End Use Numbering	Baseline 1 End Use	Line Lookup for Baseline 1	Baseline 2 End Use	Line Lookup for Baseline 2
1	Space heating	1	Space heating	1
2	Space cooling	-1	Space cooling	-1
3	Ventilation and Circulation	-1	Ventilation and	-1
4	Domestic hot water (DHW)	2	Domestic hot water	2
5	Fireplace	3	Fireplace	3
6	Cooking	4	Cooking	4
7	Dishwasher	-1	Dishwasher	-1
8	Clothes washer	-1	Clothes washer	-1
9	Clothes dryer	5	Clothes dryer	5
10	Pool & spa heaters	6	Pool & spa heaters	6
11	Other gas uses	7	Other gas uses	7
12	Other electrical internal loads	-1	Other electrical	-1
13		-1		-1
14		-1		-1
15		-1		-1
16		-1		-1
17		-1		-1
18		-1		-1
19		-1		-1
20		-1		-1

End Use Numbering	Baseline 1 End Use	Line Lookup for Baseline 1	Baseline 2 End Use	Line Lookup for Baseline 2
1	Space heating	-1	Space heating	-1
2	Space cooling	2	Space cooling	2
3	Ventilation and Circulation	1	Ventilation and	1
4	Domestic hot water (DHW)	-1	Domestic hot water	-1
5	Fireplace	-1	Fireplace	-1
6	Cooking	-1	Cooking	-1
7	Dishwasher	4	Dishwasher	4
8	Clothes washer	3	Clothes washer	3
9	Clothes dryer	-1	Clothes dryer	-1
10	Pool & spa heaters	-1	Pool & spa heaters	-1
11	Other gas uses	-1	Other gas uses	-1
12	Other electrical internal loads	5	Other electrical	5
13		-1		-1
14		-1		-1
15		-1		-1
16		-1		-1
17		-1		-1
18		-1		-1
19		-1		-1
20		-1		-1

Measure Information		Applicability										Savings by End Use																				
Measure #	Technology	Climate Zone	Building Type(s)	Exist	Reno	New	Life	Cost	Benefit/Cost Ratio	Economic Screen	Basis	Space heating	Space cooling	Ventilation and Circulation	Domestic hot water (DHW)	Fireplace	Cooking	Dishwasher	Clothes washer	Clothes dryer	Pool & spa heaters	Other gas uses	Other electrical internal loads									
1	Attic Insulation	1	Detached (Pre-1976)	y	y		30.0	$675	0.77	Fail	Full	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2	Attic Insulation	1	Detached (Post-1976)	y	y		30.0	$713	0.52	Fail	Full	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3	Attic Insulation	1	Attached (Pre-1976)	y	y		30.0	$450	0.64	Fail	Full	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4	Attic Insulation	1	Attached (Post-1976)	y	y		30.0	$488	0.41	Fail	Full	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5	Attic Insulation	1	Mobile (Existing)	y	y		30.0	$525	0.46	Fail	Full	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6	Wall Insulation	1	Detached (Pre-1976)	y	y		30.0	$2,000	0.68	Fail	Incr.	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
7	Wall Insulation	1	Detached (Post-1976)	y	y		30.0	$2,000	0.60	Fail	Incr.	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
8	Wall Insulation	1	Attached (Pre-1976)	y	y		30.0	$1,500	0.51	Fail	Incr.	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
9	Wall Insulation	1	Attached (Post-1976)	y	y		30.0	$1,500	0.43	Fail	Incr.	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
10	Wall Insulation	1	Mobile (Existing)	y	y		30.0	$1,500	0.46	Fail	Incr.	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
11	Slab Insulation	1	Detached (Pre-1976)	y	y		30.0	$1,125	0.10	Fail	Incr.	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12	Slab Insulation	1	Detached (Post-1976)	y	y		30.0	$1,275	0.06	Fail	Incr.	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
13	Slab Insulation	1	Attached (Pre-1976)	y	y		30.0	$975	0.06	Fail	Incr.	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
14	Slab Insulation	1	Attached (Post-1976)	y	y		30.0	$1,050	0.04	Fail	Incr.	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
15	Basement Insulation	1	Detached (Pre-1976)	y	y		30.0	$1,400	0.72	Fail	Incr.	12%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
16	Basement Insulation	1	Detached (Post-1976)	y	y		30.0	$1,500	0.63	Fail	Incr.	13%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
17	Basement Insulation	1	Attached (Pre-1976)	y	y		30.0	$900	0.51	Fail	Incr.	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
18	Basement Insulation	1	Attached (Post-1976)	y	y		30.0	$1,000	0.41	Fail	Incr.	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
19	Crawl Space Insul.	1	Detached (Pre-1976)	y	y		30.0	$800	0.26	Fail	Full	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
20	Crawl Space Insul.	1	Detached (Post-1976)	y	y		30.0	$800	0.23	Fail	Full	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21	Crawl Space Insul.	1	Attached (Pre-1976)	y	y		30.0	$800	0.14	Fail	Full	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22	Crawl Space Insul.	1	Attached (Post-1976)	y	y		30.0	$800	0.12	Fail	Full	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23	Air Sealing	1	Detached (Pre-1976)	y	y		25.0	$1,800	0.40	Fail	Full	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
24	Air Sealing	1	Detached (Post-1976)	y	y		25.0	$1,800	0.30	Fail	Full	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
25	Air Sealing	1	Attached (Pre-1976)	y	y		25.0	$1,800	0.22	Fail	Full	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
26	Air Sealing	1	Attached (Post-1976)	y	y		25.0	$1,800	0.16	Fail	Full	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
27	Air Sealing	1	Mobile (Existing)	y	y		25.0	$1,800	0.18	Fail	Full	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
28	Homeowner Air Sealing	1	Detached (Pre-1976)	y	y		10.0	$200	0.73	Fail	Full	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
29	Homeowner Air Sealing	1	Detached (Post-1976)	y	y		10.0	$200	0.56	Fail	Full	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
30	Homeowner Air Sealing	1	Attached (Pre-1976)	y	y		10.0	$200	0.41	Fail	Full	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
31	Homeowner Air Sealing	1	Attached (Post-1976)	y	y		10.0	$200	0.30	Fail	Full	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
32	Homeowner Air Sealing	1	Mobile (Existing)	y	y		10.0	$200	0.33	Fail	Full	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
33	Sealing & Insul. - Old Homes	1	Detached (Pre-1976)	y	y		25.0	$3,000	0.40	Fail	Full	17%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
34	Sealing & Insul. - Old Homes	1	Attached (Pre-1976)	y	y		25.0	$2,500	0.26	Fail	Full	17%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
35	Zone Up Windows	1	Detached (Pre-1976)	y	y		25.0	$1,000	0.19	Fail	Incr.	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
36	Zone Up Windows	1	Detached (Post-1976)	y	y		25.0	$1,200	0.20	Fail	Incr.	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
37	Zone Up Windows	1	Detached (New)			y	25.0	$2,600	0.15	Fail	Incr.	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
38	Zone Up Windows	1	Attached (Pre-1976)	y	y		25.0	$800	0.13	Fail	Incr.	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
39	Zone Up Windows	1	Attached (Post-1976)	y	y		25.0	$960	0.13	Fail	Incr.	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
40	Zone Up Windows	1	Attached (New)			y	25.0	$2,080	0.10	Fail	Incr.	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
41	Zone Up Windows	1	Mobile (Existing)	y	y		25.0	$720	0.17	Fail	Incr.	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
42	Zone Up Windows	1	Mobile (New)			y	25.0	$1,600	0.14	Fail	Incr.	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
43	Super Windows	1	Detached (Pre-1976)	y	y		25.0	$1,500	0.46	Fail	Incr.	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
44	Super Windows	1	Detached (Post-1976)	y	y		25.0	$1,800	0.50	Fail	Incr.	13%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
45	Super Windows	1	Detached (New)			y	25.0	$3,900	0.34	Fail	Incr.	19%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
46	Super Windows	1	Attached (Pre-1976)	y	y		25.0	$1,200	0.33	Fail	Incr.	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
47	Super Windows	1	Attached (Post-1976)	y	y		25.0	$1,440	0.34	Fail	Incr.	13%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
48	Super Windows	1	Attached (New)			y	25.0	$3,120	0.23	Fail	Incr.	19%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
49	Super Windows	1	Mobile (Existing)	y	y		25.0	$1,080	0.38	Fail	Incr.	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
50	Super Windows	1	Mobile (New)			y	25.0	$2,400	0.32	Fail	Incr.	19%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
51	High-Perf. New Homes	1	Detached (New)			y	30.0	$6,000	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
52	High-Perf. New Homes	1	Attached (New)			y	30.0	$4,800	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
53	High-Perf. New Homes	1	Mobile (New)			y	30.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
54	Net Zero Ready Homes	1	Detached (New)			y	30.0	$14,000	0.20	Fail	Full	30%	0%	0%	30%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
55	Net Zero Ready Homes	1	Attached (New)			y	30.0	$9,800	0.18	Fail	Full	30%	0%	0%	30%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
56	Net Zero Ready Homes	1	Mobile (New)			y	30.0	$9,800	0.19	Fail	Full	30%	0%	0%	30%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
57	Condensing Gas Furnaces	1	Detached (Pre-1976)	y	y		18.0	$1,477	0.24	Fail	Incr.	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
58	Condensing Gas Furnaces	1	Detached (Post-1976)	y	y		18.0	$1,477	0.20	Fail	Incr.	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
59	Condensing Gas Furnaces	1	Detached (New)			y	18.0	$1,477	0.20	Fail	Incr.	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
60	Condensing Gas Furnaces	1	Attached (Pre-1976)	y	y		18.0	$1,477	0.13	Fail	Incr.	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
61	Condensing Gas Furnaces	1	Attached (Post-1976)	y	y		18.0	$1,477	0.11	Fail	Incr.	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
62	Condensing Gas Furnaces	1	Attached (New)			y	18.0	$1,477	0.11	Fail	Incr.	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
63	Condensing Gas Furnaces	1	Mobile (Existing)	y	y		18.0	$1,477	0.13	Fail	Incr.	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
64	Condensing Gas Furnaces	1	Mobile (New)			y	18.0	$1,477	0.13	Fail	Incr.	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
65	Early Retire Gas Furnaces	1	Detached (Pre-1976)	y	y		9.0	$1,864	0.16	Fail	Incr.	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
66	Early Retire Gas Furnaces	1	Detached (Post-1976)	y	y		9.0	$1,864	0.13	Fail	Incr.	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
67	Early Retire Gas Furnaces	1	Attached (Pre-1976)	y	y		9.0	$1,864	0.09	Fail	Incr.	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
68	Early Retire Gas Furnaces	1	Attached (Post-1976)	y	y		9.0	$1,864	0.07	Fail	Incr.	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
69	Early Retire Gas Furnaces	1	Mobile (Existing)	y	y		9.0	$1,864	0.08	Fail	Incr.	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
70	Condensing Gas Boilers	1	Detached (Pre-1976)	y	y		20.0	$3,200	0.21	Fail	Incr.	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
71	Condensing Gas Boilers	1	Detached (Post-1976)	y	y		20.0	$3,200	0.17	Fail	Incr.	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
72	Condensing Gas Boilers	1	Detached (New)			y	20.0	$3,200	0.17	Fail	Incr.	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
73	Condensing Gas Boilers	1	Attached (Pre-1976)	y	y		20.0	$3,200	0.11	Fail	Incr.	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
74	Condensing Gas Boilers	1	Attached (Post-1976)	y	y		20.0	$3,200	0.09	Fail	Incr.	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
75	Condensing Gas Boilers	1	Attached (New)			y	20.0	$3,200	0.09	Fail	Incr.	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
76	Condensing Gas Boilers	1	Mobile (Existing)	y	y		20.0	$3,200	0.11	Fail	Incr.	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
77	Condensing Gas Boilers	1	Mobile (New)			y	20.0	$3,200	0.11	Fail	Incr.	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
78	Gas Fireplaces	1	Detached (Pre-1976)	y	y		15.0	$150	2.59	Pass	Incr.	0%	0%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
79	Gas Fireplaces	1	Detached (Post-1976)	y	y		15.0	$150	2.59	Pass	Incr.	0%	0%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
80	Gas Fireplaces	1	Detached (New)			y	15.0	$150	2.59	Pass	Incr.	0%	0%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
81	Gas Fireplaces	1	Attached (Pre-1976)	y	y		15.0	$150	1.58	Pass	Incr.	0%	0%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
82	Gas Fireplaces	1	Attached (Post-1976)	y	y		15.0	$150	1.58	Pass	Incr.	0%	0%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
83	Gas Fireplaces	1	Attached (New)			y	15.0	$150	1.58	Pass	Incr.	0%	0%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
84	Gas Fireplaces	1	Mobile (Existing)	y	y		15.0	$150	1.58	Pass	Incr.	0%	0%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
85	Gas Fireplaces	1	Mobile (New)			y	15.0	$150	1.58	Pass	Incr.	0%	0%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
86	Prog. Thermostats	1	Detached (Pre-1976)	y	y		11.0	$50	5.37	Pass	Full	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
87	Prog. Thermostats	1	Detached (Post-1976)	y	y		11.0	$50	4.47	Pass	Full	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
88	Prog. Thermostats	1	Detached (New)			y	11.0	$50	4.46	Pass	Full	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
89	Prog. Thermostats	1	Attached (Pre-1976)	y	y		11.0	$50	2.95	Pass	Full	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
90	Prog. Thermostats	1	Attached (Post-1976)	y	y		11.0	$50	2.44	Pass	Full	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
91	Prog. Thermostats	1	Attached (New)			y	11.0	$50	2.43	Pass	Full	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
92	Prog. Thermostats	1	Mobile (Existing)	y	y		11.0	$50	2.83	Pass	Full	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
93	Prog. Thermostats	1	Mobile (New)			y	11.0	$50	2.82	Pass	Full	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
94	Solar Make-Up Air	1	Detached (Pre-1976)	y	y		40.0	$1,300	0.15	Fail	Full	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
95	Solar Make-Up Air	1	Detached (Post-1976)	y	y		40.0	$1,300	0.13	Fail	Full	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
96	Solar Make-Up Air	1	Detached (New)			y	40.0	$1,300	0.13	Fail	Full	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
97	Solar Make-Up Air	1	Attached (Pre-1976)	y	y		40.0	$1,300	0.08	Fail	Full	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
98	Solar Make-Up Air	1	Attached (Post-1976)	y	y		40.0	$1,300	0.07	Fail	Full	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
99	Solar Make-Up Air	1	Attached (New)			y	40.0	$1,300	0.07	Fail	Full	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
100	Solar Make-Up Air	1	Mobile (Existing)	y	y		40.0	$1,300	0.08	Fail	Full	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
101	Solar Make-Up Air	1	Mobile (New)			y	40.0	$1,300	0.08	Fail	Full	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
102	HRVs	1	Detached (Pre-1976)	y	y		15.0	$600	0.26	Fail	Incr.	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
103	HRVs	1	Detached (Post-1976)	y	y		15.0	$600	0.23	Fail	Incr.	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
104	HRVs	1	Detached (New)			y	15.0	$600	0.23	Fail	Incr.	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
105	HRVs	1	Attached (Pre-1976)	y	y		15.0	$600	0.15	Fail	Incr.	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
106	HRVs	1	Attached (Post-1976)	y	y		15.0	$600	0.13	Fail	Incr.	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
107	HRVs	1	Attached (New)			y	15.0	$600	0.13	Fail	Incr.	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
108	HRVs	1	Mobile (Existing)	y	y		15.0	$600	0.13	Fail	Incr.	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
109	HRVs	1	Mobile (New)			y	15.0	$600	0.13	Fail	Incr.	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
110	Air Heat Pumps	1	Detached (Pre-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
111	Air Heat Pumps	1	Detached (Post-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
112	Air Heat Pumps	1	Detached (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
113	Air Heat Pumps	1	Attached (Pre-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
114	Air Heat Pumps	1	Attached (Post-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
115	Air Heat Pumps	1	Attached (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
116	Air Heat Pumps	1	Mobile (Existing)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
117	Air Heat Pumps	1	Mobile (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
118	Ground Heat Pumps	1	Detached (Pre-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
119	Ground Heat Pumps	1	Detached (Post-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
120	Ground Heat Pumps	1	Detached (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
121	Ground Heat Pumps	1	Attached (Pre-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
122	Ground Heat Pumps	1	Attached (Post-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
123	Ground Heat Pumps	1	Attached (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
124	Ground Heat Pumps	1	Mobile (Existing)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
125	Ground Heat Pumps	1	Mobile (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
126	Heating & DHW	1	Detached (Pre-1976)	y	y		18.0	$8,506	0.08	Fail	Incr.	4%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
127	Heating & DHW	1	Detached (Post-1976)	y	y		18.0	$8,506	0.07	Fail	Incr.	4%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
128	Heating & DHW	1	Detached (New)			y	18.0	$3,506	0.18	Fail	Incr.	4%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
129	Heating & DHW	1	Attached (Pre-1976)	y	y		18.0	$8,506	0.06	Fail	Incr.	4%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
130	Heating & DHW	1	Attached (Post-1976)	y	y		18.0	$8,506	0.06	Fail	Incr.	4%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
131	Heating & DHW	1	Attached (New)			y	18.0	$3,506	0.14	Fail	Incr.	4%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
132	Heating & DHW	1	Mobile (Existing)	y	y		18.0	$8,506	0.06	Fail	Incr.	4%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
133	Heating & DHW	1	Mobile (New)			y	18.0	$3,506	0.13	Fail	Incr.	4%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
134	Heating & DHW (Hydronic)	1	Detached (Pre-1976)	y	y		20.0	$8,000	0.15	Fail	Incr.	12%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
135	Heating & DHW (Hydronic)	1	Detached (Post-1976)	y	y		20.0	$8,000	0.13	Fail	Incr.	12%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
136	Heating & DHW (Hydronic)	1	Detached (New)			y	20.0	$3,000	0.35	Fail	Incr.	12%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
137	Heating & DHW (Hydronic)	1	Attached (Pre-1976)	y	y		20.0	$8,000	0.10	Fail	Incr.	12%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
138	Heating & DHW (Hydronic)	1	Attached (Post-1976)	y	y		20.0	$8,000	0.09	Fail	Incr.	12%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
139	Heating & DHW (Hydronic)	1	Attached (New)			y	20.0	$3,000	0.24	Fail	Incr.	12%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
140	Heating & DHW (Hydronic)	1	Mobile (Existing)	y	y		20.0	$8,000	0.09	Fail	Incr.	12%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
141	Heating & DHW (Hydronic)	1	Mobile (New)			y	20.0	$3,000	0.25	Fail	Incr.	12%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
142	Condensing Gas DHW	1	Detached (Pre-1976)	y	y		13.0	$1,567	0.18	Fail	Incr.	0%	0%	0%	23%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
143	Condensing Gas DHW	1	Detached (Post-1976)	y	y		13.0	$1,567	0.18	Fail	Incr.	0%	0%	0%	23%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
144	Condensing Gas DHW	1	Detached (New)			y	13.0	$1,073	0.26	Fail	Incr.	0%	0%	0%	23%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
145	Condensing Gas DHW	1	Attached (Pre-1976)	y	y		13.0	$1,567	0.16	Fail	Incr.	0%	0%	0%	23%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
146	Condensing Gas DHW	1	Attached (Post-1976)	y	y		13.0	$1,567	0.16	Fail	Incr.	0%	0%	0%	23%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
147	Condensing Gas DHW	1	Attached (New)			y	13.0	$1,073	0.23	Fail	Incr.	0%	0%	0%	23%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
148	Condensing Gas DHW	1	Mobile (Existing)	y	y		13.0	$1,567	0.14	Fail	Incr.	0%	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
149	Condensing Gas DHW	1	Mobile (New)			y	13.0	$1,073	0.20	Fail	Incr.	0%	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
150	Tankless Gas DHW	1	Detached (Pre-1976)	y	y		20.0	$2,274	0.26	Fail	Incr.	0%	0%	0%	35%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
151	Tankless Gas DHW	1	Detached (Post-1976)	y	y		20.0	$2,274	0.26	Fail	Incr.	0%	0%	0%	35%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
152	Tankless Gas DHW	1	Detached (New)			y	20.0	$1,646	0.36	Fail	Incr.	0%	0%	0%	35%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
153	Tankless Gas DHW	1	Attached (Pre-1976)	y	y		20.0	$2,274	0.23	Fail	Incr.	0%	0%	0%	35%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
154	Tankless Gas DHW	1	Attached (Post-1976)	y	y		20.0	$2,274	0.23	Fail	Incr.	0%	0%	0%	35%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
155	Tankless Gas DHW	1	Attached (New)			y	20.0	$1,646	0.32	Fail	Incr.	0%	0%	0%	35%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
156	Tankless Gas DHW	1	Mobile (Existing)	y	y		20.0	$2,274	0.23	Fail	Incr.	0%	0%	0%	35%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
157	Tankless Gas DHW	1	Mobile (New)			y	20.0	$1,646	0.31	Fail	Incr.	0%	0%	0%	35%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
158	Solar DHW	1	Detached (Pre-1976)	y	y		25.0	$7,000	0.17	Fail	Full	0%	0%	0%	63%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
159	Solar DHW	1	Detached (Post-1976)	y	y		25.0	$7,000	0.17	Fail	Full	0%	0%	0%	63%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
160	Solar DHW	1	Detached (New)			y	25.0	$7,000	0.17	Fail	Full	0%	0%	0%	63%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
161	Solar DHW	1	Attached (Pre-1976)	y	y		25.0	$7,000	0.17	Fail	Full	0%	0%	0%	68%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
162	Solar DHW	1	Attached (Post-1976)	y	y		25.0	$7,000	0.17	Fail	Full	0%	0%	0%	68%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
163	Solar DHW	1	Attached (New)			y	25.0	$7,000	0.17	Fail	Full	0%	0%	0%	68%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
164	Solar DHW	1	Mobile (Existing)	y	y		25.0	$7,000	0.17	Fail	Full	0%	0%	0%	73%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%
165	Solar DHW	1	Mobile (New)			y	25.0	$7,000	0.17	Fail	Full	0%	0%	0%	73%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%
166	DHW Tank Insulation	1	Detached (Pre-1976)	y	y		13.0	$35	0.68	Fail	Full	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
167	DHW Tank Insulation	1	Detached (Post-1976)	y	y		13.0	$35	0.68	Fail	Full	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
168	DHW Tank Insulation	1	Detached (New)			y	13.0	$35	0.68	Fail	Full	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
169	DHW Tank Insulation	1	Attached (Pre-1976)	y	y		13.0	$25	0.84	Fail	Full	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
170	DHW Tank Insulation	1	Attached (Post-1976)	y	y		13.0	$25	0.84	Fail	Full	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
171	DHW Tank Insulation	1	Attached (New)			y	13.0	$25	0.84	Fail	Full	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
172	DHW Tank Insulation	1	Mobile (Existing)	y	y		13.0	$25	0.82	Fail	Full	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
173	DHW Tank Insulation	1	Mobile (New)			y	13.0	$25	0.82	Fail	Full	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
174	DHW Pipe Insulation	1	Detached (Pre-1976)	y	y		15.0	$1	13.54	Pass	Full	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
175	DHW Pipe Insulation	1	Detached (Post-1976)	y	y		15.0	$1	13.54	Pass	Full	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
176	DHW Pipe Insulation	1	Detached (New)			y	15.0	$1	13.54	Pass	Full	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
177	DHW Pipe Insulation	1	Attached (Pre-1976)	y	y		15.0	$1	11.99	Pass	Full	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
178	DHW Pipe Insulation	1	Attached (Post-1976)	y	y		15.0	$1	11.99	Pass	Full	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
179	DHW Pipe Insulation	1	Attached (New)			y	15.0	$1	11.99	Pass	Full	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
180	DHW Pipe Insulation	1	Mobile (Existing)	y	y		15.0	$1	11.73	Pass	Full	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
181	DHW Pipe Insulation	1	Mobile (New)			y	15.0	$1	11.73	Pass	Full	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
182	DHW Heat Traps	1	Detached (New)			y	13.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
183	DHW Heat Traps	1	Attached (New)			y	13.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
184	DHW Heat Traps	1	Mobile (New)			y	13.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
185	Showerheads	1	Detached (Pre-1976)	y	y		10.0	$13	7.64	Pass	Full	0%	0%	0%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
186	Showerheads	1	Detached (Post-1976)	y	y		10.0	$13	7.64	Pass	Full	0%	0%	0%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
187	Showerheads	1	Detached (New)			y	10.0	$13	7.64	Pass	Full	0%	0%	0%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
188	Showerheads	1	Attached (Pre-1976)	y	y		10.0	$13	6.77	Pass	Full	0%	0%	0%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
189	Showerheads	1	Attached (Post-1976)	y	y		10.0	$13	6.77	Pass	Full	0%	0%	0%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
190	Showerheads	1	Attached (New)			y	10.0	$13	6.77	Pass	Full	0%	0%	0%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
191	Showerheads	1	Mobile (Existing)	y	y		10.0	$13	6.62	Pass	Full	0%	0%	0%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
192	Showerheads	1	Mobile (New)			y	10.0	$13	6.62	Pass	Full	0%	0%	0%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
193	Faucet Aerators	1	Detached (Pre-1976)	y	y		10.0	$15	4.00	Pass	Full	0%	0%	0%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
194	Faucet Aerators	1	Detached (Post-1976)	y	y		10.0	$15	4.00	Pass	Full	0%	0%	0%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
195	Faucet Aerators	1	Detached (New)			y	10.0	$15	4.00	Pass	Full	0%	0%	0%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
196	Faucet Aerators	1	Attached (Pre-1976)	y	y		10.0	$15	3.54	Pass	Full	0%	0%	0%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
197	Faucet Aerators	1	Attached (Post-1976)	y	y		10.0	$15	3.54	Pass	Full	0%	0%	0%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
198	Faucet Aerators	1	Attached (New)			y	10.0	$15	3.54	Pass	Full	0%	0%	0%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
199	Faucet Aerators	1	Mobile (Existing)	y	y		10.0	$15	3.47	Pass	Full	0%	0%	0%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
200	Faucet Aerators	1	Mobile (New)			y	10.0	$15	3.47	Pass	Full	0%	0%	0%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
201	Wastewater Heat Recovery	1	Detached (Pre-1976)	y	y		30.0	$800	0.36	Fail	Full	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
202	Wastewater Heat Recovery	1	Detached (Post-1976)	y	y		30.0	$800	0.36	Fail	Full	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
203	Wastewater Heat Recovery	1	Detached (New)			y	30.0	$800	0.36	Fail	Full	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
204	Wastewater Heat Recovery	1	Attached (Pre-1976)	y	y		30.0	$731	0.35	Fail	Full	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
205	Wastewater Heat Recovery	1	Attached (Post-1976)	y	y		30.0	$731	0.35	Fail	Full	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
206	Wastewater Heat Recovery	1	Attached (New)			y	30.0	$731	0.35	Fail	Full	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
207	Wastewater Heat Recovery	1	Mobile (Existing)	y	y		30.0	$731	0.34	Fail	Full	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
208	Wastewater Heat Recovery	1	Mobile (New)			y	30.0	$731	0.34	Fail	Full	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
209	DHW Recirculation	1	Detached (Pre-1976)	y	y		18.0	$570	0.45	Fail	Full	0%	0%	0%	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%

210	DHW Recirculation	1	Detached (Post-1976)	y	y		18.0	$570	0.45	Fail	Full	0%	0%	0%	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
211	DHW Recirculation	1	Detached (New)			y	18.0	$570	0.45	Fail	Full	0%	0%	0%	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
212	DHW Recirculation	1	Attached (Pre-1976)	y	y		18.0	$470	0.48	Fail	Full	0%	0%	0%	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
213	DHW Recirculation	1	Attached (Post-1976)	y	y		18.0	$470	0.48	Fail	Full	0%	0%	0%	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
214	DHW Recirculation	1	Attached (New)			y	18.0	$470	0.48	Fail	Full	0%	0%	0%	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
215	DHW Recirculation	1	Mobile (Existing)	y	y		18.0	$470	0.47	Fail	Full	0%	0%	0%	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
216	DHW Recirculation	1	Mobile (New)			y	18.0	$470	0.47	Fail	Full	0%	0%	0%	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
217	ESTAR Dishwashers	1	Detached (Pre-1976)	y	y		11.0	$105	0.27	Fail	Incr.	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
218	ESTAR Dishwashers	1	Detached (Post-1976)	y	y		11.0	$105	0.27	Fail	Incr.	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
219	ESTAR Dishwashers	1	Detached (New)			y	11.0	$105	0.27	Fail	Incr.	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
220	ESTAR Dishwashers	1	Attached (Pre-1976)	y	y		11.0	$105	0.23	Fail	Incr.	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
221	ESTAR Dishwashers	1	Attached (Post-1976)	y	y		11.0	$105	0.23	Fail	Incr.	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
222	ESTAR Dishwashers	1	Attached (New)			y	11.0	$105	0.23	Fail	Incr.	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
223	ESTAR Dishwashers	1	Mobile (Existing)	y	y		11.0	$105	0.23	Fail	Incr.	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
224	ESTAR Dishwashers	1	Mobile (New)			y	11.0	$105	0.23	Fail	Incr.	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
225	ESTAR Clothes Washers	1	Detached (Pre-1976)	y	y		14.0	$300	0.79	Fail	Incr.	0%	0%	0%	7%	0%	0%	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
226	ESTAR Clothes Washers	1	Detached (Post-1976)	y	y		14.0	$300	0.79	Fail	Incr.	0%	0%	0%	7%	0%	0%	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
227	ESTAR Clothes Washers	1	Detached (New)			y	14.0	$300	0.79	Fail	Incr.	0%	0%	0%	7%	0%	0%	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
228	ESTAR Clothes Washers	1	Attached (Pre-1976)	y	y		14.0	$300	0.69	Fail	Incr.	0%	0%	0%	7%	0%	0%	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
229	ESTAR Clothes Washers	1	Attached (Post-1976)	y	y		14.0	$300	0.69	Fail	Incr.	0%	0%	0%	7%	0%	0%	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
230	ESTAR Clothes Washers	1	Attached (New)			y	14.0	$300	0.69	Fail	Incr.	0%	0%	0%	7%	0%	0%	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
231	ESTAR Clothes Washers	1	Mobile (Existing)	y	y		14.0	$300	0.74	Fail	Incr.	0%	0%	0%	7%	0%	0%	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
232	ESTAR Clothes Washers	1	Mobile (New)			y	14.0	$300	0.74	Fail	Incr.	0%	0%	0%	7%	0%	0%	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
233	Gas Clothes Dryers	1	Detached (Pre-1976)	y	y		18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
234	Gas Clothes Dryers	1	Detached (Post-1976)	y	y		18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
235	Gas Clothes Dryers	1	Detached (New)			y	18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
236	Gas Clothes Dryers	1	Attached (Pre-1976)	y	y		18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
237	Gas Clothes Dryers	1	Attached (Post-1976)	y	y		18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
238	Gas Clothes Dryers	1	Attached (New)			y	18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
239	Gas Clothes Dryers	1	Mobile (Existing)	y	y		18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
240	Gas Clothes Dryers	1	Mobile (New)			y	18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
241	Pool Covers	1	Detached (Pre-1976)	y	y		10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	26%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
242	Pool Covers	1	Detached (Post-1976)	y	y		10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	26%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
243	Pool Covers	1	Detached (New)			y	10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	26%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
244	Pool Covers	1	Attached (Pre-1976)	y	y		10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	26%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
245	Pool Covers	1	Attached (Post-1976)	y	y		10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	26%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
246	Pool Covers	1	Attached (New)			y	10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	26%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
247	Pool Covers	1	Mobile (Existing)	y	y		10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	26%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
248	Pool Covers	1	Mobile (New)			y	10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	26%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
249	Heat Pump Pool Heaters	1	Detached (Pre-1976)	y	y		10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
250	Heat Pump Pool Heaters	1	Detached (Post-1976)	y	y		10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
251	Heat Pump Pool Heaters	1	Detached (New)			y	10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
252	Heat Pump Pool Heaters	1	Attached (Pre-1976)	y	y		10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
253	Heat Pump Pool Heaters	1	Attached (Post-1976)	y	y		10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
254	Heat Pump Pool Heaters	1	Attached (New)			y	10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
255	Heat Pump Pool Heaters	1	Mobile (Existing)	y	y		10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
256	Heat Pump Pool Heaters	1	Mobile (New)			y	10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
257	Efficient Pool Heaters	1	Detached (Pre-1976)	y	y		7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
258	Efficient Pool Heaters	1	Detached (Post-1976)	y	y		7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
259	Efficient Pool Heaters	1	Detached (New)			y	7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
260	Efficient Pool Heaters	1	Attached (Pre-1976)	y	y		7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
261	Efficient Pool Heaters	1	Attached (Post-1976)	y	y		7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
262	Efficient Pool Heaters	1	Attached (New)			y	7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
263	Efficient Pool Heaters	1	Mobile (Existing)	y	y		7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
264	Efficient Pool Heaters	1	Mobile (New)			y	7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
265	Solar Pool Heaters	1	Detached (Pre-1976)	y	y		20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
266	Solar Pool Heaters	1	Detached (Post-1976)	y	y		20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
267	Solar Pool Heaters	1	Detached (New)			y	20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
268	Solar Pool Heaters	1	Attached (Pre-1976)	y	y		20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
269	Solar Pool Heaters	1	Attached (Post-1976)	y	y		20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
270	Solar Pool Heaters	1	Attached (New)			y	20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
271	Solar Pool Heaters	1	Mobile (Existing)	y	y		20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
272	Solar Pool Heaters	1	Mobile (New)			y	20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
273	Micro-CHP	1	Detached (Pre-1976)	y	y		20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
274	Micro-CHP	1	Detached (Post-1976)	y	y		20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
275	Micro-CHP	1	Detached (New)			y	20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
276	Micro-CHP	1	Attached (Pre-1976)	y	y		20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
277	Micro-CHP	1	Attached (Post-1976)	y	y		20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
278	Micro-CHP	1	Attached (New)			y	20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
279	Micro-CHP	1	Mobile (Existing)	y	y		20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
280	Micro-CHP	1	Mobile (New)			y	20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Measure Information		Applicability										Savings by End Use																				
Measure #	Technology	Climate Zone	Building Type(s)	Exist	Reno	New	Life	Cost	Benefit/Cost Ratio	Economic Screen	Basis	Space heating	Space cooling	Ventilation and Circulation	Domestic hot water (DHW)	Fireplace	Cooking	Dishwasher	Clothes washer	Clothes dryer	Pool & spa heaters	Other gas uses	Other electrical internal loads									
1	Attic Insulation	1	Detached (Pre-1976)	y	y		30.0	$675	0.77	Fail	Full	0%	3%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2	Attic Insulation	1	Detached (Post-1976)	y	y		30.0	$713	0.52	Fail	Full	0%	2%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3	Attic Insulation	1	Attached (Pre-1976)	y	y		30.0	$450	0.64	Fail	Full	0%	3%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4	Attic Insulation	1	Attached (Post-1976)	y	y		30.0	$488	0.41	Fail	Full	0%	2%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5	Attic Insulation	1	Mobile (Existing)	y	y		30.0	$525	0.46	Fail	Full	0%	2%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6	Wall Insulation	1	Detached (Pre-1976)	y	y		30.0	$2,000	0.68	Fail	Incr.	0%	3%	15%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
7	Wall Insulation	1	Detached (Post-1976)	y	y		30.0	$2,000	0.60	Fail	Incr.	0%	3%	15%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
8	Wall Insulation	1	Attached (Pre-1976)	y	y		30.0	$1,500	0.51	Fail	Incr.	0%	3%	15%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
9	Wall Insulation	1	Attached (Post-1976)	y	y		30.0	$1,500	0.43	Fail	Incr.	0%	3%	15%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
10	Wall Insulation	1	Mobile (Existing)	y	y		30.0	$1,500	0.46	Fail	Incr.	0%	3%	15%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
11	Slab Insulation	1	Detached (Pre-1976)	y	y		30.0	$1,125	0.10	Fail	Incr.	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12	Slab Insulation	1	Detached (Post-1976)	y	y		30.0	$1,275	0.06	Fail	Incr.	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
13	Slab Insulation	1	Attached (Pre-1976)	y	y		30.0	$975	0.06	Fail	Incr.	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
14	Slab Insulation	1	Attached (Post-1976)	y	y		30.0	$1,050	0.04	Fail	Incr.	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
15	Basement Insulation	1	Detached (Pre-1976)	y	y		30.0	$1,400	0.72	Fail	Incr.	0%	0%	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
16	Basement Insulation	1	Detached (Post-1976)	y	y		30.0	$1,500	0.63	Fail	Incr.	0%	0%	12%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
17	Basement Insulation	1	Attached (Pre-1976)	y	y		30.0	$900	0.51	Fail	Incr.	0%	0%	8%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
18	Basement Insulation	1	Attached (Post-1976)	y	y		30.0	$1,000	0.41	Fail	Incr.	0%	0%	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
19	Crawl Space Insul.	1	Detached (Pre-1976)	y	y		30.0	$800	0.26	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
20	Crawl Space Insul.	1	Detached (Post-1976)	y	y		30.0	$800	0.23	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21	Crawl Space Insul.	1	Attached (Pre-1976)	y	y		30.0	$800	0.14	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22	Crawl Space Insul.	1	Attached (Post-1976)	y	y		30.0	$800	0.12	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23	Air Sealing	1	Detached (Pre-1976)	y	y		25.0	$1,800	0.40	Fail	Full	0%	1%	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
24	Air Sealing	1	Detached (Post-1976)	y	y		25.0	$1,800	0.30	Fail	Full	0%	1%	8%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
25	Air Sealing	1	Attached (Pre-1976)	y	y		25.0	$1,800	0.22	Fail	Full	0%	1%	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
26	Air Sealing	1	Attached (Post-1976)	y	y		25.0	$1,800	0.16	Fail	Full	0%	1%	8%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
27	Air Sealing	1	Mobile (Existing)	y	y		25.0	$1,800	0.18	Fail	Full	0%	1%	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
28	Homeowner Air Sealing	1	Detached (Pre-1976)	y	y		10.0	$200	0.73	Fail	Full	0%	0%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
29	Homeowner Air Sealing	1	Detached (Post-1976)	y	y		10.0	$200	0.56	Fail	Full	0%	1%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
30	Homeowner Air Sealing	1	Attached (Pre-1976)	y	y		10.0	$200	0.41	Fail	Full	0%	0%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
31	Homeowner Air Sealing	1	Attached (Post-1976)	y	y		10.0	$200	0.30	Fail	Full	0%	1%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
32	Homeowner Air Sealing	1	Mobile (Existing)	y	y		10.0	$200	0.33	Fail	Full	0%	0%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
33	Sealing & Insul. - Old Homes	1	Detached (Pre-1976)	y	y		25.0	$3,000	0.40	Fail	Full	0%	3%	15%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
34	Sealing & Insul. - Old Homes	1	Attached (Pre-1976)	y	y		25.0	$2,500	0.26	Fail	Full	0%	3%	15%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
35	Zone Up Windows	1	Detached (Pre-1976)	y	y		25.0	$1,000	0.19	Fail	Incr.	0%	1%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
36	Zone Up Windows	1	Detached (Post-1976)	y	y		25.0	$1,200	0.20	Fail	Incr.	0%	1%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
37	Zone Up Windows	1	Detached (New)			y	25.0	$2,600	0.15	Fail	Incr.	0%	2%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
38	Zone Up Windows	1	Attached (Pre-1976)	y	y		25.0	$800	0.13	Fail	Incr.	0%	1%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
39	Zone Up Windows	1	Attached (Post-1976)	y	y		25.0	$960	0.13	Fail	Incr.	0%	1%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
40	Zone Up Windows	1	Attached (New)			y	25.0	$2,080	0.10	Fail	Incr.	0%	2%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
41	Zone Up Windows	1	Mobile (Existing)	y	y		25.0	$720	0.17	Fail	Incr.	0%	1%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
42	Zone Up Windows	1	Mobile (New)			y	25.0	$1,600	0.14	Fail	Incr.	0%	2%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
43	Super Windows	1	Detached (Pre-1976)	y	y		25.0	$1,500	0.46	Fail	Incr.	0%	8%	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
44	Super Windows	1	Detached (Post-1976)	y	y		25.0	$1,800	0.50	Fail	Incr.	0%	10%	13%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
45	Super Windows	1	Detached (New)			y	25.0	$3,900	0.34	Fail	Incr.	0%	17%	19%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
46	Super Windows	1	Attached (Pre-1976)	y	y		25.0	$1,200	0.33	Fail	Incr.	0%	8%	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
47	Super Windows	1	Attached (Post-1976)	y	y		25.0	$1,440	0.34	Fail	Incr.	0%	10%	13%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
48	Super Windows	1	Attached (New)			y	25.0	$3,120	0.23	Fail	Incr.	0%	17%	19%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
49	Super Windows	1	Mobile (Existing)	y	y		25.0	$1,080	0.38	Fail	Incr.	0%	9%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
50	Super Windows	1	Mobile (New)			y	25.0	$2,400	0.32	Fail	Incr.	0%	17%	19%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
51	High-Perf. New Homes	1	Detached (New)			y	30.0	$6,000	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
52	High-Perf. New Homes	1	Attached (New)			y	30.0	$4,800	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
53	High-Perf. New Homes	1	Mobile (New)			y	30.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
54	Net Zero Ready Homes	1	Detached (New)			y	30.0	$14,000	0.20	Fail	Full	0%	0%	30%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
55	Net Zero Ready Homes	1	Attached (New)			y	30.0	$9,800	0.18	Fail	Full	0%	0%	30%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
56	Net Zero Ready Homes	1	Mobile (New)			y	30.0	$9,800	0.19	Fail	Full	0%	0%	30%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
57	Condensing Gas Furnaces	1	Detached (Pre-1976)	y	y		18.0	$1,477	0.24	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
58	Condensing Gas Furnaces	1	Detached (Post-1976)	y	y		18.0	$1,477	0.20	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
59	Condensing Gas Furnaces	1	Detached (New)			y	18.0	$1,477	0.20	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
60	Condensing Gas Furnaces	1	Attached (Pre-1976)	y	y		18.0	$1,477	0.13	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
61	Condensing Gas Furnaces	1	Attached (Post-1976)	y	y		18.0	$1,477	0.11	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
62	Condensing Gas Furnaces	1	Attached (New)			y	18.0	$1,477	0.11	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
63	Condensing Gas Furnaces	1	Mobile (Existing)	y	y		18.0	$1,477	0.13	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
64	Condensing Gas Furnaces	1	Mobile (New)			y	18.0	$1,477	0.13	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
65	Early Retire Gas Furnaces	1	Detached (Pre-1976)	y	y		9.0	$1,864	0.16	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
66	Early Retire Gas Furnaces	1	Detached (Post-1976)	y	y		9.0	$1,864	0.13	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
67	Early Retire Gas Furnaces	1	Attached (Pre-1976)	y	y		9.0	$1,864	0.09	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
68	Early Retire Gas Furnaces	1	Attached (Post-1976)	y	y		9.0	$1,864	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
69	Early Retire Gas Furnaces	1	Mobile (Existing)	y	y		9.0	$1,864	0.08	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
70	Condensing Gas Boilers	1	Detached (Pre-1976)	y	y		20.0	$3,200	0.21	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
71	Condensing Gas Boilers	1	Detached (Post-1976)	y	y		20.0	$3,200	0.17	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
72	Condensing Gas Boilers	1	Detached (New)			y	20.0	$3,200	0.17	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
73	Condensing Gas Boilers	1	Attached (Pre-1976)	y	y		20.0	$3,200	0.11	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
74	Condensing Gas Boilers	1	Attached (Post-1976)	y	y		20.0	$3,200	0.09	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
75	Condensing Gas Boilers	1	Attached (New)			y	20.0	$3,200	0.09	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
76	Condensing Gas Boilers	1	Mobile (Existing)	y	y		20.0	$3,200	0.11	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
77	Condensing Gas Boilers	1	Mobile (New)			y	20.0	$3,200	0.11	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
78	Gas Fireplaces	1	Detached (Pre-1976)	y	y		15.0	$150	2.59	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
79	Gas Fireplaces	1	Detached (Post-1976)	y	y		15.0	$150	2.59	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
80	Gas Fireplaces	1	Detached (New)			y	15.0	$150	2.59	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
81	Gas Fireplaces	1	Attached (Pre-1976)	y	y		15.0	$150	1.58	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
82	Gas Fireplaces	1	Attached (Post-1976)	y	y		15.0	$150	1.58	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
83	Gas Fireplaces	1	Attached (New)			y	15.0	$150	1.58	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
84	Gas Fireplaces	1	Mobile (Existing)	y	y		15.0	$150	1.58	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
85	Gas Fireplaces	1	Mobile (New)			y	15.0	$150	1.58	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
86	Prog. Thermostats	1	Detached (Pre-1976)	y	y		11.0	$50	5.37	Pass	Full	0%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
87	Prog. Thermostats	1	Detached (Post-1976)	y	y		11.0	$50	4.47	Pass	Full	0%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
88	Prog. Thermostats	1	Detached (New)			y	11.0	$50	4.46	Pass	Full	0%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
89	Prog. Thermostats	1	Attached (Pre-1976)	y	y		11.0	$50	2.95	Pass	Full	0%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
90	Prog. Thermostats	1	Attached (Post-1976)	y	y		11.0	$50	2.44	Pass	Full	0%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
91	Prog. Thermostats	1	Attached (New)			y	11.0	$50	2.43	Pass	Full	0%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
92	Prog. Thermostats	1	Mobile (Existing)	y	y		11.0	$50	2.83	Pass	Full	0%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
93	Prog. Thermostats	1	Mobile (New)			y	11.0	$50	2.82	Pass	Full	0%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
94	Solar Make-Up Air	1	Detached (Pre-1976)	y	y		40.0	$1,300	0.15	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
95	Solar Make-Up Air	1	Detached (Post-1976)	y	y		40.0	$1,300	0.13	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
96	Solar Make-Up Air	1	Detached (New)			y	40.0	$1,300	0.13	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
97	Solar Make-Up Air	1	Attached (Pre-1976)	y	y		40.0	$1,300	0.08	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
98	Solar Make-Up Air	1	Attached (Post-1976)	y	y		40.0	$1,300	0.07	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
99	Solar Make-Up Air	1	Attached (New)			y	40.0	$1,300	0.07	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
100	Solar Make-Up Air	1	Mobile (Existing)	y	y		40.0	$1,300	0.08	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
101	Solar Make-Up Air	1	Mobile (New)			y	40.0	$1,300	0.08	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
102	HRVs	1	Detached (Pre-1976)	y	y		15.0	$600	0.26	Fail	Incr.	0%	3%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
103	HRVs	1	Detached (Post-1976)	y	y		15.0	$600	0.23	Fail	Incr.	0%	3%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
104	HRVs	1	Detached (New)			y	15.0	$600	0.23	Fail	Incr.	0%	3%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
105	HRVs	1	Attached (Pre-1976)	y	y		15.0	$600	0.15	Fail	Incr.	0%	3%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
106	HRVs	1	Attached (Post-1976)	y	y		15.0	$600	0.13	Fail	Incr.	0%	3%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
107	HRVs	1	Attached (New)			y	15.0	$600	0.13	Fail	Incr.	0%	3%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
108	HRVs	1	Mobile (Existing)	y	y		15.0	$600	0.13	Fail	Incr.	0%	3%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
109	HRVs	1	Mobile (New)			y	15.0	$600	0.13	Fail	Incr.	0%	3%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
110	Air Heat Pumps	1	Detached (Pre-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
111	Air Heat Pumps	1	Detached (Post-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
112	Air Heat Pumps	1	Detached (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
113	Air Heat Pumps	1	Attached (Pre-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
114	Air Heat Pumps	1	Attached (Post-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
115	Air Heat Pumps	1	Attached (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
116	Air Heat Pumps	1	Mobile (Existing)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
117	Air Heat Pumps	1	Mobile (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
118	Ground Heat Pumps	1	Detached (Pre-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
119	Ground Heat Pumps	1	Detached (Post-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
120	Ground Heat Pumps	1	Detached (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
121	Ground Heat Pumps	1	Attached (Pre-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
122	Ground Heat Pumps	1	Attached (Post-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
123	Ground Heat Pumps	1	Attached (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
124	Ground Heat Pumps	1	Mobile (Existing)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
125	Ground Heat Pumps	1	Mobile (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
126	Heating & DHW	1	Detached (Pre-1976)	y	y		18.0	$8,506	0.08	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
127	Heating & DHW	1	Detached (Post-1976)	y	y		18.0	$8,506	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
128	Heating & DHW	1	Detached (New)			y	18.0	$3,506	0.18	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
129	Heating & DHW	1	Attached (Pre-1976)	y	y		18.0	$8,506	0.06	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
130	Heating & DHW	1	Attached (Post-1976)	y	y		18.0	$8,506	0.06	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
131	Heating & DHW	1	Attached (New)			y	18.0	$3,506	0.14	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
132	Heating & DHW	1	Mobile (Existing)	y	y		18.0	$8,506	0.06	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
133	Heating & DHW	1	Mobile (New)			y	18.0	$3,506	0.13	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
134	Heating & DHW (Hydronic)	1	Detached (Pre-1976)	y	y		20.0	$8,000	0.15	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
135	Heating & DHW (Hydronic)	1	Detached (Post-1976)	y	y		20.0	$8,000	0.13	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
136	Heating & DHW (Hydronic)	1	Detached (New)			y	20.0	$3,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
137	Heating & DHW (Hydronic)	1	Attached (Pre-1976)	y	y		20.0	$8,000	0.10	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
138	Heating & DHW (Hydronic)	1	Attached (Post-1976)	y	y		20.0	$8,000	0.09	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
139	Heating & DHW (Hydronic)	1	Attached (New)			y	20.0	$3,000	0.24	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
140	Heating & DHW (Hydronic)	1	Mobile (Existing)	y	y		20.0	$8,000	0.09	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
141	Heating & DHW (Hydronic)	1	Mobile (New)			y	20.0	$3,000	0.25	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
142	Condensing Gas DHW	1	Detached (Pre-1976)	y	y		13.0	$1,567	0.18	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
143	Condensing Gas DHW	1	Detached (Post-1976)	y	y		13.0	$1,567	0.18	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
144	Condensing Gas DHW	1	Detached (New)			y	13.0	$1,073	0.26	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
145	Condensing Gas DHW	1	Attached (Pre-1976)	y	y		13.0	$1,567	0.16	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
146	Condensing Gas DHW	1	Attached (Post-1976)	y	y		13.0	$1,567	0.16	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
147	Condensing Gas DHW	1	Attached (New)			y	13.0	$1,073	0.23	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
148	Condensing Gas DHW	1	Mobile (Existing)	y	y		13.0	$1,567	0.14	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
149	Condensing Gas DHW	1	Mobile (New)			y	13.0	$1,073	0.20	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
150	Tankless Gas DHW	1	Detached (Pre-1976)	y	y		20.0	$2,274	0.26	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
151	Tankless Gas DHW	1	Detached (Post-1976)	y	y		20.0	$2,274	0.26	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
152	Tankless Gas DHW	1	Detached (New)			y	20.0	$1,646	0.36	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
153	Tankless Gas DHW	1	Attached (Pre-1976)	y	y		20.0	$2,274	0.23	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
154	Tankless Gas DHW	1	Attached (Post-1976)	y	y		20.0	$2,274	0.23	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
155	Tankless Gas DHW	1	Attached (New)			y	20.0	$1,646	0.32	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
156	Tankless Gas DHW	1	Mobile (Existing)	y	y		20.0	$2,274	0.23	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
157	Tankless Gas DHW	1	Mobile (New)			y	20.0	$1,646	0.31	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
158	Solar DHW	1	Detached (Pre-1976)	y	y		25.0	$7,000	0.17	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
159	Solar DHW	1	Detached (Post-1976)	y	y		25.0	$7,000	0.17	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
160	Solar DHW	1	Detached (New)			y	25.0	$7,000	0.17	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
161	Solar DHW	1	Attached (Pre-1976)	y	y		25.0	$7,000	0.17	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
162	Solar DHW	1	Attached (Post-1976)	y	y		25.0	$7,000	0.17	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
163	Solar DHW	1	Attached (New)			y	25.0	$7,000	0.17	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
164	Solar DHW	1	Mobile (Existing)	y	y		25.0	$7,000	0.17	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
165	Solar DHW	1	Mobile (New)			y	25.0	$7,000	0.17	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
166	DHW Tank Insulation	1	Detached (Pre-1976)	y	y		13.0	$35	0.68	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
167	DHW Tank Insulation	1	Detached (Post-1976)	y	y		13.0	$35	0.68	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
168	DHW Tank Insulation	1	Detached (New)			y	13.0	$35	0.68	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
169	DHW Tank Insulation	1	Attached (Pre-1976)	y	y		13.0	$25	0.84	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
170	DHW Tank Insulation	1	Attached (Post-1976)	y	y		13.0	$25	0.84	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
171	DHW Tank Insulation	1	Attached (New)			y	13.0	$25	0.84	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
172	DHW Tank Insulation	1	Mobile (Existing)	y	y		13.0	$25	0.82	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
173	DHW Tank Insulation	1	Mobile (New)			y	13.0	$25	0.82	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
174	DHW Pipe Insulation	1	Detached (Pre-1976)	y	y		15.0	$1	13.54	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
175	DHW Pipe Insulation	1	Detached (Post-1976)	y	y		15.0	$1	13.54	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
176	DHW Pipe Insulation	1	Detached (New)			y	15.0	$1	13.54	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
177	DHW Pipe Insulation	1	Attached (Pre-1976)	y	y		15.0	$1	11.99	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
178	DHW Pipe Insulation	1	Attached (Post-1976)	y	y		15.0	$1	11.99	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
179	DHW Pipe Insulation	1	Attached (New)			y	15.0	$1	11.99	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
180	DHW Pipe Insulation	1	Mobile (Existing)	y	y		15.0	$1	11.73	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
181	DHW Pipe Insulation	1	Mobile (New)			y	15.0	$1	11.73	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
182	DHW Heat Traps	1	Detached (New)			y	13.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
183	DHW Heat Traps	1	Attached (New)			y	13.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
184	DHW Heat Traps	1	Mobile (New)			y	13.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
185	Showerheads	1	Detached (Pre-1976)	y	y		10.0	$13	7.64	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
186	Showerheads	1	Detached (Post-1976)	y	y		10.0	$13	7.64	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
187	Showerheads	1	Detached (New)			y	10.0	$13	7.64	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
188	Showerheads	1	Attached (Pre-1976)	y	y		10.0	$13	6.77	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
189	Showerheads	1	Attached (Post-1976)	y	y		10.0	$13	6.77	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
190	Showerheads	1	Attached (New)			y	10.0	$13	6.77	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
191	Showerheads	1	Mobile (Existing)	y	y		10.0	$13	6.62	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
192	Showerheads	1	Mobile (New)			y	10.0	$13	6.62	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
193	Faucet Aerators	1	Detached (Pre-1976)	y	y		10.0	$15	4.00	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
194	Faucet Aerators	1	Detached (Post-1976)	y	y		10.0	$15	4.00	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
195	Faucet Aerators	1	Detached (New)			y	10.0	$15	4.00	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
196	Faucet Aerators	1	Attached (Pre-1976)	y	y		10.0	$15	3.54	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
197	Faucet Aerators	1	Attached (Post-1976)	y	y		10.0	$15	3.54	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
198	Faucet Aerators	1	Attached (New)			y	10.0	$15	3.54	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
199	Faucet Aerators	1	Mobile (Existing)	y	y		10.0	$15	3.47	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
200	Faucet Aerators	1	Mobile (New)			y	10.0	$15	3.47	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
201	Wastewater Heat Recovery	1	Detached (Pre-1976)	y	y		30.0	$800	0.36	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
202	Wastewater Heat Recovery	1	Detached (Post-1976)	y	y		30.0	$800	0.36	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
203	Wastewater Heat Recovery	1	Detached (New)			y	30.0	$800	0.36	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
204	Wastewater Heat Recovery	1	Attached (Pre-1976)	y	y		30.0	$731	0.35	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
205	Wastewater Heat Recovery	1	Attached (Post-1976)	y	y		30.0	$731	0.35	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
206	Wastewater Heat Recovery	1	Attached (New)			y	30.0	$731	0.35	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
207	Wastewater Heat Recovery	1	Mobile (Existing)	y	y		30.0	$731	0.34	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
208	Wastewater Heat Recovery	1	Mobile (New)			y	30.0	$731	0.34	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
209	DHW Recirculation	1	Detached (Pre-1976)	y	y		18.0	$570	0.45	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

210	DHW Recirculation	1	Detached (Post-1976)	y	y		18.0	$570	0.45	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
211	DHW Recirculation	1	Detached (New)			y	18.0	$570	0.45	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
212	DHW Recirculation	1	Attached (Pre-1976)	y	y		18.0	$470	0.48	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
213	DHW Recirculation	1	Attached (Post-1976)	y	y		18.0	$470	0.48	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
214	DHW Recirculation	1	Attached (New)			y	18.0	$470	0.48	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
215	DHW Recirculation	1	Mobile (Existing)	y	y		18.0	$470	0.47	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
216	DHW Recirculation	1	Mobile (New)			y	18.0	$470	0.47	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
217	ESTAR Dishwashers	1	Detached (Pre-1976)	y	y		11.0	$105	0.27	Fail	Incr.	0%	0%	0%	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
218	ESTAR Dishwashers	1	Detached (Post-1976)	y	y		11.0	$105	0.27	Fail	Incr.	0%	0%	0%	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
219	ESTAR Dishwashers	1	Detached (New)			y	11.0	$105	0.27	Fail	Incr.	0%	0%	0%	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
220	ESTAR Dishwashers	1	Attached (Pre-1976)	y	y		11.0	$105	0.23	Fail	Incr.	0%	0%	0%	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
221	ESTAR Dishwashers	1	Attached (Post-1976)	y	y		11.0	$105	0.23	Fail	Incr.	0%	0%	0%	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
222	ESTAR Dishwashers	1	Attached (New)			y	11.0	$105	0.23	Fail	Incr.	0%	0%	0%	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
223	ESTAR Dishwashers	1	Mobile (Existing)	y	y		11.0	$105	0.23	Fail	Incr.	0%	0%	0%	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
224	ESTAR Dishwashers	1	Mobile (New)			y	11.0	$105	0.23	Fail	Incr.	0%	0%	0%	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
225	ESTAR Clothes Washers	1	Detached (Pre-1976)	y	y		14.0	$300	0.79	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	37%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
226	ESTAR Clothes Washers	1	Detached (Post-1976)	y	y		14.0	$300	0.79	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	37%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
227	ESTAR Clothes Washers	1	Detached (New)			y	14.0	$300	0.79	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	37%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
228	ESTAR Clothes Washers	1	Attached (Pre-1976)	y	y		14.0	$300	0.69	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	37%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
229	ESTAR Clothes Washers	1	Attached (Post-1976)	y	y		14.0	$300	0.69	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	37%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
230	ESTAR Clothes Washers	1	Attached (New)			y	14.0	$300	0.69	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	37%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
231	ESTAR Clothes Washers	1	Mobile (Existing)	y	y		14.0	$300	0.74	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	37%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
232	ESTAR Clothes Washers	1	Mobile (New)			y	14.0	$300	0.74	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	37%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
233	Gas Clothes Dryers	1	Detached (Pre-1976)	y	y		18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
234	Gas Clothes Dryers	1	Detached (Post-1976)	y	y		18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
235	Gas Clothes Dryers	1	Detached (New)			y	18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
236	Gas Clothes Dryers	1	Attached (Pre-1976)	y	y		18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
237	Gas Clothes Dryers	1	Attached (Post-1976)	y	y		18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
238	Gas Clothes Dryers	1	Attached (New)			y	18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
239	Gas Clothes Dryers	1	Mobile (Existing)	y	y		18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
240	Gas Clothes Dryers	1	Mobile (New)			y	18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
241	Pool Covers	1	Detached (Pre-1976)	y	y		10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
242	Pool Covers	1	Detached (Post-1976)	y	y		10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
243	Pool Covers	1	Detached (New)			y	10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
244	Pool Covers	1	Attached (Pre-1976)	y	y		10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
245	Pool Covers	1	Attached (Post-1976)	y	y		10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
246	Pool Covers	1	Attached (New)			y	10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
247	Pool Covers	1	Mobile (Existing)	y	y		10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
248	Pool Covers	1	Mobile (New)			y	10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
249	Heat Pump Pool Heaters	1	Detached (Pre-1976)	y	y		10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
250	Heat Pump Pool Heaters	1	Detached (Post-1976)	y	y		10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
251	Heat Pump Pool Heaters	1	Detached (New)			y	10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
252	Heat Pump Pool Heaters	1	Attached (Pre-1976)	y	y		10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
253	Heat Pump Pool Heaters	1	Attached (Post-1976)	y	y		10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
254	Heat Pump Pool Heaters	1	Attached (New)			y	10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
255	Heat Pump Pool Heaters	1	Mobile (Existing)	y	y		10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
256	Heat Pump Pool Heaters	1	Mobile (New)			y	10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
257	Efficient Pool Heaters	1	Detached (Pre-1976)	y	y		7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
258	Efficient Pool Heaters	1	Detached (Post-1976)	y	y		7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
259	Efficient Pool Heaters	1	Detached (New)			y	7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
260	Efficient Pool Heaters	1	Attached (Pre-1976)	y	y		7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
261	Efficient Pool Heaters	1	Attached (Post-1976)	y	y		7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
262	Efficient Pool Heaters	1	Attached (New)			y	7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
263	Efficient Pool Heaters	1	Mobile (Existing)	y	y		7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
264	Efficient Pool Heaters	1	Mobile (New)			y	7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
265	Solar Pool Heaters	1	Detached (Pre-1976)	y	y		20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
266	Solar Pool Heaters	1	Detached (Post-1976)	y	y		20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
267	Solar Pool Heaters	1	Detached (New)			y	20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
268	Solar Pool Heaters	1	Attached (Pre-1976)	y	y		20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
269	Solar Pool Heaters	1	Attached (Post-1976)	y	y		20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
270	Solar Pool Heaters	1	Attached (New)			y	20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
271	Solar Pool Heaters	1	Mobile (Existing)	y	y		20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
272	Solar Pool Heaters	1	Mobile (New)			y	20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
273	Micro-CHP	1	Detached (Pre-1976)	y	y		20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
274	Micro-CHP	1	Detached (Post-1976)	y	y		20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
275	Micro-CHP	1	Detached (New)			y	20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
276	Micro-CHP	1	Attached (Pre-1976)	y	y		20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
277	Micro-CHP	1	Attached (Post-1976)	y	y		20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
278	Micro-CHP	1	Attached (New)			y	20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
279	Micro-CHP	1	Mobile (Existing)	y	y		20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
280	Micro-CHP	1	Mobile (New)			y	20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Back to Index

Attic Insulation

		References/Notes
Description:	Insulation levels can be increased in attics by blowing insulation into the attic spaces to fill and cover the space within the roof frame. One technique is to make sure loose-fill or batt insulation fills the attic floor joists fully and then add an additional layer of unfaced fibreglass batt insulation across the joists. To reduce cost, it is also possible to blow in cellulose insulation on top of the existing insulation instead.	
Baseline:	A home with average insulation in the attic	
Upgrade:	Improving the attic insulation in an average home by RSI-3.5 (R-20), through the addition of cellulose insulation	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.648	$1.648		$1.648	$1.648		$1.648	
Electricity ($/kW)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	
Natural Gas ($/MJ)	$0.010	$0.139	$0.139		$0.139	$0.139		$0.139	
Oil ($/L)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	
Water ($/1000L)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☐	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☐	Mobile (Existing) ☑	Mobile (New) ☐	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	878	1,078		565	565		359		948	
	Natural Gas (MJ/yr.)	54,195	44,259		29,496	24,104		28,549		46,448	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Upgrade Consumption	Electricity (kWh/yr.)	838	1,037		539	545		346		910	
	Natural Gas (MJ/yr.)	50,943	42,046		27,726	22,898		26,979		43,908	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%		0%	0%		0%		0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%		0%	0%		0%		0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-		-	-		-		-	
	Electricity, Cooling (kWh/yr.)	-	-		-	-		-		-	
	Electricity, Total (kWh/yr.)	-	-		-	-		-		-	
	Natural Gas (MJ/yr.)	-	-		-	-		-		-	
	Oil (L/yr.)	-	-		-	-		-		-	
Winter Peak Hours-Use Factor		-	-		-	-		-		-	
Resource Savings	Electricity (kWh/yr.)	40	40		26	20		13		38	
	Electricity (kW peak)	-	-		-	-		-		-	
	Natural Gas (MJ/yr.)	3,252	2,213		1,770	1,205		1,570		2,540	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Cost Parameters	Upgrade, Material ($)	$675.00	$712.50		$450.00	$487.50		$525.00		$677.86	Consultations with utilities and contractors have suggested that an average cost of $0.75/ft^2 (material and installation) is reasonable. Average ceiling areas based on ecoENERGY database data for BC and HOT2000 modelling.
	Upgrade, Installation ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	Installation costs included above
	Baseline, Material ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	
	Baseline, Installation ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	
	Total Measure Cost ($)	$675.00	$712.50		$450.00	$487.50		$525.00		$677.86	
	Basis (Full/Incremental)	Full	Full		Full	Full		Full		Full	
Incremental O&M ($/yr.)		$0	$0		$0	$0		$0		$0	
Lifetimes	Upgrade (yrs.)	30	30		30	30		30		30	Approximate lifetime, based on previous Marbek energy efficiency potential studies
	Baseline (yrs.)	-	-		-	-		-		-	
Cost Savings ($/yr.)		$35	$25		$20	$14		$16		$28	
Simple Payback (yrs.)		19.2	28.5		23.1	36.1		31.9		25.34	
NPV of O&M Costs ($)		$0	$0		$0	$0		$0		$0	
Total Benefits ($)	Electric Energy	$66	$66		$43	$34		$21		$63	
	Electric Demand	$0	$0		$0	$0		$0		$0	
	Natural Gas	$452	$308		$246	$168		$218		$353	
	Oil	$0	$0		$0	$0		$0		$0	
	Water	$0	$0		$0	$0		$0		$0	
Measure TRC ($)		-$157	-$339		-$161	-$286		-$286		-$262	
Benefit/Cost Ratio		0.77	0.52		0.64	0.41		0.46		0.61	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1		1	1		1		
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental		Incremental	Incremental		Incremental		
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	5.5%	4.5%		5.5%	4.5%		5.0%		4.9%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes.
Space Cooling	-	1	1	2.5%	1.5%		2.5%	1.5%		2.0%		1.9%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes.
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	6.0%	5.0%		6.0%	5.0%		5.5%		5.4%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes.
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heater	-	0	0									-	
Pool and Spa Heater	Pool Heaters	0	0									-	
Pool and Spa Heater	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	

Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	5.5%	4.5%		5.5%	4.5%		5.0%		4.9%	
Space Cooling	1	1	2.5%	1.5%		2.5%	1.5%		2.0%		1.9%	
Clothes Washers	0	0	-	-		-	-		-		-	
Dishwashers	0	0	-	-		-	-		-		-	
Other Electric Loads	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	6.0%	5.0%		6.0%	5.0%		5.5%		5.4%	
Domestic Hot Water (DHW)	0	0	-	-		-	-		-		-	
Fireplaces	0	0	-	-		-	-		-		-	
Cooking	0	0	-	-		-	-		-		-	
Clothes Dryers	0	0	-	-		-	-		-		-	
Pool and Spa Heaters	0	0	-	-		-	-		-		-	
Other	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-		-	-		-		-	
Domestic Hot Water (DHW)	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Wall Insulation

		References/Notes
Description:	It can be challenging to retrofit wall insulation in existing homes since the inside surfaces of the exterior walls are already finished. It is sometimes possible to add insulation to a wall by blowing insulating materials into the wall cavity, if sufficient space exists. Alternatively, if the siding is old and due for replacement, rigid foam insulation can be added before the new siding is installed. In this situation, it would also be quite cost-effective to install a more effective vapour and air barrier (e.g., Dupont Tyvek®) to reduce the amount of air leakage through the walls.	
Baseline:	A home with average wall insulation	
Upgrade:	Improving the wall insulation in an average home by RSI-1.76 (R-10) to RSI-4.2 (R-24)	Assumed that the homeowner is replacing the home's siding and improving the wall insulation on an incremental basis.

Baseline Reference:	1. Annual consumption, end use							
Heating Fuel Type:	All Fuels (Average Fuel Mix)							
Main End Use:	Space Heating							
Discount Rate:	7.38%							
GHG Adder Incl.?	No							
Resource Costs:	Baseload							
	Customer Cost	**Avoided Costs (NPV)**						
Electricity ($/kWh)	$0.083	$1.648	$1.648		$1.648	$1.648		$1.648
Electricity ($/kW)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000
Natural Gas ($/MJ)	$0.010	$0.139	$0.139		$0.139	$0.139		$0.139
Oil ($/L)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000
Water ($/1000L)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000

= User Input
= Calculation

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☐	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☐	Mobile (Existing) ☑	Mobile (New) ☐	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	878	1,078		565	565		359		948	
	Natural Gas (MJ/yr.)	54,195	44,259		29,496	24,104		28,549		46,448	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Upgrade Consumption	Electricity (kWh/yr.)	779	951		500	501		327		839	
	Natural Gas (MJ/yr.)	45,524	37,178		24,777	20,247		23,982		39,016	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%		0%	0%		0%		0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%		0%	0%		0%		0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-		-	-		-		-	
	Electricity, Cooling (kWh/yr.)	-	-		-	-		-		-	
	Electricity, Total (kWh/yr.)	-	-		-	-		-		-	
	Natural Gas (MJ/yr.)	-	-		-	-		-		-	
	Oil (L/yr.)	-	-		-	-		-		-	
Winter Peak Hours-Use Factor		-	-		-	-		-		-	
Resource Savings	Electricity (kWh/yr.)	98	127		65	64		32		109	
	Electricity (kW peak)	-	-		-	-		-		-	
	Natural Gas (MJ/yr.)	8,671	7,081		4,719	3,857		4,568		7,432	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Cost Parameters	Upgrade, Material ($)	$2,000.00	$2,000.00		$1,500.00	$1,500.00		$1,500.00		$1,954.45	Approx. material and installation costs, based on private communication with Tony Woods, CanAm Building Envelope Specialists (2009)
	Upgrade, Installation ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	Installation costs included above
	Baseline, Material ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	
	Baseline, Installation ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	
	Total Measure Cost ($)	$2,000.00	$2,000.00		$1,500.00	$1,500.00		$1,500.00		$1,954.45	
	Basis (Full/Incremental)	Incr.	Incr.		Incr.	Incr.		Incr.		Incr.	Forced to incremental because it would be done as part of siding replacement
Incremental O&M ($/yr.)		$0	$0		$0	$0		$0		$0	
Lifetimes	Upgrade (yrs.)	30	30		30	30		30		30	Approximate lifetime, based on previous Marbek energy efficiency potential studies
	Baseline (yrs.)	30	30		30	30		30		30	
Cost Savings ($/yr.)		$93	$80		$52	$43		$47		$82	
Simple Payback (yrs.)		21.5	25.0		29.1	34.8		31.6		24.41	
NPV of O&M Costs ($)		$0	$0		$0	$0		$0		$0	
Total Benefits ($)	Electric Energy	$162	$209		$107	$106		$53		$180	
	Electric Demand	$0	$0		$0	$0		$0		$0	
	Natural Gas	$1,206	$985		$656	$536		$635		$1,034	
	Oil	$0	$0		$0	$0		$0		$0	
	Water	$0	$0		$0	$0		$0		$0	
Measure TRC ($)		-$632	-$806		-$737	-$858		-$812		-$741	
Benefit/Cost Ratio		0.68	0.60		0.51	0.43		0.46		0.62	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1		1	1		1		
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental		Incremental	Incremental		Incremental		
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	15.0%	15.0%		15.0%	15.0%		15.0%		15.0%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes.
Space Cooling	-	1	1	3.0%	2.5%		3.0%	2.5%		2.5%		2.7%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes.
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	16.0%	16.0%		16.0%	16.0%		16.0%		16.0%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes.
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heater	-	0	0									-	
Pool and Spa Heater	Pool Heaters	0	0									-	
Pool and Spa Heater	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	

Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	**Sub End Use/Equipment (If Applicable)**	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
		Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Ventilation and Circulation	1	1	15.0%	15.0%		15.0%	15.0%		15.0%		15.0%	
Space Cooling	1	1	3.0%	2.5%		3.0%	2.5%		2.5%		2.7%	
Clothes Washers	0	0	-	-		-	-		-		-	
Dishwashers	0	0	-	-		-	-		-		-	
Other Electric Loads	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Space Heating	1	1	16.0%	16.0%		16.0%	16.0%		16.0%		16.0%	
Domestic Hot Water (DHW)	0	0	-	-		-	-		-		-	
Fireplaces	0	0	-	-		-	-		-		-	
Cooking	0	0	-	-		-	-		-		-	
Clothes Dryers	0	0	-	-		-	-		-		-	
Pool and Spa Heaters	0	0	-	-		-	-		-		-	
Other	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Space Heating	0	0	-	-		-	-		-		-	
Domestic Hot Water (DHW)	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Water	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Slab Insulation (Unfinished Basements)

		References/Notes
Description:	Insulation can be added both under and on top of basement slab floors. However, in existing homes, only the latter is practical. It is assumed that additional insulation is added to the slab floor while the basement is being finished. This can be done by purchasing insulated subfloor panels or laying down extruded polystyrene rigid foam insulation.	
Baseline:	Homes with unfinished basements	
Upgrade:	The addition of slab (basement floor) insulation in homes with unfinished basements. It is assumed that 2" polystyrene rigid foam insulation (RSI-1.76 (R-10)) is being added.	Assumed that the homeowner is finishing their basement and improving the slab/floor insulation on an incremental basis.

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.648	$1.648		$1.648	$1.648			
Electricity ($/kW)	$0.000	$0.000	$0.000		$0.000	$0.000			
Natural Gas ($/MJ)	$0.010	$0.139	$0.139		$0.139	$0.139			
Oil ($/L)	$0.000	$0.000	$0.000		$0.000	$0.000			
Water ($/1000L)	$0.000	$0.000	$0.000		$0.000	$0.000			

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☐	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☐	Mobile (Existing) ☐	Mobile (New) ☐	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	600	800		400	400				692	
	Natural Gas (MJ/yr.)	54,195	44,259		29,496	24,104				46,856	
	Oil (L/yr.)	-	-		-	-				-	
	Water (L/yr.)	-	-		-	-				-	
Upgrade Consumption	Electricity (kWh/yr.)	594	792		396	396				685	
	Natural Gas (MJ/yr.)	53,491	43,817		29,112	23,863				46,321	
	Oil (L/yr.)	-	-		-	-				-	
	Water (L/yr.)	-	-		-	-				-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%		0%	0%				0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%		0%	0%				0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-		-	-				-	
	Electricity, Cooling (kWh/yr.)	-	-		-	-				-	
	Electricity, Total (kWh/yr.)	-	-		-	-				-	
	Natural Gas (MJ/yr.)	-	-		-	-				-	
	Oil (L/yr.)	-	-		-	-				-	
Winter Peak Hours-Use Factor		-	-		-	-				-	
Resource Savings	Electricity (kWh/yr.)	6	8		4	4				7	
	Electricity (kW peak)	-	-		-	-				-	
	Natural Gas (MJ/yr.)	705	443		383	241				534	
	Oil (L/yr.)	-	-		-	-				-	
	Water (L/yr.)	-	-		-	-				-	
Cost Parameters	Upgrade, Material ($)	$1,125.00	$1,275.00		$975.00	$1,050.00				$1,198.61	Based on a retail scan (Home Depot), the cost of this type of insulation is ~$1.50/ft^2 ($16/m^2) (2010). Average basement areas based on ecoENERGY database data for BC and HOT2000 modelling.
	Upgrade, Installation ($)	$0.00	$0.00		$0.00	$0.00				$0.00	Assuming that additional labour costs are minimal since the basement is being finished
	Baseline, Material ($)	$0.00	$0.00		$0.00	$0.00				$0.00	
	Baseline, Installation ($)	$0.00	$0.00		$0.00	$0.00				$0.00	
	Total Measure Cost ($)	$1,125.00	$1,275.00		$975.00	$1,050.00				$1,198.61	
	Basis (Full/Incremental)	Incr.	Incr.		Incr.	Incr.				Incr.	Forced to incremental because it would be done as part of basement reno.
Incremental O&M ($/yr.)		$0	$0		$0	$0				$0	
Lifetimes	Upgrade (yrs.)	30	30		30	30				30	Approximate lifetime, based on previous Marbek energy efficiency potential studies
	Baseline (yrs.)	30	30		30	30				30	
Cost Savings ($/yr.)		$7	$5		$4	$3				$6	
Simple Payback (yrs.)		152.0	255.0		238.4	389.8				221.94	
NPV of O&M Costs ($)		$0	$0		$0	$0				$0	
Total Benefits ($)	Electric Energy	$10	$13		$7	$7				$11	
	Electric Demand	$0	$0		$0	$0				$0	
	Natural Gas	$98	$62		$53	$34				$74	
	Oil	$0	$0		$0	$0				$0	
	Water	$0	$0		$0	$0				$0	
Measure TRC ($)		-$1,017	-$1,200		-$915	-$1,010				-$1,113	
Benefit/Cost Ratio		0.10	0.06		0.06	0.04				0.07	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1		1	1				
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental		Incremental	Incremental				
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	1.0%	1.0%		1.0%	1.0%				1.0%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached homes.
Space Cooling	-	0	0									-	Space cooling savings are negligible, based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC.
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	1.3%	1.0%		1.3%	1.0%				1.1%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached homes.
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	

Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	1.0%	1.0%		1.0%	1.0%				1.0%	
Space Cooling	0	0	-	-		-	-				-	
Clothes Washers	0	0	-	-		-	-				-	
Dishwashers	0	0	-	-		-	-				-	
Other Electric Loads	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	1.3%	1.0%		1.3%	1.0%				1.1%	
Domestic Hot Water (DHW)	0	0	-	-		-	-				-	
Fireplaces	0	0	-	-		-	-				-	
Cooking	0	0	-	-		-	-				-	
Clothes Dryers	0	0	-	-		-	-				-	
Pool and Spa Heaters	0	0	-	-		-	-				-	
Other	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-		-	-				-	
Domestic Hot Water (DHW)	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Basement (Foundation) Insulation

		References/Notes
Description:	In many homes, the basement is often under-insulated or even left uninsulated. Increasing the insulation level in basements can be achieved in a number of ways, including constructing a new insulated frame wall, moving the existing frame wall to increase the insulation level, adding extra insulation to the existing frame wall, adding rigid board insulation to the exterior of the foundation, or using a combination of interior and exterior rigid board insulation. As a lower cost alternative, it is also possible to use polyurethane foam.	
Baseline:	A home with average insulation in the basement (foundation) walls	
Upgrade:	In average homes with basements, improving the foundation wall insulation by RSI-2.12 (R-12)	Assumed that the homeowner is finishing or refinishing the basement and improving the foundation insulation on an incremental basis.

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.648	$1.648		$1.648	$1.648			
Electricity ($/kW)	$0.000	$0.000	$0.000		$0.000	$0.000			
Natural Gas ($/MJ)	$0.010	$0.139	$0.139		$0.139	$0.139			
Oil ($/L)	$0.000	$0.000	$0.000		$0.000	$0.000			
Water ($/1000L)	$0.000	$0.000	$0.000		$0.000	$0.000			

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☐	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☐	Mobile (Existing) ☐	Mobile (New) ☐	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	878	1,078		565	565				962	
	Natural Gas (MJ/yr.)	54,195	44,259		29,496	24,104				46,856	
	Oil (L/yr.)	-	-		-	-				-	
	Water (L/yr.)	-	-		-	-				-	
Upgrade Consumption	Electricity (kWh/yr.)	812	986		533	531				884	
	Natural Gas (MJ/yr.)	47,692	38,505		26,546	21,573				41,026	
	Oil (L/yr.)	-	-		-	-				-	
	Water (L/yr.)	-	-		-	-				-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%		0%	0%				0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%		0%	0%				0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-		-	-				-	
	Electricity, Cooling (kWh/yr.)	-	-		-	-				-	
	Electricity, Total (kWh/yr.)	-	-		-	-				-	
	Natural Gas (MJ/yr.)	-	-		-	-				-	
	Oil (L/yr.)	-	-		-	-				-	
Winter Peak Hours-Use Factor		-	-		-	-				-	
Resource Savings	Electricity (kWh/yr.)	66	92		32	34				78	
	Electricity (kW peak)	-	-		-	-				-	
	Natural Gas (MJ/yr.)	6,503	5,754		2,950	2,531				5,830	
	Oil (L/yr.)	-	-		-	-				-	
	Water (L/yr.)	-	-		-	-				-	
Cost Parameters	Upgrade, Material ($)	$1,400.00	$1,500.00		$900.00	$1,000.00				$1,423.94	~$2.00/ft^2 (material and installation) for addition of R-12 to foundation insulation, based on private communication with Tony Woods, CanAm Building Envelope Specialists (2009), and assuming average foundation wall areas as per HOT2000 models and the ecoENERGY database.
	Upgrade, Installation ($)	$0.00	$0.00		$0.00	$0.00				$0.00	
	Baseline, Material ($)	$0.00	$0.00		$0.00	$0.00				$0.00	
	Baseline, Installation ($)	$0.00	$0.00		$0.00	$0.00				$0.00	
	Total Measure Cost ($)	$1,400.00	$1,500.00		$900.00	$1,000.00				$1,423.94	
	Basis (Full/Incremental)	Incr.	Incr.		Incr.	Incr.				Incr.	Forced to incremental because it would be done as part of basement reno.
Incremental O&M ($/yr.)		$0	$0		$0	$0				$0	
Lifetimes	Upgrade (yrs.)	30	30		30	30				30	Approximate lifetime, based on previous Marbek energy efficiency potential studies
	Baseline (yrs.)	30	30		30	30				30	
Cost Savings ($/yr.)		$69	$64		$32	$28				$64	
Simple Payback (yrs.)		20.2	23.4		28.5	36.2				22.98	
NPV of O&M Costs ($)		$0	$0		$0	$0				$0	
Total Benefits ($)	Electric Energy	$109	$152		$53	$56				$128	
	Electric Demand	$0	$0		$0	$0				$0	
	Natural Gas	$905	$800		$410	$352				$811	
	Oil	$0	$0		$0	$0				$0	
	Water	$0	$0		$0	$0				$0	
Measure TRC ($)		-$387	-$548		-$437	-$592				-$485	
Benefit/Cost Ratio		0.72	0.63		0.51	0.41				0.66	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1		1	1				
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental		Incremental	Incremental				
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No) Baseline	Applies? (1=Yes; 0=No) Upgrade	Measure Resource Savings (%) Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Ventilation and Circulation	-	1	1	11.0%	11.5%		8.0%	8.5%				11.1%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings in attached homes are slightly lower since a smaller percentage of their wall areas is exposed to the outdoors.
Space Cooling	-	1	1									-	Space cooling savings are negligible, based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC.
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No) Baseline	Applies? (1=Yes; 0=No) Upgrade	Measure Resource Savings (%) Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Space Heating	-	1	1	12.0%	13.0%		10.0%	10.5%				12.4%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings in attached homes are slightly lower since a smaller percentage of their wall areas is exposed to the outdoors.
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No) Baseline	Applies? (1=Yes; 0=No) Upgrade	Measure Resource Savings (%) Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	

Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	11.0%	11.5%		8.0%	8.5%				11.1%	
Space Cooling	1	1	-	-		-	-				-	
Clothes Washers	0	0	-	-		-	-				-	
Dishwashers	0	0	-	-		-	-				-	
Other Electric Loads	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	12.0%	13.0%		10.0%	10.5%				12.4%	
Domestic Hot Water (DHW)	0	0	-	-		-	-				-	
Fireplaces	0	0	-	-		-	-				-	
Cooking	0	0	-	-		-	-				-	
Clothes Dryers	0	0	-	-		-	-				-	
Pool and Spa Heaters	0	0	-	-		-	-				-	
Other	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-		-	-				-	
Domestic Hot Water (DHW)	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Crawl Space Insulation

		References/Notes
Description:	Insulation levels remain below code in many homes that include crawlspaces as part of the basement design. If the floor is exposed, it would first be necessary to install a vapour barrier (e.g., 6 mil (600 gauge/0.15 mm) polyurethane barrier). Polyurethane foam could then be applied to the ceiling of the crawlspace (or the outer walls if there are pipes running below the floor). In addition to increasing the insulation of the crawlspace, this would help to eliminate any air leaks. Co-benefits of improved crawlspace insulation include improved thermal comfort, fewer drafts, and less condensation.	
Baseline:	Minimal crawlspace insulation in homes with crawlspaces	
Upgrade:	In homes with crawlspaces, the addition of crawlspace insulation to bring the thermal resistance values up to RSI-2.1 (R-12)	

Baseline Reference:	1. Annual consumption, end use
Heating Fuel Type:	All Fuels (Average Fuel Mix)
Main End Use:	Space Heating
Discount Rate:	7.38%
GHG Adder Incl.?	No
Resource Costs:	Baseload

= User Input
= Calculation

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.648	$1.648		$1.648	$1.648			
Electricity ($/kW)	$0.000	$0.000	$0.000		$0.000	$0.000			
Natural Gas ($/MJ)	$0.010	$0.139	$0.139		$0.139	$0.139			
Oil ($/L)	$0.000	$0.000	$0.000		$0.000	$0.000			
Water ($/1000L)	$0.000	$0.000	$0.000		$0.000	$0.000			

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☐	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☐	Mobile (Existing) ☐	Mobile (New) ☐	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	600	800		400	400				692	
	Natural Gas (MJ/yr.)	54,195	44,259		29,496	24,104				46,856	
	Oil (L/yr.)	-	-		-	-				-	
	Water (L/yr.)	-	-		-	-				-	
Upgrade Consumption	Electricity (kWh/yr.)	588	784		392	392				678	
	Natural Gas (MJ/yr.)	52,840	43,153		28,758	23,501				45,684	
	Oil (L/yr.)	-	-		-	-				-	
	Water (L/yr.)	-	-		-	-				-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%		0%	0%				0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%		0%	0%				0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-		-	-				-	
	Electricity, Cooling (kWh/yr.)	-	-		-	-				-	
	Electricity, Total (kWh/yr.)	-	-		-	-				-	
	Natural Gas (MJ/yr.)	-	-		-	-				-	
	Oil (L/yr.)	-	-		-	-				-	
Winter Peak Hours-Use Factor		-	-		-	-				-	
Resource Savings	Electricity (kWh/yr.)	12	16		8	8				14	
	Electricity (kW peak)	-	-		-	-				-	
	Natural Gas (MJ/yr.)	1,355	1,106		737	603				1,171	
	Oil (L/yr.)	-	-		-	-				-	
	Water (L/yr.)	-	-		-	-				-	
Cost Parameters	Upgrade, Material ($)	$800.00	$800.00		$800.00	$800.00				$800.00	Approx. material and installation costs, based on cost estimates from recent studies (i.e. 40 ft of walls x 4 ft high assumed) (2009)
	Upgrade, Installation ($)	$0.00	$0.00		$0.00	$0.00				$0.00	Installation costs included above
	Baseline, Material ($)	$0.00	$0.00		$0.00	$0.00				$0.00	
	Baseline, Installation ($)	$0.00	$0.00		$0.00	$0.00				$0.00	
	Total Measure Cost ($)	$800.00	$800.00		$800.00	$800.00				$800.00	
	Basis (Full/Incremental)	Full	Full		Full	Full				Full	
Incremental O&M ($/yr.)		$0	$0		$0	$0				$0	
Lifetimes	Upgrade (yrs.)	30	30		30	30				30	
	Baseline (yrs.)	-	-		-	-				-	
Cost Savings ($/yr.)		$14	$12		$8	$7				$13	
Simple Payback (yrs.)		56.1	65.7		101.4	121.8				65.63	
NPV of O&M Costs ($)		$0	$0		$0	$0				$0	
Total Benefits ($)	Electric Energy	$20	$26		$13	$13				$23	
	Electric Demand	$0	$0		$0	$0				$0	
	Natural Gas	$188	$154		$103	$84				$163	
	Oil	$0	$0		$0	$0				$0	
	Water	$0	$0		$0	$0				$0	
Measure TRC ($)		-$592	-$620		-$684	-$703				-$614	
Benefit/Cost Ratio		0.26	0.23		0.14	0.12				0.23	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1		1	1				
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental		Incremental	Incremental				
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	2.0%	2.0%		2.0%	2.0%				2.0%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached homes.
Space Cooling	-	0	0									-	Space cooling savings are negligible, based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC.
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	2.5%	2.5%		2.5%	2.5%				2.5%	Based on HOT2000 modeling results of average single detached homes with crawl spaces (different vintages) in BC. Assuming savings are similar in attached homes.
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heater	-	0	0									-	
Pool and Spa Heater	Pool Heaters	0	0									-	
Pool and Spa Heater	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	

Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	2.0%	2.0%		2.0%	2.0%				2.0%	
Space Cooling	0	0	-	-		-	-				-	
Clothes Washers	0	0	-	-		-	-				-	
Dishwashers	0	0	-	-		-	-				-	
Other Electric Loads	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	2.5%	2.5%		2.5%	2.5%				2.5%	
Domestic Hot Water (DHW)	0	0	-	-		-	-				-	
Fireplaces	0	0	-	-		-	-				-	
Cooking	0	0	-	-		-	-				-	
Clothes Dryers	0	0	-	-		-	-				-	
Pool and Spa Heaters	0	0	-	-		-	-				-	
Other	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-		-	-				-	
Domestic Hot Water (DHW)	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, VANCOUVER ISLAND - NATURAL GAS EFFICIENCY

Back to Index

Professional Air Sealing/Weather Stripping/Caulking

		References/Notes
Description:	Air leakage sealing of building envelopes includes completion of a blower door test to quantify leakage levels and to identify the location of air leaks. Generally, major leakage occurs at window-to-wall interfaces, around doors (especially patio doors), through electrical and plumbing penetrations and at the top of foundation walls. Installation of sealant and gaskets are generally accepted methods for reducing air leakage in buildings. Other sources of air leaks include pot lights, wall-to-floor interfaces (i.e., top and bottom of baseboards) and bathroom and kitchen exhaust piping.	
Baseline:	No action taken	
Upgrade:	A comprehensive air sealing job, which results in an air tightness (ACH @ 50 Pa) improvement of 30%	

Baseline Reference:	1. Annual consumption, end use
Heating Fuel Type:	All Fuels (Average Fuel Mix)
Main End Use:	Space Heating
Discount Rate:	7.38%
GHG Adder Incl.?	No
Resource Costs:	Baseload

= User Input
= Calculation

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.553	$1.553		$1.553	$1.553		$1.553	
Electricity ($/kW)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	
Natural Gas ($/MJ)	$0.010	$0.127	$0.127		$0.127	$0.127		$0.127	
]	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	
Water ($/1000L)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☐	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☐	Mobile (Existing) ☑	Mobile (New) ☐	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	878	1,078		565	565		359		948	
	Natural Gas (MJ/yr.)	54,195	44,259		29,496	24,104		28,549		46,448	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Upgrade Consumption	Electricity (kWh/yr.)	822	1,011		528	532		343		889	
	Natural Gas (MJ/yr.)	48,505	40,276		26,399	21,934		25,837		41,943	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%		0%	0%		0%		0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%		0%	0%		0%		0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-		-	-		-		-	
	Electricity, Cooling (kWh/yr.)	-	-		-	-		-		-	
	Electricity, Total (kWh/yr.)	-	-		-	-		-		-	
	Natural Gas (MJ/yr.)	-	-		-	-		-		-	
	Oil (L/yr.)	-	-		-	-		-		-	
Winter Peak Hours-Use Factor		-	-		-	-		-		-	
Resource Savings	Electricity (kWh/yr.)	55	67		37	34		16		59	
	Electricity (kW peak)	-	-		-	-		-		-	
	Natural Gas (MJ/yr.)	5,690	3,983		3,097	2,169		2,712		4,505	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Cost Parameters	Upgrade, Material ($)	$1,800.00	$1,800.00		$1,800.00	$1,800.00		$1,800.00		$1,800.00	Approx. mateial and installation costs, based on personal communication with Tony Woods, CanAm Building Envelope Specialists (material & installation) (2009). Assuming similar cost for all housing types.
	Upgrade, Installation ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	Installation costs included above
	Baseline, Material ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	
	Baseline, Installation ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	
	Total Measure Cost ($)	$1,800.00	$1,800.00		$1,800.00	$1,800.00		$1,800.00		$1,800.00	
	Basis (Full/Incremental)	Full	Full		Full	Full		Full		Full	
Incremental O&M ($/yr.)		$20	$20		$20	$20		$20		$20	Approximate annual cost to maintain weatherstripping, caulking, etc.
Lifetimes	Upgrade (yrs.)	25	25		25	25		25		25	Approximate lifetime, based on previous Marbek energy efficiency potential studies
	Baseline (yrs.)	-	-		-	-		-		-	
Cost Savings ($/yr.)		$40	$25		$13	$4		$8		$29	
Simple Payback (yrs.)		44.6	73.3		134.3	444.9		226.7		88.11	
NPV of O&M Costs ($)		$225	$225		$225	$225		$225		$225	
Total Benefits ($)	Electric Energy	$86	$104		$57	$52		$26		$92	
	Electric Demand	$0	$0		$0	$0		$0		$0	
	Natural Gas	$723	$506		$393	$276		$344		$572	
	Oil	$0	$0		$0	$0		$0		$0	
	Water	$0	$0		$0	$0		$0		$0	
Measure TRC ($)		-$1,216	-$1,416		-$1,575	-$1,697		-$1,655		-$1,362	
Benefit/Cost Ratio		0.40	0.30		0.22	0.16		0.18		0.33	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1		1	1		1		
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental		Incremental	Incremental		Incremental		
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	9.0%	8.0%		9.0%	8.0%		8.5%		8.4%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached homes.
Space Cooling	-	1	1	0.5%	1.0%		0.5%	1.0%		0.5%		0.8%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached homes.
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	10.5%	9.0%		10.5%	9.0%		9.5%		9.6%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached homes.
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	

Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	9.0%	8.0%		9.0%	8.0%		8.5%		8.4%	
Space Cooling	1	1	0.5%	1.0%		0.5%	1.0%		0.5%		0.8%	
Clothes Washers	0	0	-	-		-	-		-		-	
Dishwashers	0	0	-	-		-	-		-		-	
Other Electric Loads	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	10.5%	9.0%		10.5%	9.0%		9.5%		9.6%	
Domestic Hot Water (DHW)	0	0	-	-		-	-		-		-	
Fireplaces	0	0	-	-		-	-		-		-	
Cooking	0	0	-	-		-	-		-		-	
Clothes Dryers	0	0	-	-		-	-		-		-	
Pool and Spa Heaters	0	0	-	-		-	-		-		-	
Other	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-		-	-		-		-	
Domestic Hot Water (DHW)	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, VANCOUVER ISLAND - NATURAL GAS EFFICIENCY

Back to Index

Homeowner Air Sealing/Weather Stripping/Caulking

		References/Notes
Description:	Homeowner air leakage sealing does not include a blower door test to quantify leakage levels and to identify the location of air leaks. Homeowners are likely to identify leakage primarily in more visible areas of the envelope, for example, the major leakage at window-to-wall interfaces, around doors (especially patio doors), through electrical and plumbing penetrations and perhaps at the top of foundation walls. Installation of weather stripping, sealant and gaskets are the most likely methods to be used. Less visible sources of air leaks such as pot lights, wall-to-floor interfaces (i.e., top and bottom of baseboards), bathroom and kitchen exhaust piping, and leaks from the top of walls into the attic are less likely to be addressed by the homeowner.	
Baseline:	No action taken	
Upgrade:	A homeowner air sealing job, which results in an air tightness (ACH @ 50 Pa) improvement of 15-20%	

Baseline Reference:	1. Annual consumption, end use
Heating Fuel Type:	All Fuels (Average Fuel Mix)
Main End Use:	Space Heating
Discount Rate:	7.38%
GHG Adder Incl.?	No
Resource Costs:	Baseload

= User Input
= Calculation

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$0.952	$0.952		$0.952	$0.952		$0.952	
Electricity ($/kW)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	
Natural Gas ($/MJ)	$0.010	$0.067	$0.067		$0.067	$0.067		$0.067	
]	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	
Water ($/1000L)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	

Sub-sector		Detached ☑ (Pre-1976)	Detached ☑ (Post-1976)	Detached ☐ (New)	Attached ☑ (Pre-1976)	Attached ☑ (Post-1976)	Attached ☐ (New)	Mobile ☑ (Existing)	Mobile ☐ (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	878	1,078		565	565		359		948	
	Natural Gas (MJ/yr.)	54,195	44,259		29,496	24,104		28,549		46,448	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Upgrade Consumption	Electricity (kWh/yr.)	846	1,039		544	546		350		915	
	Natural Gas (MJ/yr.)	50,943	41,983		27,726	22,864		27,000		43,874	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%		0%	0%		0%		0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%		0%	0%		0%		0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-		-	-		-		-	
	Electricity, Cooling (kWh/yr.)	-	-		-	-		-		-	
	Electricity, Total (kWh/yr.)	-	-		-	-		-		-	
	Natural Gas (MJ/yr.)	-	-		-	-		-		-	
	Oil (L/yr.)	-	-		-	-		-		-	
Winter Peak Hours-Use Factor		-	-		-	-		-		-	
Resource Savings	Electricity (kWh/yr.)	32	38		21	19		9		34	
	Electricity (kW peak)	-	-		-	-		-		-	
	Natural Gas (MJ/yr.)	3,252	2,276		1,770	1,240		1,550		2,574	3800 MJ from Innes Hood report for LiveSmartBC 2010 business case, March 2010
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Cost Parameters	Upgrade, Material ($)	$200.00	$200.00		$200.00	$200.00		$200.00		$200.00	Innes Hood report for LiveSmartBC 2010 business case, March 2010
	Upgrade, Installation ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	Installation costs included above
	Baseline, Material ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	
	Baseline, Installation ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	
	Total Measure Cost ($)	$200.00	$200.00		$200.00	$200.00		$200.00		$200.00	
	Basis (Full/Incremental)	Full	Full		Full	Full		Full		Full	
Incremental O&M ($/yr.)		$20	$20		$20	$20		$20		$20	Approximate annual cost to maintain weatherstripping, caulking, etc.
Lifetimes	Upgrade (yrs.)	10	10		10	10		10		10	Innes Hood report for LiveSmartBC 2010 business case, March 2010
	Baseline (yrs.)	-	-		-	-		-		-	
Cost Savings ($/yr.)		$14	$5		-$1	-$6		-$4		$8	
Simple Payback (yrs.)		13.8	36.6		-218.8	-32.0		-49.6		19.28	
NPV of O&M Costs ($)		$138	$138		$138	$138		$138		$138	
Total Benefits ($)	Electric Energy	$30	$36		$20	$18		$9		$32	
	Electric Demand	$0	$0		$0	$0		$0		$0	
	Natural Gas	$218	$152		$119	$83		$104		$172	
	Oil	$0	$0		$0	$0		$0		$0	
	Water	$0	$0		$0	$0		$0		$0	
Measure TRC ($)		-$90	-$149		-$199	-$237		-$225		-$134	
Benefit/Cost Ratio		0.73	0.56		0.41	0.30		0.33		0.60	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1		1	1		1		
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental		Incremental	Incremental		Incremental		
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	5.1%	4.6%		5.1%	4.6%		4.9%		4.8%	Based on ratio of heating savings below to heating savings on Air Sealing tab, times electric savings on Air Sealing tab
Space Cooling	-	1	1	0.3%	0.6%		0.3%	0.6%		0.3%		0.5%	Based on ratio of heating savings below to heating savings on Air Sealing tab, times electric savings on Air Sealing tab
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	6.0%	5.1%		6.0%	5.1%		5.4%		5.5%	3800 MJ from Innes Hood report for LiveSmartBC 2010 business case, March 2010
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	

Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	5.1%	4.6%		5.1%	4.6%		4.9%		4.8%	
Space Cooling	1	1	0.3%	0.6%		0.3%	0.6%		0.3%		0.5%	
Clothes Washers	0	0	-	-		-	-		-		-	
Dishwashers	0	0	-	-		-	-		-		-	
Other Electric Loads	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	6.0%	5.1%		6.0%	5.1%		5.4%		5.5%	
Domestic Hot Water (DHW)	0	0	-	-		-	-		-		-	
Fireplaces	0	0	-	-		-	-		-		-	
Cooking	0	0	-	-		-	-		-		-	
Clothes Dryers	0	0	-	-		-	-		-		-	
Pool and Spa Heaters	0	0	-	-		-	-		-		-	
Other	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-		-	-		-		-	
Domestic Hot Water (DHW)	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, VANCOUVER ISLAND - NATURAL GAS EFFICIENCY

Back to Index

Air Leakage Sealing and Insulation (Old Homes)

		References/Notes
Description:	This measure is targeted at homes that are at least 30 years old, since many of these homes haven't had any work done to improve insulation and air-sealing deficiencies and it is generally most cost-effective to upgrade the insulation and the air sealing at the same time. This includes wall, attic, foundation, and crawlspace retrofits of older homes but, for the purposes of this analysis, it is assumed that a retrofit is being conducted on the attic. The air-sealing portion of the work could be accomplished by segmenting the attic. In each segment, the existing insulation could be moved to one side and polyurethane foam could be sprayed in (serves as an air sealant in addition to its insulating properties). It may also be necessary to install or refurbish top plates to prevent airflow into the attic through exterior wall cavities. Other considerations that would increase the cost of the air-sealing portion of the work and may be present in some homes include sealing pot lights and kitchen or bathroom exhaust piping. When completed, these measures would dramatically improve the air tightness of an older home. The attic insulation could subsequently be cost-effectively improved with cellulose insulation.	
Baseline:	An older home with average air tightness and attic insulation (for that particular vintage)	
Upgrade:	Improve both the attic insulation and the air tightness (ACH@50 Pa) in an old home. It is assumed that the air tightness is improved by 30% and that RSI-3.52 (R-20) of attic insulation is added.	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.553			$1.553				
Electricity ($/kW)	$0.000	$0.000			$0.000				
Natural Gas ($/MJ)	$0.010	$0.127			$0.127				
Oil ($/L)	$0.000	$0.000			$0.000				
Water ($/1000L)	$0.000	$0.000			$0.000				

Sub-sector		Detached ☑ (Pre-1976)	Detached ☐ (Post-1976)	Detached ☐ (New)	Attached ☑ (Pre-1976)	Attached ☐ (Post-1976)	Attached ☐ (New)	Mobile ☐ (Existing)	Mobile ☐ (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	878			565					870	
	Natural Gas (MJ/yr.)	54,195			29,496					53,603	
	Oil (L/yr.)	-			-					-	
	Water (L/yr.)	-			-					-	
Upgrade Consumption	Electricity (kWh/yr.)	781			501					774	
	Natural Gas (MJ/yr.)	45,253			24,629					44,758	
	Oil (L/yr.)	-			-					-	
	Water (L/yr.)	-			-					-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%			0%					0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%			0%					0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-			-					-	
	Electricity, Cooling (kWh/yr.)	-			-					-	
	Electricity, Total (kWh/yr.)	-			-					-	
	Natural Gas (MJ/yr.)	-			-					-	
	Oil (L/yr.)	-			-					-	
Winter Peak Hours-Use Factor		-			-					-	
Resource Savings	Electricity (kWh/yr.)	97			64					96	
	Electricity (kW peak)	-			-					-	
	Natural Gas (MJ/yr.)	8,942			4,867					8,844	
	Oil (L/yr.)	-			-					-	
	Water (L/yr.)	-			-					-	
Cost Parameters	Upgrade, Material ($)	$3,000.00			$2,500.00					$2,988.01	Cost is variable depending on the approach that is used. Estimate is based on recent communication with air sealing and insulation contractors (2010).
	Upgrade, Installation ($)	$0.00			$0.00					$0.00	
	Baseline, Material ($)	$0.00			$0.00					$0.00	
	Baseline, Installation ($)	$0.00			$0.00					$0.00	
	Total Measure Cost ($)	$3,000.00			$2,500.00					$2,988.01	
	Basis (Full/Incremental)	Full			Full					Full	
Incremental O&M ($/yr.)		$20			$20					$20	Approximate annual cost to maintain weather-stripping, caulking, etc.
Lifetimes	Upgrade (yrs.)	25			25					25	Approximate lifetime, based on previous Marbek energy efficiency potential studies
	Baseline (yrs.)	-			-					-	
Cost Savings ($/yr.)		$76			$33					$75	
Simple Payback (yrs.)		39.7			75.7					40.52	
NPV of O&M Costs ($)		$225			$225					$225	
Total Benefits ($)	Electric Energy	$151			$100					$149	
	Electric Demand	$0			$0					$0	
	Natural Gas	$1,136			$618					$1,123	
	Oil	$0			$0					$0	
	Water	$0			$0					$0	
Measure TRC ($)		-$1,939			-$2,008					-$1,941	
Benefit/Cost Ratio		0.40			0.26					0.40	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1			1					
Cost Flag (i.e. way measure is typically applied)	Incremental			Incremental					
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	15.0%			15.0%					15.0%	Based on HOT2000 modeling results of average pre-1976 single detached homes. Assuming savings are similar in attached homes.
Space Cooling	-	1	1	2.5%			2.5%					2.5%	Based on HOT2000 modeling results of average pre-1976 single detached homes. Assuming savings are similar in attached homes.
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	16.5%			16.5%					16.5%	Based on HOT2000 modeling results of average pre-1976 single detached homes. Assuming savings are similar in attached homes.
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment	Applies? (1=Yes; 0=No)	Measure Resource Savings (%)	References/Notes

Main End Use	Use/Equipment (If Applicable)	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	15.0%			15.0%					15.0%	
Space Cooling	1	1	2.5%			2.5%					2.5%	
Clothes Washers	0	0	-			-					-	
Dishwashers	0	0	-			-					-	
Other Electric Loads	0	0	-			-					-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	16.5%			16.5%					16.5%	
Domestic Hot Water (DHW)	0	0	-			-					-	
Fireplaces	0	0	-			-					-	
Cooking	0	0	-			-					-	
Clothes Dryers	0	0	-			-					-	
Pool and Spa Heaters	0	0	-			-					-	
Other	0	0	-			-					-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-			-					-	
Domestic Hot Water (DHW)	0	0	-			-					-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-			-					-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Zoned-Up Windows: (ENERGY STAR®) Rating for a Colder Zone

		References/Notes
Description:	High-performance windows incorporate a number of additional energy-saving features, including low-E (soft coating), insulating spacers, argon fill and low conductivity frames (which can be sliders, hinged or picture). These windows are certified based on their energy rating (ER), which is based on their tested energy performance, rather than on their specific combination of features. In this case, however, the Energy Star windows for a colder zone are specified instead of the Energy Star windows for the zone where the house is located - for example, Zone C Energy Star windows would be chosen for a house in Zone A. High-performance windows also provide occupant co-benefits, such as reduced interior noise, reduced air leakage, greater thermal comfort, and fewer condensation problems.	
Baseline:	ENERGY STAR windows for Zone A (double glazed, argon fill, low-e coating, insulating spacer, vinyl frame, hinged)	Assuming U-value of at least 2.0 W/m2 K (RSI of 0.5)
Upgrade:	In existing homes, replacing 50% of windows with ENERGY STAR windows from Zone C (double-glazed, argon fill, low-e coating, insulating spacer, vinyl frame, hinged). In hew homes, replacing 100% of windows.	Assuming windows with an approximate U-value of 1.6 W/m2 K (RSI of ~0.63), based on ENERGY STAR requirements for windows.

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.553	$1.553	$1.553	$1.553	$1.553	$1.553	$1.553	$1.553
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.127	$0.127	$0.127	$0.127	$0.127	$0.127	$0.127	$0.127
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	878	1,078	1,035	565	565	543	359	345	929	
	Natural Gas (MJ/yr.)	54,195	44,259	44,259	29,496	24,104	24,104	28,549	28,549	42,939	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	860	1,047	986	554	550	518	352	331	896	
	Natural Gas (MJ/yr.)	52,894	42,754	41,781	28,788	23,284	22,754	27,693	26,951	41,153	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	18	31	49	12	16	25	8	14	33	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	1,301	1,505	2,479	708	820	1,350	856	1,599	1,785	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$8,000.00	$9,600.00	$20,800.00	$6,400.00	$7,680.00	$16,640.00	$5,760.00	$12,800.00	$14,221.75	BCH program cost estimates are $1000 to $2000 per house, depending on number of windows done and number of Zones up. To match these numbers, we used $64/ft^2.
	Upgrade, Installation ($)	$1,875.00	$2,250.00	$4,875.00	$1,500.00	$1,800.00	$3,900.00	$1,350.00	$3,000.00	$3,333.22	Based on personal communication with SAWDAC (Siding and Window Dealers Association of Canada) in 2010, the installation cost of ENERGY STAR windows is about $15/ft^2
	Baseline, Material ($)	$7,000.00	$8,400.00	$18,200.00	$5,600.00	$6,720.00	$14,560.00	$5,040.00	$11,200.00	$12,444.03	Based on personal communication with SAWDAC (Siding and Window Dealers Association of Canada) in 2010, the material cost of ENERGY STAR windows is about $56/ft^2
	Baseline, Installation ($)	$1,875.00	$2,250.00	$4,875.00	$1,500.00	$1,800.00	$3,900.00	$1,350.00	$3,000.00	$3,333.22	Based on personal communication with SAWDAC (Siding and Window Dealers Association of Canada) in 2010, the installation cost of ENERGY STAR windows is about $15/ft^2
	Total Measure Cost ($)	$1,000.00	$1,200.00	$2,600.00	$800.00	$960.00	$2,080.00	$720.00	$1,600.00	$1,777.72	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	25	25	25	25	25	25	25	25	25	Approximate lifetime, based on previous Marbek energy efficiency potential studies and consistent with the market rate of window replacement
	Baseline (yrs.)	25	25	25	25	25	25	25	25	25	Approximate lifetime, based on previous Marbek energy efficiency potential studies
Cost Savings ($/yr.)		$14	$17	$28	$8	$9	$15	$9	$17	$20	
Simple Payback (yrs.)		70.3	69.5	91.8	101.3	103.0	136.0	79.8	95.3	86.99	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$28	$47	$76	$18	$24	$39	$12	$21	$52	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$165	$191	$315	$90	$104	$171	$109	$203	$227	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$807	-$961	-$2,209	-$692	-$832	-$1,870	-$599	-$1,376	-$1,499	
Benefit/Cost Ratio		0.19	0.20	0.15	0.13	0.13	0.10	0.17	0.14	0.17	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	2.4%	3.4%	5.6%	2.4%	3.4%	5.6%	3.0%	5.6%	4.3%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes. Further assuming that savings would scale with new homes (i.e. 100% of windows being replaced versus 50%). Then scaled down the savings: original figures were based on U-value improvement from 4.2 to 2.0, or 52% lower. This improvement from 2 to 1.6 is 20% lower. Therefore, savings percentage 40% of the original percentage is used.
Space Cooling	-	1	1	1.2%	1.2%	2.2%	1.2%	1.2%	2.2%	1.2%	2.2%	1.7%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes. Further assuming that savings would scale with new homes (i.e. 100% of windows being replaced versus 50%). Then scaled down the savings: original figures were based on U-value improvement from 4.2 to 2.0, or 52% lower. This improvement from 2 to 1.6 is 20% lower. Therefore, savings percentage 40% of the original percentage is used.
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	2.4%	3.4%	5.6%	2.4%	3.4%	5.6%	3.0%	5.6%	4.3%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes. Further assuming that savings would scale with new homes (i.e. 100% of windows being replaced versus 50%). Then scaled down the savings: original figures were based on U-value improvement from 4.2 to 2.0, or 52% lower. This improvement from 2 to 1.6 is 20% lower. Therefore, savings percentage 40% of the original percentage is used.
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	

Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	2.4%	3.4%	5.6%	2.4%	3.4%	5.6%	3.0%	5.6%	4.3%	
Space Cooling	1	1	1.2%	1.2%	2.2%	1.2%	1.2%	2.2%	1.2%	2.2%	1.7%	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	2.4%	3.4%	5.6%	2.4%	3.4%	5.6%	3.0%	5.6%	4.3%	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, VANCOUVER ISLAND - NATURAL GAS EFFICIENCY

Back to Index

Super High-Performance Windows

		References/Notes
Description:	In addition to low-E coating, argon fill and insulating spacers, super-high performance windows incorporate features such as triple glazing, transparent insulating films, and fibreglass frames.	
Baseline:	Standard windows (double glazed, air fill, no coating, metal spacer, vinyl frame, slider with sash)	
Upgrade:	In existing homes, replacing 50% of windows with super high-performance windows (triple-glazed, krypton fill, low-e and insulating coatings, insulating spacer, fiberglass frame, hinged). In new homes, replacing all of the windows with super high-performance windows.	

Baseline Reference:	1. Annual consumption, end use
Heating Fuel Type:	All Fuels (Average Fuel Mix)
Main End Use:	Space Heating
Discount Rate:	7.38%
GHG Adder Incl.?	No
Resource Costs:	Baseload

= User Input
= Calculation

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.553	$1.553	$1.553	$1.553	$1.553	$1.553	$1.553	$1.553
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.127	$0.127	$0.127	$0.127	$0.127	$0.127	$0.127	$0.127
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	878	1,078	1,035	565	565	543	359	345	929	
	Natural Gas (MJ/yr.)	54,195	44,259	44,259	29,496	24,104	24,104	28,549	28,549	42,939	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	806	950	849	519	499	446	326	285	798	
	Natural Gas (MJ/yr.)	49,589	38,727	36,071	26,989	21,091	19,644	25,694	23,268	36,825	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	72	128	186	46	67	97	33	60	132	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	4,607	5,532	8,188	2,507	3,013	4,459	2,855	5,282	6,114	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$8,250.00	$9,900.00	$21,450.00	$6,600.00	$7,920.00	$17,160.00	$5,940.00	$13,200.00	$14,666.18	Based on personal communication with SAWDAC (Siding and Window Dealers Association of Canada) in 2010, the material cost of super high-performance windows is about $66/ft^2
	Upgrade, Installation ($)	$1,875.00	$2,250.00	$4,875.00	$1,500.00	$1,800.00	$3,900.00	$1,350.00	$3,000.00	$3,333.22	Based on personal communication with SAWDAC (Siding and Window Dealers Association of Canada) in 2010, the installation cost of super high-performance windows is about $15/ft^2
	Baseline, Material ($)	$6,875.00	$8,250.00	$17,875.00	$5,500.00	$6,600.00	$14,300.00	$4,950.00	$11,000.00	$12,221.81	Based on personal communication with SAWDAC (Siding and Window Dealers Association of Canada) in 2010, the material cost of std performance windows is about $55/ft^2
	Baseline, Installation ($)	$1,750.00	$2,100.00	$4,550.00	$1,400.00	$1,680.00	$3,640.00	$1,260.00	$2,800.00	$3,111.01	Based on personal communication with SAWDAC (Siding and Window Dealers Association of Canada) in 2010, the installation cost of std performance windows is about $14/ft^2
	Total Measure Cost ($)	$1,500.00	$1,800.00	$3,900.00	$1,200.00	$1,440.00	$3,120.00	$1,080.00	$2,400.00	$2,666.58	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	25	25	25	25	25	25	25	25	25	Approximate lifetime, based on previous Marbek energy efficiency potential studies
	Baseline (yrs.)	25	25	25	25	25	25	25	25	25	Approximate lifetime, based on previous Marbek energy efficiency potential studies
Cost Savings ($/yr.)		$51	$65	$96	$28	$35	$52	$31	$57	$71	
Simple Payback (yrs.)		29.4	27.8	40.8	42.2	41.1	60.3	35.1	42.3	37.32	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$112	$198	$289	$72	$103	$151	$52	$94	$204	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$585	$703	$1,040	$318	$383	$566	$363	$671	$777	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$803	-$899	-$2,571	-$809	-$954	-$2,403	-$666	-$1,635	-$1,686	
Benefit/Cost Ratio		0.46	0.50	0.34	0.33	0.34	0.23	0.38	0.32	0.39	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	8.5%	12.5%	18.5%	8.5%	12.5%	18.5%	10.0%	18.5%	14.7%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes. Further assuming that savings would scale with new homes (i.e. 100% of windows being replaced versus 50%)
Space Cooling	-	1	1	7.5%	10.0%	16.5%	7.5%	10.0%	16.5%	8.5%	16.5%	12.7%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes. Further assuming that savings would scale with new homes (i.e. 100% of windows being replaced versus 50%)
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	8.5%	12.5%	18.5%	8.5%	12.5%	18.5%	10.0%	18.5%	14.7%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes. Further assuming that savings would scale with new homes (i.e. 100% of windows being replaced versus 50%)
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	8.5%	12.5%	18.5%	8.5%	12.5%	18.5%	10.0%	18.5%	14.7%	
Space Cooling	1	1	7.5%	10.0%	16.5%	7.5%	10.0%	16.5%	8.5%	16.5%	12.7%	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	8.5%	12.5%	18.5%	8.5%	12.5%	18.5%	10.0%	18.5%	14.7%	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, VANCOUVER ISLAND - NATURAL GAS EFFICIENCY

Back to Index

High-Performance Homes (EGH 80/R2000/ENERGY STAR®)

Not used--EGH 80 is now the minimum

		References/Notes
Description:	There are several certification schemes for energy-efficient new homes that incorporate integrated design and multiple envelope measures. An EnerGuide for Houses (EGH) rating is a standard measure of a home's energy performance, calculated by a professional EGH advisor. The rating is based on information on the construction of the home and the results of a blower door test performed once the house has been built. The R2000 standard is one method of achieving an EGH 80 rating. However, R2000 homes are required to achieve an air tightness level of 1.5 ACH@50Pa, install a heat recovery ventilator (HRV), and meet other environmental requirements. This substantially increases the cost of the measure. The ENERGY STAR® for New Homes program has similar requirements and also requires that homes be rated EGH 80. Since these three high performance home standards all result in essentially the same energy performance, the costs assumed for the measure are those of the least expensive of the three. EGH 80 is the lowest cost, since it allows the builder the most flexibitility for achieving the energy performance.	
Baseline:	An average new home (EGH rating of 76 assumed)	
Upgrade:	A high-performance new home (EGH rating of 80 assumed). This option no longer applies as EGH of 80 is now the minimum.	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083			$1.648			$1.648		$1.648
Electricity ($/kW)	$0.000			$0.000			$0.000		$0.000
Natural Gas ($/MJ)	$0.010			$0.139			$0.139		$0.139
Oil ($/L)	$0.000			$0.000			$0.000		$0.000
Water ($/1000L)	$0.000			$0.000			$0.000		$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New) ☑	Attached (Pre-1976)	Attached (Post-1976)	Attached (New) ☑	Mobile (Existing)	Mobile (New) ☑	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)			-			-		-	-	
	Natural Gas (MJ/yr.)			-			-		-	-	
	Oil (L/yr.)			-			-		-	-	
	Water (L/yr.)			-			-		-	-	
Upgrade Consumption	Electricity (kWh/yr.)			-			-		-	-	
	Natural Gas (MJ/yr.)			-			-		-	-	
	Oil (L/yr.)			-			-		-	-	
	Water (L/yr.)			-			-		-	-	
Interactive Effects (Inputs)	Heating Penalty ☐			0%			0%		0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐			0%			0%		0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)			-			-		-	-	
	Electricity, Cooling (kWh/yr.)			-			-		-	-	
	Electricity, Total (kWh/yr.)			-			-		-	-	
	Natural Gas (MJ/yr.)			-			-		-	-	
	Oil (L/yr.)			-			-		-	-	
Winter Peak Hours-Use Factor				-			-		-	-	
Resource Savings	Electricity (kWh/yr.)			-			-		-	-	
	Electricity (kW peak)			-			-		-	-	
	Natural Gas (MJ/yr.)			-			-		-	-	
	Oil (L/yr.)			-			-		-	-	
	Water (L/yr.)			-			-		-	-	
Cost Parameters	Upgrade, Material ($)			$6,000.00			$4,800.00		$0.00	$5,599.69	Based on cost estimates for Saskatchewan homes from Rob Dumont (Dumont and Associates) and Dave Fetsch (Sun Ridge Group). Assuming cost scales to 80% for attached homes. Need value for mobile homes.
	Upgrade, Installation ($)			$0.00			$0.00		$0.00	$0.00	
	Baseline, Material ($)			$0.00			$0.00		$0.00	$0.00	
	Baseline, Installation ($)			$0.00			$0.00		$0.00	$0.00	
	Total Measure Cost ($)			$6,000.00			$4,800.00		$0.00	$5,599.69	
	Basis (Full/Incremental)			Full			Full		Full	Full	
Incremental O&M ($/yr.)				$0			$0		$0	$0	
Lifetimes	Upgrade (yrs.)			30			30		30	30	Approximate lifetime, based on previous Marbek energy efficiency potential studies
	Baseline (yrs.)			30			30		30	30	
Cost Savings ($/yr.)				$0			$0		$0	$0	
Simple Payback (yrs.)				N/A			N/A		N/A	0.00	
NPV of O&M Costs ($)				$0			$0		$0	$0	
Total Benefits ($)	Electric Energy			$0			$0		$0	$0	
	Electric Demand			$0			$0		$0	$0	
	Natural Gas			$0			$0		$0	$0	
	Oil			$0			$0		$0	$0	
	Water			$0			$0		$0	$0	
Measure TRC ($)				-$6,000			-$4,800		$0	-$5,600	
Benefit/Cost Ratio				0.00			0.00		0.00	0.00	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed			1			1		1	
Cost Flag (i.e. way measure is typically applied)			Incremental			Incremental		Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No) Baseline	Upgrade	Measure Resource Savings (%) Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	Standard EGH rating assumes no space cooling
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No) Baseline	Upgrade	Measure Resource Savings (%) Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No) Baseline	Upgrade	Measure Resource Savings (%) Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	

Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	**Sub End Use/Equipment (If Applicable)**	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
		Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Ventilation and Circulation	0	0			-			-		-	-	
Space Cooling	0	0			-			-		-	-	
Clothes Washers	0	0			-			-		-	-	
Dishwashers	0	0			-			-		-	-	
Other Electric Loads	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Space Heating	0	0			-			-		-	-	
Domestic Hot Water (DHW)	0	0			-			-		-	-	
Fireplaces	0	0			-			-		-	-	
Cooking	0	0			-			-		-	-	
Clothes Dryers	0	0			-			-		-	-	
Pool and Spa Heaters	0	0			-			-		-	-	
Other	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Space Heating	0	0			-			-		-	-	
Domestic Hot Water (DHW)	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Water	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, VANCOUVER ISLAND - NATURAL GAS EFFICIENCY

Back to Index

Net-Zero Ready Energy Homes

		References/Notes
Description:	Net-zero energy homes (NZEH) produce at least as much energy as they consume. This is accomplished by incorporating on-site power generation, such as solar PV panels or small wind turbines, to offset electrical loads. However, the energy consumption of a NZEH is significantly lower, due to the addition of a wide array of energy efficiency features. Measures that are typically considered include increased insulation, super high-performance windows, ENERGY STAR® appliances, solar thermal space and/or water heating, heat pumps, and passive solar designs. This measure is designed to produce a highly efficient house that is ready to be turned into a NZEH with the addition of on-site renewable energy generation.	
Baseline:	An average new home (Minimum EGH rating of 80 required)	
Upgrade:	A net-zero energy ready home (EGH rating of 86 assumed)	

Baseline Reference:	1. Annual consumption, end use
Heating Fuel Type:	All Fuels (Average Fuel Mix)
Main End Use:	Space Heating
Discount Rate:	7.38%
GHG Adder Incl.?	No
Resource Costs:	Baseload

= User Input
= Calculation

	Customer Cost	Avoided Costs (NPV)						
Electricity ($/kWh)	$0.083			$1.648			$1.648		$1.648
Electricity ($/kW)	$0.000			$0.000			$0.000		$0.000
Natural Gas ($/MJ)	$0.010			$0.139			$0.139		$0.139
Oil ($/L)	$0.000			$0.000			$0.000		$0.000
Water ($/1000L)	$0.000			$0.000			$0.000		$0.000

Sub-sector		Detached (Pre-1976) ☐	Detached (Post-1976) ☐	Detached (New) ☑	Attached (Pre-1976) ☐	Attached (Post-1976) ☐	Attached (New) ☑	Mobile (Existing) ☐	Mobile (New) ☑	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)			768			384		176	670	
	Natural Gas (MJ/yr.)			59,473			37,577		41,728	54,212	
	Oil (L/yr.)			-			-		-	-	
	Water (L/yr.)			-			-		-	-	
Upgrade Consumption	Electricity (kWh/yr.)			538			269		123	469	
	Natural Gas (MJ/yr.)			41,631			26,304		29,210	37,948	
	Oil (L/yr.)			-			-		-	-	
	Water (L/yr.)			-			-		-	-	
Interactive Effects (Inputs)	Heating Penalty ☐			0%			0%		0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐			0%			0%		0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)			-			-		-	-	
	Electricity, Cooling (kWh/yr.)			-			-		-	-	
	Electricity, Total (kWh/yr.)			-			-		-	-	
	Natural Gas (MJ/yr.)			-			-		-	-	
	Oil (L/yr.)			-			-		-	-	
Winter Peak Hours-Use Factor				-			-		-	-	
Resource Savings	Electricity (kWh/yr.)			230			115		53	201	
	Electricity (kW peak)			-			-		-	-	
	Natural Gas (MJ/yr.)			17,842			11,273		12,519	16,263	
	Oil (L/yr.)			-			-		-	-	
	Water (L/yr.)			-			-		-	-	
Cost Parameters	Upgrade, Material ($)			$14,000.00			$9,800.00		$9,800.00	$12,972.99	Working value of $14,000 based on NRCan's R-2000 renewal work (personal communication with Anil Parekh, Nov. 25, 2010). Assumed that cost scales by 75% for detached and mobile homes.
	Upgrade, Installation ($)			$0.00			$0.00		$0.00	$0.00	
	Baseline, Material ($)			$0.00			$0.00		$0.00	$0.00	
	Baseline, Installation ($)			$0.00			$0.00		$0.00	$0.00	
	Total Measure Cost ($)			$14,000.00			$9,800.00		$9,800.00	$12,972.99	
	Basis (Full/Incremental)			Full			Full		Full	Full	
Incremental O&M ($/yr.)				$0			$0		$0	$0	
Lifetimes	Upgrade (yrs.)			30			30		30	30	Maximum lifetime used in study.
	Baseline (yrs.)			30			30		30	30	
Cost Savings ($/yr.)				$194			$120		$127	$176	
Simple Payback (yrs.)				72.2			81.7		77.1	74.40	
NPV of O&M Costs ($)				$0			$0		$0	$0	
Total Benefits ($)	Electric Energy			$380			$190		$87	$331	
	Electric Demand			$0			$0		$0	$0	
	Natural Gas			$2,482			$1,568		$1,741	$2,262	
	Oil			$0			$0		$0	$0	
	Water			$0			$0		$0	$0	
Measure TRC ($)				-$11,139			-$8,042		-$7,972	-$10,380	
Benefit/Cost Ratio				0.20			0.18		0.19	0.20	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed			1			1		1	
Cost Flag (i.e. way measure is typically applied)			Incremental			Incremental		Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1			30.0%			30.0%		30.0%	30.0%	Going from EGH 80 to EGH 86 represents a savings of 30%. It is assumed that all major end uses are affected equally.
Space Cooling	-	0	0									-	Standard EGH rating assumes no space cooling
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1			30.0%			30.0%		30.0%	30.0%	Going from EGH 80 to EGH 86 represents a savings of 30%. It is assumed that all major end uses are affected equally.
Domestic Hot Water (DHW)	-	1	1			30.0%			30.0%		30.0%	30.0%	Going from EGH 80 to EGH 86 represents a savings of 30%. It is assumed that all major end uses are affected equally.
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	

Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1			30.0%			30.0%		30.0%	30.0%	
Space Cooling	0	0			-			-		-	-	
Clothes Washers	0	0			-			-		-	-	
Dishwashers	0	0			-			-		-	-	
Other Electric Loads	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1			30.0%			30.0%		30.0%	30.0%	
Domestic Hot Water (DHW)	1	1			30.0%			30.0%		30.0%	30.0%	
Fireplaces	0	0			-			-		-	-	
Cooking	0	0			-			-		-	-	
Clothes Dryers	0	0			-			-		-	-	
Pool and Spa Heaters	0	0			-			-		-	-	
Other	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0			-			-		-	-	
Domestic Hot Water (DHW)	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, VANCOUVER ISLAND - NATURAL GAS EFFICIENCY

Back to Index

High Efficiency Condensing Gas Furnaces

		References/Notes
Description:	Federal legislation now requires that all residential furnaces meet the minimum performance standard of 90% AFUE . However, higher efficiency condensing furnaces are available. These furnaces include more advanced heat exchanger designs that extract more heat from the flue gases before they are exhausted.	
Baseline:	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 90%	BC minimum
Upgrade:	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 96%	

Baseline Reference:	1. Annual consumption, end use
Heating Fuel Type:	All Fuels (Average Fuel Mix)
Main End Use:	Space Heating
Discount Rate:	7.38%
GHG Adder Incl.?	No
Resource Costs:	Baseload

= User Input
= Calculation

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	54,195	44,259	44,259	29,496	24,104	24,104	28,549	28,549	42,939	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	50,781	41,471	41,471	27,638	22,585	22,585	26,751	26,751	40,234	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	3,414	2,788	2,788	1,858	1,519	1,519	1,799	1,799	2,705	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$4,667.00	$4,667.00	$4,667.00	$4,667.00	$4,667.00	$4,667.00	$4,667.00	$4,667.00	$4,667.00	Cost of a 96% AFUE gas furnace, based on Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-41, April 16, 2009.
	Upgrade, Installation ($)	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	Approximate installation cost
	Baseline, Material ($)	$3,190.00	$3,190.00	$3,190.00	$3,190.00	$3,190.00	$3,190.00	$3,190.00	$3,190.00	$3,190.00	Cost of a 90% AFUE gas furnace, based on Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-41, April 16, 2009.
	Baseline, Installation ($)	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	Approximate installation cost
	Total Measure Cost ($)	$1,477.00	$1,477.00	$1,477.00	$1,477.00	$1,477.00	$1,477.00	$1,477.00	$1,477.00	$1,477.00	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	18	18	18	18	18	18	18	18	18	Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-41, April 16, 2009.
	Baseline (yrs.)	18	18	18	18	18	18	18	18	18	Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-41, April 16, 2009.
Cost Savings ($/yr.)		$33	$27	$27	$18	$15	$15	$18	$18	$27	
Simple Payback (yrs.)		44.1	54.1	54.1	81.1	99.3	99.3	83.8	83.8	59.27	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$357	$292	$292	$194	$159	$159	$188	$188	$283	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$1,120	-$1,185	-$1,185	-$1,283	-$1,318	-$1,318	-$1,289	-$1,289	-$1,194	
Benefit/Cost Ratio		0.24	0.20	0.20	0.13	0.11	0.11	0.13	0.13	0.19	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	96% AFUE versus 90% AFUE
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	

Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, VANCOUVER ISLAND - NATURAL GAS EFFICIENCY

Back to Index

Early Retirement of Existing Gas Furnaces

		References/Notes
Description:	Federal legislation now requires that all residential furnaces meet the minimum performance standard of 90% AFUE . However, consumers with less efficient furnaces that still work may wait years before replacing them. Early retirement of existing furnaces that are still functional is an option. Energy savings only last until the old furnace would have been replaced, because after that the energy consumption of the base case and upgrade is the same. The consumer has the added peace of mind of having a new furnace that is less likely to break down in winter.	
Baseline:	Keep existing 82% efficient furnace until failure, assumed to be in 9 years; then replace with the same furnace as the upgrade	Calculation of average existing efficiency from the REUS
Upgrade:	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 90%	BC minimum

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$0.884	$0.884		$0.884	$0.884		$0.884	
Electricity ($/kW)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	
Natural Gas ($/MJ)	$0.010	$0.061	$0.061		$0.061	$0.061		$0.061	
Oil ($/L)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	
Water ($/1000L)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☐	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☐	Mobile (Existing) ☑	Mobile (New) ☐	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-		-	-		-		-	
	Natural Gas (MJ/yr.)	54,195	44,259		29,496	24,104		28,549		46,448	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-		-	-		-		-	
	Natural Gas (MJ/yr.)	49,378	40,325		26,874	21,961		26,012		42,319	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%		0%	0%		0%		0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%		0%	0%		0%		0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-		-	-		-		-	
	Electricity, Cooling (kWh/yr.)	-	-		-	-		-		-	
	Electricity, Total (kWh/yr.)	-	-		-	-		-		-	
	Natural Gas (MJ/yr.)	-	-		-	-		-		-	
	Oil (L/yr.)	-	-		-	-		-		-	
Winter Peak Hours-Use Factor		-	-		-	-		-		-	
Resource Savings	Electricity (kWh/yr.)	-	-		-	-		-		-	
	Electricity (kW peak)	-	-		-	-		-		-	
	Natural Gas (MJ/yr.)	4,817	3,934		2,622	2,143		2,538		4,129	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Cost Parameters	Upgrade, Material ($)	$3,190.00	$3,190.00		$3,190.00	$3,190.00		$3,190.00		$3,190.00	Cost of a 90% AFUE gas furnace, based on Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-41, April 16, 2009.
	Upgrade, Installation ($)	$750.00	$750.00		$750.00	$750.00		$750.00		$750.00	Approximate installation cost
	Baseline, Material ($)	$1,680.66	$1,680.66		$1,680.66	$1,680.66		$1,680.66		$1,680.66	Cost of a 90% AFUE gas furnace, based on Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-41, April 16, 2009. Discounted by remaining life.
	Baseline, Installation ($)	$395.14	$395.14		$395.14	$395.14		$395.14		$395.14	Approximate installation cost
	Total Measure Cost ($)	$1,864.20	$1,864.20		$1,864.20	$1,864.20		$1,864.20		$1,864.20	
	Basis (Full/Incremental)	Incr.	Incr.		Incr.	Incr.		Incr.		Incr.	
Incremental O&M ($/yr.)		$0	$0		$0	$0		$0		$0	
Lifetimes	Upgrade (yrs.)	9	9		9	9		9		9	Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-41, April 16, 2009. See calculation at top right. Assumed age of present furnace is subtracted from Navigant's lifetime assumption
	Baseline (yrs.)	9	9		9	9		9		9	Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-41, April 16, 2009. See calculation at top right. Assumed age of present furnace is subtracted from Navigant's lifetime assumption
Cost Savings ($/yr.)		$47	$39		$26	$21		$25		$40	
Simple Payback (yrs.)		39.5	48.4		72.6	88.8		75.0		48.12	
NPV of O&M Costs ($)		$0	$0		$0	$0		$0		$0	
Total Benefits ($)	Electric Energy	$0	$0		$0	$0		$0		$0	
	Electric Demand	$0	$0		$0	$0		$0		$0	
	Natural Gas	$294	$240		$160	$131		$155		$252	
	Oil	$0	$0		$0	$0		$0		$0	
	Water	$0	$0		$0	$0		$0		$0	
Measure TRC ($)		-$1,570	-$1,624		-$1,704	-$1,733		-$1,709		-$1,612	
Benefit/Cost Ratio		0.16	0.13		0.09	0.07		0.08		0.14	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1		1	1		1		
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental		Incremental	Incremental		Incremental		
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	8.9%	8.9%		8.9%	8.9%		8.9%		8.9%	90% AFUE versus 82% AFUE
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	

Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	**Sub End Use/Equipment (If Applicable)**	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
		Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Ventilation and Circulation	0	0	-	-		-	-		-		-	
Space Cooling	0	0	-	-		-	-		-		-	
Clothes Washers	0	0	-	-		-	-		-		-	
Dishwashers	0	0	-	-		-	-		-		-	
Other Electric Loads	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Space Heating	1	1	8.9%	8.9%		8.9%	8.9%		8.9%		8.9%	
Domestic Hot Water (DHW)	0	0	-	-		-	-		-		-	
Fireplaces	0	0	-	-		-	-		-		-	
Cooking	0	0	-	-		-	-		-		-	
Clothes Dryers	0	0	-	-		-	-		-		-	
Pool and Spa Heaters	0	0	-	-		-	-		-		-	
Other	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Space Heating	0	0	-	-		-	-		-		-	
Domestic Hot Water (DHW)	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Water	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, VANCOUVER ISLAND - NATURAL GAS EFFICIENCY

Back to Index

Condensing Gas Boilers

		References/Notes
Description:	High-efficiency condensing boilers feature advanced heat exchanger designs that extract more heat from the flue gases before they are exhausted. So much heat is extracted that the flue gases condense and must be discharged as a condensate rather than a gas. In retrofit applications where condensing boilers are replacing non-condensing units, it may be necessary to modify the radiating system. Otherwise, the units may not actually condense the flue gas and realize their full efficiency potential.	
Baseline:	A non-condensing mid-efficiency natural gas boiler (82% AFUE assumed)	Minimum proposed standard for gas boilers, to take effect on Sept. 1, 2010 - Link.
Upgrade:	A condensing natural gas boiler (92% AFUE assumed)	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	54,195	44,259	44,259	29,496	24,104	24,104	28,549	28,549	42,939	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	48,288	39,435	39,435	26,281	21,476	21,476	25,438	25,438	38,258	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	5,907	4,824	4,824	3,215	2,627	2,627	3,112	3,112	4,680	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$8,200.00	$8,200.00	$8,200.00	$8,200.00	$8,200.00	$8,200.00	$8,200.00	$8,200.00	$8,200.00	Needs to be updated
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Installation costs included above
	Baseline, Material ($)	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	Needs to be updated
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Installation costs included above
	Total Measure Cost ($)	$3,200.00	$3,200.00	$3,200.00	$3,200.00	$3,200.00	$3,200.00	$3,200.00	$3,200.00	$3,200.00	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	20	20	20	20	20	20	20	20	20	Needs to be updated
	Baseline (yrs.)	20	20	20	20	20	20	20	20	20	Needs to be updated
Cost Savings ($/yr.)		$58	$47	$47	$32	$26	$26	$30	$30	$46	
Simple Payback (yrs.)		55.3	67.7	67.7	101.6	124.3	124.3	104.9	104.9	74.22	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$660	$539	$539	$359	$294	$294	$348	$348	$523	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$2,540	-$2,661	-$2,661	-$2,841	-$2,906	-$2,906	-$2,852	-$2,852	-$2,677	
Benefit/Cost Ratio		0.21	0.17	0.17	0.11	0.09	0.09	0.11	0.11	0.16	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	10.9%	10.9%	10.9%	10.9%	10.9%	10.9%	10.9%	10.9%	10.9%	92% AFUE versus 82% AFUE
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	

Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	10.9%	10.9%	10.9%	10.9%	10.9%	10.9%	10.9%	10.9%	10.9%	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, VANCOUVER ISLAND - NATURAL GAS EFFICIENCY

Back to Index

High Efficiency Gas Fireplaces

		References/Notes
Description:	All vented gas fireplaces sold in Canada must now be tested for their energy efficiency using the Canadian Standards Association CSA-P.4.1-02 standard if they are shipped across provincial lines. The energy-efficiency rating of the fireplace is printed on the EnerGuide label. EnerGuide does not set a minimum efficiency level, so savings are possible by using the EnerGuide label to choose the more efficient unit.	
Baseline:	An average efficiency natural gas fireplace (60% assumed)	NRCan data, obtained via personal communication, 2008
Upgrade:	A high efficiency natural gas fireplace (80% assumed)	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.226	$1.226	$1.226	$1.226	$1.226	$1.226	$1.226	$1.226
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.092	$0.092	$0.092	$0.092	$0.092	$0.092	$0.092	$0.092
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	16,836	16,836	16,836	10,253	10,253	10,253	10,253	10,253	15,732	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	12,627	12,627	12,627	7,690	7,690	7,690	7,690	7,690	11,799	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	4,209	4,209	4,209	2,563	2,563	2,563	2,563	2,563	3,933	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$150.00	$150.00	$150.00	$150.00	$150.00	$150.00	$150.00	$150.00	$150.00	Previous analyses have suggested that the cost of gas fireplaces has more to do with "add-ons" (e.g., mantles, etched glass, etc.) than with efficiency. An incremental cost of $150 is assumed for higher-efficiency models, based on a discussion 22 Nov 2010 with Paul Miles of Miles Industries.
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$150.00	$150.00	$150.00	$150.00	$150.00	$150.00	$150.00	$150.00	$150.00	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Set to incremental
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	15	15	15	15	15	15	15	15	15	Lifetime based on previous energy efficiency potential studies conducted by Marbek
	Baseline (yrs.)	15	15	15	15	15	15	15	15	15	Lifetime based on previous energy efficiency potential studies conducted by Marbek
Cost Savings ($/yr.)		$41	$41	$41	$25	$25	$25	$25	$25	$39	
Simple Payback (yrs.)		3.6	3.6	3.6	6.0	6.0	6.0	6.0	6.0	4.03	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$388	$388	$388	$237	$237	$237	$237	$237	$363	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		$238	$238	$238	$87	$87	$87	$87	$87	$213	
Benefit/Cost Ratio		2.59	2.59	2.59	1.58	1.58	1.58	1.58	1.58	2.42	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	1	1	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	Improvement from average efficiency of 60% to 80%.
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	

Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	1	1	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Programmable Thermostats (Central Heating and Cooling)

		References/Notes
Description:	Digital programmable thermostats provide improved temperature setting accuracy and allow occupants to preset temperatures for various time periods. A 4ºC temperature setback is often assumed during night and unoccupied periods. However, utility studies have indicated that a lower average setback value should be used to reflect the fact that the thermostat's setback capabilities do not completely reflect how they are used. For example, some home occupants reliably set back manual thermostats while others do not use the setback features on their electronic thermostats.	
Baseline:	Non-programmable thermostat installed on central forced-air natural gas furnace and electric space cooling system	
Upgrade:	Programmable thermostat installed on central forced-air natural gas furnace and electric space cooling system	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.015	$1.015	$1.015	$1.015	$1.015	$1.015	$1.015	$1.015
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.073	$0.073	$0.073	$0.073	$0.073	$0.073	$0.073	$0.073
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☑	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☑	Mobile (Existing) ☑	Mobile (New) ☑	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	878	1,078	1,035	565	565	543	359	345	929	
	Natural Gas (MJ/yr.)	54,195	44,259	44,259	29,496	24,104	24,104	28,549	28,549	42,939	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	865	1,063	1,021	557	557	535	353	339	917	
	Natural Gas (MJ/yr.)	50,672	41,382	41,382	27,579	22,537	22,537	26,694	26,694	40,148	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	13	14	14	8	8	8	7	6	13	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	3,523	2,877	2,877	1,917	1,567	1,567	1,856	1,856	2,791	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	Based on a retail scan of p-stats designed for central space heating and cooling (Home Depot, 2010)
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Assume that homeowners are able to install programmable thermostats on their own
	Baseline, Material ($)	$25.00	$25.00	$25.00	$25.00	$25.00	$25.00	$25.00	$25.00	$25.00	Based on a retail scan of manual thermostats designed for central space heating and cooling (Home Depot, 2010)
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Assume that homeowners are able to install thermostats on their own
	Total Measure Cost ($)	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	11	11	11	11	11	11	11	11	11	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 327, January 2010.
	Baseline (yrs.)	11	11	11	11	11	11	11	11	11	Assume similar lifetime for non-programmable thermostats
Cost Savings ($/yr.)		$36	$29	$29	$19	$16	$16	$19	$19	$28	
Simple Payback (yrs.)		1.4	1.7	1.7	2.6	3.1	3.1	2.7	2.7	1.87	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$13	$15	$14	$8	$8	$8	$7	$6	$13	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$256	$209	$209	$139	$114	$114	$135	$135	$203	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		$219	$173	$173	$97	$72	$71	$91	$91	$166	
Benefit/Cost Ratio		5.37	4.47	4.46	2.95	2.44	2.43	2.83	2.82	4.31	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	Assuming only night setback to 18°C (conservative estimate). Savings based on NRC, "The effects of thermostat set-back and set-up on seasonal energy consumption, surface temperatures and recovery times at the CCHT Twin House Facility", ASHRAE Transactions, v. 113, pt. 1, p. 5, 2007. Savings are conservative because testing was in R-2000 homes.
Space Cooling	-	1	1	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	Assuming day set-up to 25°C and low solar gains (conservative). Savings based on NRC, "The effects of thermostat set-back and set-up on seasonal energy consumption, surface temperatures and recovery times at the CCHT Twin House Facility", ASHRAE Transactions, v. 113, pt. 1, p. 8, 2007.
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	Assuming only night setback to 18°C (conservative estimate). Savings based on NRC, "The effects of thermostat set-back and set-up on seasonal energy consumption, surface temperatures and recovery times at the CCHT Twin House Facility", ASHRAE Transactions, v. 113, pt. 1, p. 5, 2007. Savings are conservative because testing was in R-2000 homes.
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment	Applies? (1=Yes; 0=No)	Measure Resource Savings (%)	References/Notes

Main End Use	Use/Equipment (If Applicable)	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	
Space Cooling	1	1	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Water

											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, VANCOUVER ISLAND - NATURAL GAS EFFICIENCY

Back to Index

Solar Pre-Heated Make-Up Air Systems (e.g., SolarWall®)

		References/Notes
Description:	Solar preheated ventilation systems preheat incoming ventilation air and reduce heat loss through the portion of the building shell covered by them. They consist of perforated steel or aluminum absorber sheets that are mounted vertically on a building's exterior surface and are ideally mounted on southerly facing walls, plus or minus 20 degrees. The dark coloured metal sheets that make up the system are mounted a small distance away from the building's surface, creating an air cavity. A negative pressure is created within the cavity by ventilation fans and air is drawn through small holes in the metal panels. On sunny winter days, these systems can raise incoming air temperatures by 25°C to 35°C. In summer months, ventilation air can be drawn directly from the outside through a bypass damper, while heated air is rejected through vents at the top of the air cavity. These systems are generally used in commercial and industrial applications but they have seen some limited residential use.	
Baseline:	Homes with ducting and heat recovery ventilators (HRVs)	
Upgrade:	A 10 m2 solar pre-heated make-up air system, located on the south side of a home	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.648	$1.648	$1.648	$1.648	$1.648	$1.648	$1.648	$1.648
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.139	$0.139	$0.139	$0.139	$0.139	$0.139	$0.139	$0.139
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	600	800	768	400	400	384	183	176	675	
	Natural Gas (MJ/yr.)	54,195	44,259	44,259	29,496	24,104	24,104	28,549	28,549	42,939	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	586	782	751	391	391	375	179	172	660	
	Natural Gas (MJ/yr.)	52,949	43,241	43,241	28,817	23,549	23,549	27,893	27,893	41,951	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	14	18	18	9	9	9	4	4	16	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	1,246	1,018	1,018	678	554	554	657	657	988	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$845.00	$845.00	$845.00	$845.00	$845.00	$845.00	$845.00	$845.00	$845.00	Based on private communication with Conserval, installed cost is about $130/m^2 - asumming 65% for material.
	Upgrade, Installation ($)	$455.00	$455.00	$455.00	$455.00	$455.00	$455.00	$455.00	$455.00	$455.00	Based on private communication with Conserval, installed cost is about $130/m^2 - asumming 35% for labour.
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$1,300.00	$1,300.00	$1,300.00	$1,300.00	$1,300.00	$1,300.00	$1,300.00	$1,300.00	$1,300.00	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	40	40	40	40	40	40	40	40	40	Personal communication, D McClenahan, NRCan, #### (year?)
	Baseline (yrs.)	-	-	-	-	-	-	-	-	-	
Cost Savings ($/yr.)		$13	$11	$11	$7	$6	$6	$7	$7	$11	
Simple Payback (yrs.)		97.3	113.0	113.6	175.4	209.9	210.9	191.6	192.0	126.00	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$23	$30	$29	$15	$15	$15	$7	$7	$26	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$173	$142	$142	$94	$77	$77	$91	$91	$137	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$1,104	-$1,128	-$1,129	-$1,190	-$1,208	-$1,208	-$1,202	-$1,202	-$1,137	
Benefit/Cost Ratio		0.15	0.13	0.13	0.08	0.07	0.07	0.08	0.08	0.13	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	Past Marbek work indicates approximately a 13% savings due to an HRV. An Enermodal paper indicates that a combined Solar Wall and HRV together would have a savings of 15%. This is a 2.3% savings.
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	See note above.
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	

Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, VANCOUVER ISLAND - NATURAL GAS EFFICIENCY

Back to Index

High Efficiency Heat Recovery Ventilators (HRVs)

		References/Notes
Description:	Heat recovery ventilators (HRVs) are heat exchangers that are integrated into the centralized ventilation and exhaust systems of many newer homes. In the winter, they allow for incoming fresh air to be heated by outgoing stale air. Conversely, in homes with central air conditioning systems, they allow incoming fresh air to be cooled by outgoing stale air in the summer. High efficiency HRVs incorporate more effective heat exchangers. Some models also include desiccant wheels so that latent heat (i.e. humidity) can be transferred between the two air streams.	
Baseline:	A standard-efficiency (sensible efficiency of approximately 70%) heat recovery ventilator (HRV), in a home with central heating and cooling	
Upgrade:	A high-efficiency heat recovery ventilator (HRV) (sensible efficiency of approximately 85%), in a home with central heating and cooling	

Baseline Reference:	1. Annual consumption, end use
Heating Fuel Type:	All Fuels (Average Fuel Mix)
Main End Use:	Space Heating
Discount Rate:	7.38%
GHG Adder Incl.?	No
Resource Costs:	Baseload

= User Input
= Calculation

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.226	$1.226	$1.226	$1.226	$1.226	$1.226	$1.226	$1.226
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/m^3)	$0.010	$0.092	$0.092	$0.092	$0.092	$0.092	$0.092	$0.092	$0.092
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☑	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☑	Mobile (Existing) ☑	Mobile (New) ☑	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	878	1,078	1,035	565	565	543	359	345	929	
	Natural Gas (m3/yr.)	54,195	44,259	44,259	29,496	24,104	24,104	28,549	28,549	42,939	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	855	1,050	1,008	550	550	529	350	336	905	
	Natural Gas (m3/yr.)	52,786	43,108	43,108	28,729	23,477	23,477	27,807	27,807	41,822	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	23	28	27	15	15	14	9	9	24	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Nat. Gas (m3/yr.)	1,409	1,151	1,151	767	627	627	742	742	1,116	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$1,600.00	$1,600.00	$1,600.00	$1,600.00	$1,600.00	$1,600.00	$1,600.00	$1,600.00	$1,600.00	Based on 2010 cost estimates for Saskatchewan homes from Rob Dumont (Dumont and Associates) and Dave Fetsch (Sun Ridge Group).
	Upgrade, Installation ($)	$800.00	$800.00	$800.00	$800.00	$800.00	$800.00	$800.00	$800.00	$800.00	Based on 2010 cost estimates for Saskatchewan homes from Rob Dumont (Dumont and Associates) and Dave Fetsch (Sun Ridge Group). Installation cost is very dependant on the home and accessibility within it.
	Baseline, Material ($)	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	Based on 2010 cost estimates for Saskatchewan homes from Rob Dumont (Dumont and Associates) and Dave Fetsch (Sun Ridge Group).
	Baseline, Installation ($)	$800.00	$800.00	$800.00	$800.00	$800.00	$800.00	$800.00	$800.00	$800.00	Based on 2010 cost estimates for Saskatchewan homes from Rob Dumont (Dumont and Associates) and Dave Fetsch (Sun Ridge Group). Installation cost is very dependant on the home and accessibility within it.
	Total Measure Cost ($)	$600.00	$600.00	$600.00	$600.00	$600.00	$600.00	$600.00	$600.00	$600.00	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	15	15	15	15	15	15	15	15	15	E Source Heating Technology Atlas. Also used in previous energy efficiency potential studies by Marbek. Most manufacturers provide limited lifetime warranties on HRV cores.
	Baseline (yrs.)	15	15	15	15	15	15	15	15	15	E Source Heating Technology Atlas. Also used in previous energy efficiency potential studies by Marbek. Most manufacturers provide limited lifetime warranties on HRV cores.
Cost Savings ($/yr.)		$16	$14	$14	$9	$7	$7	$8	$8	$13	
Simple Payback (yrs.)		38.2	44.1	44.4	68.7	81.5	82.1	74.6	74.8	49.21	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$28	$34	$33	$18	$18	$17	$11	$11	$30	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$130	$106	$106	$71	$58	$58	$68	$68	$103	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$442	-$459	-$461	-$511	-$524	-$525	-$520	-$521	-$467	
Benefit/Cost Ratio		0.26	0.23	0.23	0.15	0.13	0.13	0.13	0.13	0.22	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	Based on previous Marbek analyses, standard (~70% efficient) reduce space heating energy use by about 13% (i.e. for a similar ventilation rate). High efficiency models are about 20% more efficient.
Space Cooling	-	1	1	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	See comment for space heating. Similar savings are assumed for this end use.
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	See comment for space heating. Similar savings are assumed for this end use.
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment	Applies? (1=Yes; 0=No)	Measure Resource Savings (%)	References/Notes

Main End Use	Use/Equipment (If Applicable)	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	
Space Cooling	1	1	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, VANCOUVER ISLAND - NATURAL GAS EFFICIENCY

Back to Index

Gas-Fired Air-Source Heat Pumps

Not used--not commercially available in residential sizes.

		References/Notes
Description:	Early gas-fired heat pumps, such as the York Triathlon, were unsuccessful due to their bulky size and poor quality design. A new generation of gas absorption heat pumps (GAHPs) is currently available through Robur, an Italian manufacturer. These systems can either be ground-source or air-source (i.e., the heat sink may be either an underground fluid loop or an above ground heat exchanger coil). Air-source systems are substantially less expensive since they don't require drilling to install underground fluid loops. However, they can also be much less efficient than ground-source versions since their efficiency is a function of outside air temperature. Commercial-sized GAHP systems have been available in Canada since mid-2007 but residential-sized systems are rare in North America. It is hoped that residential-sized units will become more available in Canada within the study period, but the current manufacturers do not have specific plans at this time. It is estimated that air-source systems can operate at temperatures as low as -29°C and have annual efficiencies of 105% in cold winter locations. In more moderate winter climates, an efficiency of up to 129% is advertised. Unlike electric heat pump systems, GAHPs do not require any auxiliary heating equipment. In addition, the lack of a mechanical compressor extends their lifetime and allows air-source systems to withstand more extreme temperatures.	
Baseline:	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 90%	
Upgrade:	A gas-fired air-source heat pump. This option is not valid because these units are not available in residential sizes.	

Baseline Reference:	1. Annual consumption, end use
Heating Fuel Type:	All Fuels (Average Fuel Mix)
Main End Use:	Space Heating
Discount Rate:	7.38%
GHG Adder Incl.?	No
Resource Costs:	Baseload

= User Input
= Calculation

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☑	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☑	Mobile (Existing) ☑	Mobile (New) ☑	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	-	-	-	-	-	-	-	-	0	
	Baseline (yrs.)	-	-	-	-	-	-	-	-	-	
Cost Savings ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Simple Payback (yrs.)		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Benefit/Cost Ratio		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	

Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, VANCOUVER ISLAND - NATURAL GAS EFFICIENCY

Back to Index

Gas-Fired Ground-Source Heat Pumps

Not used--not yet commercially available in residential sizes.

		References/Notes
Description:	Early gas-fired heat pumps, such as the York Triathlon, were unsuccessful due to their bulky size and poor quality design. A new generation of gas absorption heat pumps (GAHPs) is currently available through Robur, an Italian manufacturer. These systems can either be ground-source or air-source (i.e., the heat sink may be either an underground fluid loop or an above ground heat exchanger coil). Air-source systems are substantially less expensive since they don't require drilling to install underground fluid loops. However, they can also be much less efficient than ground-source versions since their efficiency is a function of outside air temperature. Commercial-sized GAHP systems have been available in Canada since mid-2007 but residential-sized systems are not currently available outside of Europe. It is hoped that residential-sized units will become more available in Canada within the study period, but the current manufacturers do not have specific plans at this time. Ground-source GAHPs have efficiencies (COPs) ranging from 120% to 130% Unlike electric heat pump systems, GAHPs do not require any auxiliary heating equipment. In addition, the lack of a mechanical compressor extends their lifetime.	Need--Installed cost, maintenance costs/year, lifetime, savings (heating, cooling, HVAC)
Baseline:	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 90%	
Upgrade:	A gas-fired ground-source heat pump. This option is not valid because these units are not available in residential sizes.	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/m^3)	$0.010	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	-	-	-	-	-	-	-	-	0	
	Baseline (yrs.)	-	-	-	-	-	-	-	-	-	
Cost Savings ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Simple Payback (yrs.)		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Benefit/Cost Ratio		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	

Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, VANCOUVER ISLAND - NATURAL GAS EFFICIENCY

Back to Index

Integrated Heating and DHW (Forced Air Heating)

		References/Notes
Description:	Integrated mechanical systems combine the most efficient technologies for residential space heating and domestic water heating into one package. For example, the Matrix system by NTI NY Thermal incorporates a condensing furnace, condensing boiler, condensing water heater and HRV all in one unit. Primary benefits of the integrated units include compact construction, lower cost of installation (only one set of gas, water and circulation connections are required), and lower installation and maintenance costs (once the technology is mature). Since the minimum performance standards for furnaces was brought up to 90% efficiency at the end of 2009, the base case system is a 90% efficient forced-air furnace and a standard efficiency natural gas tank-style water heater. With this baseline, the integrated system would offer little in the way of space heating savings, but it does still offer DHW savings because the integrated system would heat domestic water with its high-efficiency, condensing combustion.	
Baseline:	A 90% AFUE efficient forced-air condensing furnace, a standard efficiency natural gas tank-style water heater (EF of 0.62 or 0.64 assumed) and a standard efficiency HRV	
Upgrade:	An integrated heating and DHW system, with a condensing furnace (AFUE of 94), a condensing natural gas water heater (EF of 0.80 assumed), and an HRV with an efficiency similar to that in the base case (72%).	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☑	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☑	Mobile (Existing) ☑	Mobile (New) ☑	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	69,409	59,473	59,473	42,970	37,577	37,577	41,728	41,728	57,854	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	62,971	53,462	53,462	38,063	32,903	32,903	37,206	37,206	51,987	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	6,438	6,011	6,011	4,906	4,674	4,674	4,522	4,522	5,868	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$15,000.00	$15,000.00	$10,000.00	$15,000.00	$15,000.00	$10,000.00	$15,000.00	$10,000.00	$12,500.00	Clifford Paite of Matrix estimates installed cost of $10,000 to $20,000, with the lowest cost in new homes. (2010 estimate)
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Included in cost above
	Baseline, Material ($)	$5,900.00	$5,900.00	$5,900.00	$5,900.00	$5,900.00	$5,900.00	$5,900.00	$5,900.00	$5,900.00	Installed costs of base furnace plus water heater. (Update if base costs are updated.)
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Included in cost above
	Total Measure Cost ($)	$8,505.78	$8,505.78	$3,505.78	$8,505.78	$8,505.78	$3,505.78	$8,505.78	$3,505.78	$6,005.78	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	18	18	18	18	18	18	18	18	18	Lifetime of high efficiency furnace--based on Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-41, April 16, 2009.
	Baseline (yrs.)	15	15	15	15	15	15	15	15	15	Lifetime of base efficiency furnace--based on Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-41, April 16, 2009.
Cost Savings ($/yr.)		$63	$59	$59	$48	$46	$46	$44	$44	$58	
Simple Payback (yrs.)		134.8	144.4	59.5	176.9	185.7	76.5	191.9	79.1	104.10	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$673	$628	$628	$513	$489	$489	$473	$473	$613	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$7,833	-$7,877	-$2,877	-$7,993	-$8,017	-$3,017	-$8,033	-$3,033	-$5,392	
Benefit/Cost Ratio		0.08	0.07	0.18	0.06	0.06	0.14	0.06	0.13	0.12	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	No savings as HRVs in base and proposed case are similar.
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	Difference between AFUE 94 and AFUE 90
Domestic Hot Water (DHW)	-	1	1	27.0%	27.0%	27.0%	27.0%	27.0%	27.0%	25.0%	25.0%	27.0%	Difference between Efs of .85 and .64 or .62.
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	

Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	
Domestic Hot Water (DHW)	1	1	27.0%	27.0%	27.0%	27.0%	27.0%	27.0%	25.0%	25.0%	27.0%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, VANCOUVER ISLAND - NATURAL GAS EFFICIENCY

Back to Index

Integrated Heating and DHW (Hydronic Heating)

		References/Notes
Description:	Integrated mechanical systems combine the most efficient technologies for residential space heating and domestic water heating into one package. For example, the Matrix system by NTI NY Thermal incorporates a condensing furnace, condensing boiler, condensing water heater and HRV all in one unit. Primary benefits of the integrated units include compact construction, lower cost of installation (only one set of gas, water and circulation connections are required), and lower installation and maintenance costs (once the technology is mature). Water heating in the base case is assumed to be provided by a standard efficiency natural gas tank-style water heater (EF of 0.62 or 0.64), while space heating is provided by a non-condensing boiler, assumed to have an AFUE of 82% . The HRV in the base case is assumed to be of similar efficiency to the HRV in the integrated unit.	
Baseline:	A non-condensing boiler with an AFUE of 82% and a standard efficiency natural gas tank-style water heater (EF of 0.62 or 0.64). An HRV of similar efficiency to the integrated unit (72%) is assumed.	
Upgrade:	An integrated heating and DHW system, with a condensing boiler (AFUE 92.7), a condensing natural gas water heater (EF of .85) and an HRV with an efficiency similar to that in the base case (72%).	

Baseline Reference:	1. Annual consumption, end use
Heating Fuel Type:	All Fuels (Average Fuel Mix)
Main End Use:	Space Heating
Discount Rate:	7.38%
GHG Adder Incl.?	No
Resource Costs:	Baseload

= User Input
= Calculation

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/m^3)	$0.010	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	69,409	59,473	59,473	42,970	37,577	37,577	41,728	41,728	57,854	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	58,798	50,054	50,054	35,792	31,047	31,047	35,008	35,008	48,680	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Nat. Gas (m3/yr.)	10,611	9,419	9,419	7,177	6,530	6,530	6,721	6,721	9,174	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$15,000.00	$15,000.00	$10,000.00	$15,000.00	$15,000.00	$10,000.00	$15,000.00	$10,000.00	$12,500.00	Clifford Paite of Matrix estimates installed cost of $10,000 to $20,000, with the lowest cost in new homes. (2010 estimate)
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Included in cost above.
	Baseline, Material ($)	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	Cost of base case boiler and water heater. (Update if base case costs are updated)
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$8,000.00	$8,000.00	$3,000.00	$8,000.00	$8,000.00	$3,000.00	$8,000.00	$3,000.00	$5,500.00	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	20	20	20	20	20	20	20	20	20	lifetime of high-efficiency condensing furnace. (Updated if condensing boiler option updated.)
	Baseline (yrs.)	20	20	20	20	20	20	20	20	20	lifetime of standard efficiency condensing furnace. (Updated if condensing boiler option updated.)
Cost Savings ($/yr.)		$104	$92	$92	$70	$64	$64	$66	$66	$90	
Simple Payback (yrs.)		76.9	86.7	32.5	113.7	125.0	46.9	121.5	45.5	61.08	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$1,186	$1,052	$1,052	$802	$730	$730	$751	$751	$1,025	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$6,814	-$6,948	-$1,948	-$7,198	-$7,270	-$2,270	-$7,249	-$2,249	-$4,475	
Benefit/Cost Ratio		0.15	0.13	0.35	0.10	0.09	0.24	0.09	0.25	0.23	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	No savings as HRVs in base and proposed case are similar.
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	Difference between AFUE 92.7 and AFUE 82
Domestic Hot Water (DHW)	-	1	1	27.0%	27.0%	27.0%	27.0%	27.0%	27.0%	25.0%	25.0%	27.0%	Difference between Efs of .85 and .64 or .62.
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	

Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	
Domestic Hot Water (DHW)	1	1	27.0%	27.0%	27.0%	27.0%	27.0%	27.0%	25.0%	25.0%	27.0%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, VANCOUVER ISLAND - NATURAL GAS EFFICIENCY

Back to Index

Condensing Gas Water Heaters

		References/Notes
Description:	Condensing water heaters feature advanced heat exchanger designs that extract more heat from the flue gases before they are exhausted. So much heat is extracted that the flue gases condense and must be discharged as a condensate rather than a gas. As a result, the efficiency of these types of water heaters is significantly higher than standard water heaters.	
Baseline:	A conventional storage natural gas hot water heater (EF of 0.62 or 0.64 assumed)	Current BC hot water heater regulations require an EF of 0.62 for 40 gallon (151 L) tanks and 0.64 for 30 gallon (114 L) tanks.
Upgrade:	A condensing natural gas water heater (EF of 0.80 assumed)	ENERGY STAR requirement for condensing hot water heaters is an EF of 0.80

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.128	$1.128	$1.128	$1.128	$1.128	$1.128	$1.128	$1.128
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.083	$0.083	$0.083	$0.083	$0.083	$0.083	$0.083	$0.083
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	15,214	15,214	15,214	13,474	13,474	13,474	13,179	13,179	14,915	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	11,791	11,791	11,791	10,442	10,442	10,442	10,543	10,543	11,567	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	3,423	3,423	3,423	3,032	3,032	3,032	2,636	2,636	3,349	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$1,500.00	$1,500.00	$1,500.00	$1,500.00	$1,500.00	$1,500.00	$1,500.00	$1,500.00	$1,500.00	Habart & Associates, "Market Transformation: Domestic Water Heaters," July 2010
	Upgrade, Installation ($)	$1,305.00	$1,305.00	$1,333.00	$1,305.00	$1,305.00	$1,333.00	$1,305.00	$1,333.00	$1,319.00	Habart & Associates, "Market Transformation: Domestic Water Heaters," July 2010
	Baseline, Material ($)	$675.00	$675.00	$675.00	$675.00	$675.00	$675.00	$675.00	$675.00	$675.00	Habart & Associates, "Market Transformation: Domestic Water Heaters," July 2010
	Baseline, Installation ($)	$563.00	$563.00	$1,085.00	$563.00	$563.00	$1,085.00	$563.00	$1,085.00	$824.00	Habart & Associates, "Market Transformation: Domestic Water Heaters," July 2010
	Total Measure Cost ($)	$1,567.00	$1,567.00	$1,073.00	$1,567.00	$1,567.00	$1,073.00	$1,567.00	$1,073.00	$1,320.00	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	13	13	13	13	13	13	13	13	13	Assume similar lifetime to conventional tanks. Habart report also makes this assumption.
	Baseline (yrs.)	13	13	13	13	13	13	13	13	13	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 495, January 2010.
Cost Savings ($/yr.)		$34	$34	$34	$30	$30	$30	$26	$26	$33	
Simple Payback (yrs.)		46.7	46.7	32.0	52.7	52.7	36.1	60.7	41.5	40.28	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$284	$284	$284	$251	$251	$251	$219	$219	$278	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$1,283	-$1,283	-$789	-$1,316	-$1,316	-$822	-$1,348	-$854	-$1,042	
Benefit/Cost Ratio		0.18	0.18	0.26	0.16	0.16	0.23	0.14	0.20	0.22	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	1	1	22.5%	22.5%	22.5%	22.5%	22.5%	22.5%	20.0%	20.0%	22.4%	EF of 0.80 versus an EF of 0.62 (40 gal) or 0.64 (30 gal)
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	

Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	**Sub End Use/Equipment (If Applicable)**	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
		Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	22.5%	22.5%	22.5%	22.5%	22.5%	22.5%	20.0%	20.0%	22.4%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, VANCOUVER ISLAND - NATURAL GAS EFFICIENCY

Back to Index

Point-of-Use (Tankless) Water Heaters (Gas)

		References/Notes
Description:	Tankless water heaters heat water on demand, eliminating hot water storage. The absence of hot water storage reduces standby heat losses. The efficiency of tankless water heaters is generally improved by the addition of features such as modulating controls, electric spark ignitions and direct venting. The applicability of tankless gas-fired DHW systems is somewhat limited by venting constraints; the burner is significantly larger than for a standard water heater, so a larger vent is required. Some houses cannot accommodate the larger flue because of requirements for clearance from other structures, windows, etc.	
Baseline:	A conventional storage natural gas hot water heater (EF of 0.60 assumed)	Based on a scan of models certified by the Air Conditioning, Heating, and Refrigeration Institute (AHRI), the average energy factor (EF) for conventional storage natural gas water heaters is ~0.60.
Upgrade:	A tankless natural gas hot water heater (EF of 0.82 assumed)	Based on a scan of models certified by the Air Conditioning, Heating, and Refrigeration Institute (AHRI), the overwhelming majority of tankless gas hot water heaters have an energy factor (EF) of 0.82

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)								
Electricity ($/kWh)	$0.083	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	
Natural Gas ($/MJ)	$0.010	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	15,214	15,214	15,214	13,474	13,474	13,474	13,179	13,179	14,915	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	9,889	9,889	9,889	8,758	8,758	8,758	8,566	8,566	9,695	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	5,325	5,325	5,325	4,716	4,716	4,716	4,613	4,613	5,220	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$1,500.00	$1,500.00	$1,500.00	$1,500.00	$1,500.00	$1,500.00	$1,500.00	$1,500.00	$1,500.00	Habart & Associates, "Market Transformation: Domestic Water Heaters," July 2010
	Upgrade, Installation ($)	$2,331.00	$2,331.00	$2,359.00	$2,331.00	$2,331.00	$2,359.00	$2,331.00	$2,359.00	$2,345.00	Habart & Associates, "Market Transformation: Domestic Water Heaters," July 2010
	Baseline, Material ($)	$675.00	$675.00	$675.00	$675.00	$675.00	$675.00	$675.00	$675.00	$675.00	Habart & Associates, "Market Transformation: Domestic Water Heaters," July 2010
	Baseline, Installation ($)	$563.00	$563.00	$1,085.00	$563.00	$563.00	$1,085.00	$563.00	$1,085.00	$824.00	Habart & Associates, "Market Transformation: Domestic Water Heaters," July 2010
	Total Measure Cost ($)	$2,274.04	$2,274.04	$1,645.56	$2,274.04	$2,274.04	$1,645.56	$2,274.04	$1,645.56	$1,959.80	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	20	20	20	20	20	20	20	20	20	Habart & Associates report: 25 yrs. Navigant Consulting Inc., Measures and Assumptions for Demand Side Management (DSM) Planning, p. C-87, April 16, 2009 indicated 18 yrs. Using 20 years as an intermediate value, after personal communication with J. Habart, Dec 2010.
	Baseline (yrs.)	13	13	13	13	13	13	13	13	13	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 495, January 2010.
Cost Savings ($/yr.)		$52	$52	$52	$46	$46	$46	$45	$45	$51	
Simple Payback (yrs.)		43.6	43.6	31.5	49.2	49.2	35.6	50.3	36.4	38.33	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$595	$595	$595	$527	$527	$527	$515	$515	$583	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$1,679	-$1,679	-$1,051	-$1,747	-$1,747	-$1,119	-$1,759	-$1,130	-$1,377	
Benefit/Cost Ratio		0.26	0.26	0.36	0.23	0.23	0.32	0.23	0.31	0.31	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	1	1	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	Actual use study shows average of 37% savings. We've assumed 35% because conventional EF is slightly higher and instantanoues EF is slightly lower than used in the study.
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	

Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Active Solar Water Heating Systems

		References/Notes
Description:	Solar DHW systems use the energy of the sun to heat water. The primary components of a solar water heating system are a solar collector, a heat transfer fluid and a well-insulated storage tank. Due to Canada's colder climate and the higher likelihood of freezing, active closed-loop systems are generally used. These systems use a pump to circulate a non-freezing heat transfer fluid through the collectors and then through a heat exchanger so that the thermal energy can be transferred to the water. Solar DHW are not generally sized to supply all of the annual requirement for water heating in the home, because if the system is sized for cloudy winter periods it will have enormous excess capacity during sunny summer periods, and will cost far too much to install. The system analyzed here meets approximately 2/3 of the annual requirements.	
Baseline:	No solar water heating system installed	
Upgrade:	Solar DHW systems use the energy of the sun to heat water. The primary components of a solar water heating system are a solar collector, a heat transfer fluid and a well-insulated storage tank. Due to Canada's colder climate and the higher likelihood of	System sizes of 5.75 m^2 are assumed .

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.553	$1.553	$1.553	$1.553	$1.553	$1.553	$1.553	$1.553
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.127	$0.127	$0.127	$0.127	$0.127	$0.127	$0.127	$0.127
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	15,214	15,214	15,214	13,474	13,474	13,474	13,179	13,179	14,915	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	5,629	5,629	5,629	4,312	4,312	4,312	3,558	3,558	5,391	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	9,585	9,585	9,585	9,162	9,162	9,162	9,621	9,621	9,524	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	SolarBC incentive program average cost of 100 installed systems
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Costs above are installed.
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	25	25	25	25	25	25	25	25	25	Retscreen default assumption.
	Baseline (yrs.)	-	-	-	-	-	-	-	-	-	
Cost Savings ($/yr.)		$94	$94	$94	$90	$90	$90	$94	$94	$93	
Simple Payback (yrs.)		74.5	74.5	74.5	78.0	78.0	78.0	74.2	74.2	75.02	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$1,217	$1,217	$1,217	$1,164	$1,164	$1,164	$1,222	$1,222	$1,210	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$5,783	-$5,783	-$5,783	-$5,836	-$5,836	-$5,836	-$5,778	-$5,778	-$5,790	
Benefit/Cost Ratio		0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	1	1	63.0%	63.0%	63.0%	68.0%	68.0%	68.0%	73.0%	73.0%	64.0%	Based on RETScreen modeling results (Assuming average occupancies for detached, attached and mobile homes are 3.1, 2.4, 1.9 respectively, DHW use of 60 L/day/person, 55°C DHW temperature, southerly directional angle 30° away from optimal (i.e. azimuth)
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	

Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby)	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	63.0%	63.0%	63.0%	68.0%	68.0%	68.0%	73.0%	73.0%	64.0%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

DHW Tank Insulation

		References/Notes
Description:	Pre-cut tank jackets/blankets (DHW tank insulation) are readily available and can be installed on hot water storage tanks to reduce standby heat losses. Caution is required to install blankets on gas water heaters, to avoid blocking the flue, the air intake to the burner, or the drain at the bottom. The thermostat should also remain uncovered.	
Baseline:	No additional tank insulation installed on a conventional hot water storage tank	
Upgrade:	An insulating blanket installed on a hot water storage tank to reduce standby losses	

Baseline Reference:	1. Annual consumption, end use
Heating Fuel Type:	All Fuels (Average Fuel Mix)
Main End Use:	Space Heating
Discount Rate:	7.38%
GHG Adder Incl.?	No
Resource Costs:	Baseload

= User Input
= Calculation

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.128	$1.128	$1.128	$1.128	$1.128	$1.128	$1.128	$1.128
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.083	$0.083	$0.083	$0.083	$0.083	$0.083	$0.083	$0.083
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	1,141	1,141	1,141	1,011	1,011	1,011	988	988	1,119	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	856	856	856	758	758	758	741	741	839	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	285	285	285	253	253	253	247	247	280	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$35.00	$35.00	$35.00	$25.00	$25.00	$25.00	$25.00	$25.00	$33.32	Based on a 2010 retail scan of insulating blankets
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Assuming that homeowners are able to install the insulating blankets on their own.
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$35.00	$35.00	$35.00	$25.00	$25.00	$25.00	$25.00	$25.00	$33.32	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	13	13	13	13	13	13	13	13	13	Assuming a lifetime similar to that of a hot water heater (hot water heater lifetime based on OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 495, January 2010.)
	Baseline (yrs.)	-	-	-	-	-	-	-	-	-	
Cost Savings ($/yr.)		$3	$3	$3	$2	$2	$2	$2	$2	$3	
Simple Payback (yrs.)		12.5	12.5	12.5	10.1	10.1	10.1	10.3	10.3	12.12	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$24	$24	$24	$21	$21	$21	$20	$20	$23	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$11	-$11	-$11	-$4	-$4	-$4	-$5	-$5	-$10	
Benefit/Cost Ratio		0.68	0.68	0.68	0.84	0.84	0.84	0.82	0.82	0.70	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	1	1	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	US DOE website suggests that insulating blankets can reduce standby losses by 25-45%. Lower end assumed to be conservative and accounts for fact that newer storage tanks are better insulated
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	

Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	1.9%	1.9%	1.9%	1.9%	1.9%	1.9%	1.9%	1.9%	1.9%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

DHW Pipe Insulation

		References/Notes
Description:	Hot water pipe insulation reduces the distribution losses for DHW. In general, only the first one or two metres of pipe nearest the DHW tank are accessible enough to insulate. However, since the dominant loss is from the pipe transferring heat out of the tank and then losing it to the basement, the first meter of pipe is the most important and only worthwhile section of pipe to insulate. Insulating this section of piping affects both the delivery of hot water and the losses from the tank. Delivery temperature is slightly increased during a hot water draw, and the water in the piping does not lose its stored heat as quickly between draws.	In SaskPower
Baseline:	No insulation installed on the piping leading out of a hot water storage tank	
Upgrade:	Installing pipe insulation on the first meter of piping leading out of a hot water storage tank	

Baseline Reference:	1. Annual consumption, end use
Heating Fuel Type:	All Fuels (Average Fuel Mix)
Main End Use:	Space Heating
Discount Rate:	7.38%
GHG Adder Incl.?	No
Resource Costs:	Baseload

= User Input
= Calculation

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.226	$1.226	$1.226	$1.226	$1.226	$1.226	$1.226	$1.226
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.092	$0.092	$0.092	$0.092	$0.092	$0.092	$0.092	$0.092
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	1,141	1,141	1,141	1,011	1,011	1,011	988	988	1,119	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	1,038	1,038	1,038	920	920	920	899	899	1,018	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	103	103	103	91	91	91	89	89	101	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$0.70	$0.70	$0.70	$0.70	$0.70	$0.70	$0.70	$0.70	$0.70	Based on OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 492, January 2010.
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Assuming that homeowners are able to install the insulation on their own.
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$0.70	$0.70	$0.70	$0.70	$0.70	$0.70	$0.70	$0.70	$0.70	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	15	15	15	15	15	15	15	15	15	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 495, January 2010.
	Baseline (yrs.)	-	-	-	-	-	-	-	-	-	
Cost Savings ($/yr.)		$1	$1	$1	$1	$1	$1	$1	$1	$1	
Simple Payback (yrs.)		0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.71	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$9	$9	$9	$8	$8	$8	$8	$8	$9	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		$9	$9	$9	$8	$8	$8	$8	$8	$9	
Benefit/Cost Ratio		13.54	13.54	13.54	11.99	11.99	11.99	11.73	11.73	13.27	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	1	1	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	Original number of 15% was used: this was just over 1% of DHW overall and was based on Shipley's engineering calculations for a pipe acting as a fin on the tank. A paper by Andersen, Fan & Furbo called "Heat Losses from Pipes Connected to Hot Water Storage Tanks" estimates a heat trap reduces the losses in the first section of pipe by 40%.
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	

Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, VANCOUVER ISLAND - NATURAL GAS EFFICIENCY

Back to Index

DHW Heat Traps

Not used because many or most new hot water heaters have integral heat traps

		References/Notes
Description:	This measure involves the installation of external "S-type" pre-bent copper pipe heat traps on both of the outlets ofwater heaters. This measure is only being considered during the installation of new tanks since it can be prohibitively expensive to bring in a plumber otherwise.	
Baseline:	No heat trap installed on a new electric storage hot water heater	
Upgrade:	Installing an external "S-type" pre-bent copper pipe heat trap on an gas-fired storage hot water heater. This option no longer applies because most new hot water heaters include an integrated heat trap.	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083			$1.128			$1.128		$1.128
Electricity ($/kW)	$0.000			$0.000			$0.000		$0.000
Natural Gas ($/MJ)	$0.010			$0.083			$0.083		$0.083
Oil ($/L)	$0.000			$0.000			$0.000		$0.000
Water ($/1000L)	$0.000			$0.000			$0.000		$0.000

Sub-sector		Detached (Pre-1976) ☐	Detached (Post-1976) ☐	Detached (New) ☑	Attached (Pre-1976) ☐	Attached (Post-1976) ☐	Attached (New) ☑	Mobile (Existing) ☐	Mobile (New) ☑	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)			-			-		-	-	
	Natural Gas (MJ/yr.)			-			-		-	-	
	Oil (L/yr.)			-			-		-	-	
	Water (L/yr.)			-			-		-	-	
Upgrade Consumption	Electricity (kWh/yr.)			-			-		-	-	
	Natural Gas (MJ/yr.)			-			-		-	-	
	Oil (L/yr.)			-			-		-	-	
	Water (L/yr.)			-			-		-	-	
Interactive Effects (Inputs)	Heating Penalty ☐			0%			0%		0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐			0%			0%		0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)			-			-		-	-	
	Electricity, Cooling (kWh/yr.)			-			-		-	-	
	Electricity, Total (kWh/yr.)			-			-		-	-	
	Natural Gas (MJ/yr.)			-			-		-	-	
	Oil (L/yr.)			-			-		-	-	
Winter Peak Hours-Use Factor				-			-		-	-	
Resource Savings	Electricity (kWh/yr.)			-			-		-	-	
	Electricity (kW peak)			-			-		-	-	
	Natural Gas (MJ/yr.)			-			-		-	-	
	Oil (L/yr.)			-			-		-	-	
	Water (L/yr.)			-			-		-	-	
Cost Parameters	Upgrade, Material ($)			$0.00			$0.00		$0.00	$0.00	
	Upgrade, Installation ($)			$0.00			$0.00		$0.00	$0.00	Minimal labour costs since tank is already being installed
	Baseline, Material ($)			$0.00			$0.00		$0.00	$0.00	
	Baseline, Installation ($)			$0.00			$0.00		$0.00	$0.00	
	Total Measure Cost ($)			$0.00			$0.00		$0.00	$0.00	
	Basis (Full/Incremental)			Full			Full		Full	Full	
Incremental O&M ($/yr.)				$0			$0		$0	$0	
Lifetimes	Upgrade (yrs.)			13			13		13	13	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 495, January 2010.
	Baseline (yrs.)			-			-		-	-	
Cost Savings ($/yr.)				$0			$0		$0	$0	
Simple Payback (yrs.)				N/A			N/A		N/A	0.00	
NPV of O&M Costs ($)				$0			$0		$0	$0	
Total Benefits ($)	Electric Energy			$0			$0		$0	$0	
	Electric Demand			$0			$0		$0	$0	
	Natural Gas			$0			$0		$0	$0	
	Oil			$0			$0		$0	$0	
	Water			$0			$0		$0	$0	
Measure TRC ($)				$0			$0		$0	$0	
Benefit/Cost Ratio				0.00			0.00		0.00	0.00	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed			1			1		1	
Cost Flag (i.e. way measure is typically applied)			Incremental			Incremental		Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No) Baseline	Upgrade	Measure Resource Savings (%) Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No) Baseline	Upgrade	Measure Resource Savings (%) Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0			25.0%			25.0%		25.0%	25.0%	Based on Acker, L. Advanced Conservation Technology Inc. Improving the Efficiency of Hot Water Distribution Systems, ACEEE Forum, p. 12, 2008, installing a heat trap improves the energy factor of a hot water heater by about 0.02 (i.e. 2%) or about 25% of pipe losses.
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No) Baseline	Upgrade	Measure Resource Savings (%) Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	

Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0			-			-		-	-	
Space Cooling	0	0			-			-		-	-	
Clothes Washers	0	0			-			-		-	-	
Dishwashers	0	0			-			-		-	-	
Other Electric Loads	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0			-			-		-	-	
Domestic Hot Water (DHW)	0	0			-			-		-	-	
Fireplaces	0	0			-			-		-	-	
Cooking	0	0			-			-		-	-	
Clothes Dryers	0	0			-			-		-	-	
Pool and Spa Heaters	0	0			-			-		-	-	
Other	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0			-			-		-	-	
Domestic Hot Water (DHW)	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Ultra Low-Flow Showerheads

		References/Notes
Description:	Ultra low-flow showerheads have aerators and flow restrictors to reduce water use. At 4.75 LPM (1.25 GPM), their flow rates are substantially lower than traditional low-flow fixtures, whose flow rates range between 7.6 LPM and 9.5 LPM (2.0-2.5 GPM).	
Baseline:	A low-flow showerhead with a 2.0 GPM (7.6 LPM) flow rate (conservative estimate)	
Upgrade:	An ultra low-flow showerhead with a 1.25 GPM (4.75) flow rate	

Baseline Reference:	1. Annual consumption, end use
Heating Fuel Type:	All Fuels (Average Fuel Mix)
Main End Use:	Space Heating
Discount Rate:	7.38%
GHG Adder Incl.?	No
Resource Costs:	Baseload

= User Input
= Calculation

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	3,956	3,956	3,956	3,503	3,503	3,503	3,427	3,427	3,878	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	2,472	2,472	2,472	2,189	2,189	2,189	2,142	2,142	2,424	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	1,483	1,483	1,483	1,314	1,314	1,314	1,285	1,285	1,454	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$13.00	$13.00	$13.00	$13.00	$13.00	$13.00	$13.00	$13.00	$13.00	Incremental cost of $7 based on OPA, OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 193, January 2010.
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Assuming that homeowners are able to install the showerheads on their own
	Baseline, Material ($)	$6.00	$6.00	$6.00	$6.00	$6.00	$6.00	$6.00	$6.00	$6.00	Based on a retail scan of low-flow showerheads (2010)
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Assuming that homeowners are able to install the showerheads on their own
	Total Measure Cost ($)	$13.00	$13.00	$13.00	$13.00	$13.00	$13.00	$13.00	$13.00	$13.00	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	10	10	10	10	10	10	10	10	10	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 193, January 2010.
	Baseline (yrs.)	10	10	10	10	10	10	10	10	10	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 193, January 2010.
Cost Savings ($/yr.)		$15	$15	$15	$13	$13	$13	$13	$13	$14	
Simple Payback (yrs.)		0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	0.91	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$99	$99	$99	$88	$88	$88	$86	$86	$97	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		$86	$86	$86	$75	$75	$75	$73	$73	$84	
Benefit/Cost Ratio		7.64	7.64	7.64	6.77	6.77	6.77	6.62	6.62	7.49	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	1	1	37.5%	37.5%	37.5%	37.5%	37.5%	37.5%	37.5%	37.5%	37.5%	1.25 GPM (4.75 LPM) showerhead versus a 2.0 GPM (7.6 LPM) showerhead and assuming that the length of showers does not change
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	

Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	9.8%	9.8%	9.8%	9.8%	9.8%	9.8%	9.8%	9.8%	9.8%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, VANCOUVER ISLAND - NATURAL GAS EFFICIENCY

Back to Index

Faucet Aerators

		References/Notes
Description:	Aerators can easily be attached to most faucets to restrict the flow rate of water flowing from them. This can result in savings to both water consumption and DHW energy.	Not in SaskPower
Baseline:	No faucet aerator installed on the kitchen faucet	
Upgrade:	A 1.5 GPM (5.7 LPM) faucet aerator installed on the kitchen faucet	

Baseline Reference:	1. Annual consumption, end use
Heating Fuel Type:	All Fuels (Average Fuel Mix)
Main End Use:	Space Heating
Discount Rate:	7.38%
GHG Adder Incl.?	No
Resource Costs:	Baseload

= User Input
= Calculation

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☑	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☑	Mobile (Existing) ☑	Mobile (New) ☑	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	2,891	2,891	2,891	2,560	2,560	2,560	2,504	2,504	2,834	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	1,995	1,995	1,995	1,766	1,766	1,766	1,728	1,728	1,955	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	896	896	896	794	794	794	776	776	879	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$15.00	$15.00	$15.00	$15.00	$15.00	$15.00	$15.00	$15.00	$15.00	Based on a 2010 retail scan of faucet aerators and OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 190, January 2010. The cost of faucet aerators is about $5. Assuming 3 aerators per home in order to realize full savings.
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$15.00	$15.00	$15.00	$15.00	$15.00	$15.00	$15.00	$15.00	$15.00	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	10	10	10	10	10	10	10	10	10	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 190, January 2010.
	Baseline (yrs.)	-	-	-	-	-	-	-	-	-	
Cost Savings ($/yr.)		$9	$9	$9	$8	$8	$8	$8	$8	$9	
Simple Payback (yrs.)		1.7	1.7	1.7	1.9	1.9	1.9	2.0	2.0	1.75	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$60	$60	$60	$53	$53	$53	$52	$52	$59	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		$45	$45	$45	$38	$38	$38	$37	$37	$44	
Benefit/Cost Ratio		4.00	4.00	4.00	3.54	3.54	3.54	3.47	3.47	3.92	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	1	1	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 190, January 2010.
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	

Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	5.9%	5.9%	5.9%	5.9%	5.9%	5.9%	5.9%	5.9%	5.9%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, VANCOUVER ISLAND - NATURAL GAS EFFICIENCY

Back to Index

Wastewater Heat Recovery Systems

		References/Notes
Description:	Residential wastewater heat recovery systems transfer the waste heat from drains to preheat make-up water. These systems work well only for DHW uses in which the hot water use and the draining of wastewater are simultaneous. Thus, in homes, application to anything other than showers is difficult. Heat recovery systems incorporate shell-and-tube heat exchangers that typically have efficiencies in the range of 40% to 55%, depending on factors such as design, material, overall length, and fluid flow rate.	In SaskPower
Baseline:	No wastewater heat recovery system installed	
Upgrade:	A 60" wastewater heat recovery system	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.648	$1.648	$1.648	$1.648	$1.648	$1.648	$1.648	$1.648
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.139	$0.139	$0.139	$0.139	$0.139	$0.139	$0.139	$0.139
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	3,956	3,956	3,956	3,503	3,503	3,503	3,427	3,427	3,878	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	1,899	1,899	1,899	1,682	1,682	1,682	1,645	1,645	1,861	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	2,057	2,057	2,057	1,822	1,822	1,822	1,782	1,782	2,017	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$680.00	$680.00	$680.00	$611.00	$611.00	$611.00	$611.00	$611.00	$668.42	Based on the cost of a Powerpipe R3-60 (3" diameter, 60" length) model for detached and an R3-48 in attached and mobile homes. Costs from Home Depot (2010).
	Upgrade, Installation ($)	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	Assuming 2 hours of labour @ $60/hr
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$800.00	$800.00	$800.00	$731.00	$731.00	$731.00	$731.00	$731.00	$788.42	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	30	30	30	30	30	30	30	30	30	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 498, January 2010.
	Baseline (yrs.)	-	-	-	-	-	-	-	-	-	
Cost Savings ($/yr.)		$20	$20	$20	$18	$18	$18	$17	$17	$20	
Simple Payback (yrs.)		39.7	39.7	39.7	40.9	40.9	40.9	41.9	41.9	39.92	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$286	$286	$286	$253	$253	$253	$248	$248	$280	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$514	-$514	-$514	-$478	-$478	-$478	-$483	-$483	-$508	
Benefit/Cost Ratio		0.36	0.36	0.36	0.35	0.35	0.35	0.34	0.34	0.36	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	1	1	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	Avg efficiency is ~52% for 2.0 GPM flow rates and a 60" model, based on RenewABILITY Energy Inc., "Power-Pipe: Backgrounder for Homes" (Note: Estimate may be high since there would be heat losses between the showerhead and the top of the HEX)
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heater	-	0	0									-	
Pool and Spa Heater	Pool Heaters	0	0									-	
Pool and Spa Heater	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	

Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, VANCOUVER ISLAND - NATURAL GAS EFFICIENCY

Back to Index

DHW Recirculation Systems (e.g. Metlund D'MAND®)

		References/Notes
Description:	When turning on the hot water tap, it often takes a long time before hot water begins to flow. DHW recirculation systems can be used to pump hot water to a faucet at the demand of a user, getting hot water to the fixture four to five times quicker than traditional systems. Water that is in the hot water lines is pumped back to the water heater either through the cold water lines or through a dedicated line. This pumping continues until the temperature of the hot water at the point of use reaches a specified value. In retrofit situations, this pumping system is generally installed at the faucet that is furthest away from the water heater and the system is enabled by remote activation from the other points of use. Along with improved convenience and water savings (since water isn't flushed down the drain), energy savings are achieved since the water that is pumped back to the water heater is generally warmer than city water. In addition, since the pump gets water to the fixture more quickly, there is an overall reduction of hot water use.	
Baseline:	A home with no DHW recirculation system	
Upgrade:	A home with a DHW recirculation system installed on the point-of-use farthest away from the hot water tank	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	15,214	15,214	15,214	13,474	13,474	13,474	13,179	13,179	14,915	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	12,780	12,780	12,780	11,318	11,318	11,318	11,070	11,070	12,529	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	2,434	2,434	2,434	2,156	2,156	2,156	2,109	2,109	2,386	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$450.00	$450.00	$450.00	$350.00	$350.00	$350.00	$350.00	$350.00	$433.22	Material cost varies from $250 to $500, depending on pump size (based on an online retail scan of these systems (2010))
	Upgrade, Installation ($)	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	Assuming 2 hours of labour @ $60/hr
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$570.00	$570.00	$570.00	$470.00	$470.00	$470.00	$470.00	$470.00	$553.22	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	18	18	18	18	18	18	18	18	18	High lifetime assumed since the systems are fairly simple (i.e. lifetime of a pump is fairly high)
	Baseline (yrs.)	-	-	-	-	-	-	-	-	-	
Cost Savings ($/yr.)		$24	$24	$24	$21	$21	$21	$21	$21	$23	
Simple Payback (yrs.)		23.9	23.9	23.9	22.2	22.2	22.2	22.7	22.7	23.63	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$254	$254	$254	$225	$225	$225	$220	$220	$250	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$316	-$316	-$316	-$245	-$245	-$245	-$250	-$250	-$304	
Benefit/Cost Ratio		0.45	0.45	0.45	0.48	0.48	0.48	0.47	0.47	0.45	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	1	1	16.0%	16.0%	16.0%	16.0%	16.0%	16.0%	16.0%	16.0%	16.0%	Oak Ridge National Laboratory, "Water and Energy Savings using Demand Hot Water Recirculating Systems in Residential Homes: A Case Study of Five Homes in Palo Alto, California", Sept. 2002, suggests 16-32% savings on DHW. Lower end assumed since very little research is available on these devices and savings are uncertain.
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	

Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	**Sub End Use/Equipment (If Applicable)**	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
		Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	16.0%	16.0%	16.0%	16.0%	16.0%	16.0%	16.0%	16.0%	16.0%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, VANCOUVER ISLAND - NATURAL GAS EFFICIENCY

Back to Index

High-Efficiency (ENERGY STAR®) Dishwashers

		References/Notes
Description:	ENERGY STAR® dishwashers save energy by using improved technology for the primary wash cycle and by using less hot water to clean. Features include more effective washing action, energy-efficient motors, and sensors that determine the length of the wash cycle and the temperature of the water necessary to clean the dishes. In addition, some advanced dishwashers can sense and adjust for the amount of soil on dishes, using only as much water as necessary. These savings affect both the energy used for heating the water and the mechanical energy of the dishwasher.	
Baseline:	A standard-sized new dishwasher	Link to bulletin on performance standards (new standards took effect on Jan. 1, 2010).
Upgrade:	An ENERGY STAR® certified, standard-sized new dishwasher	ENERGY STAR® standard for dishwashers to improve to 307 kWh/yr by July 1, 2011 (assumed here)

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.015	$1.015	$1.015	$1.015	$1.015	$1.015	$1.015	$1.015
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.073	$0.073	$0.073	$0.073	$0.073	$0.073	$0.073	$0.073
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	77	77	77	63	63	63	63	63	75	
	Natural Gas (MJ/yr.)	1,826	1,826	1,826	1,617	1,617	1,617	1,581	1,581	1,790	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	67	67	67	54	54	54	54	54	65	
	Natural Gas (MJ/yr.)	1,579	1,579	1,579	1,399	1,399	1,399	1,368	1,368	1,548	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	10	10	10	9	9	9	9	9	10	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	246	246	246	218	218	218	213	213	242	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$395.00	$395.00	$395.00	$395.00	$395.00	$395.00	$395.00	$395.00	$395.00	Incr. cost of $45 indicated in OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 34, January 2010.
	Upgrade, Installation ($)	$60.00	$60.00	$60.00	$60.00	$60.00	$60.00	$60.00	$60.00	$60.00	Assuming 1 hour of labour @ $60/hr
	Baseline, Material ($)	$350.00	$350.00	$350.00	$350.00	$350.00	$350.00	$350.00	$350.00	$350.00	Based on a retail scan of dishwashers offered by Sears (lowest cost models by reliable manufacturers) (2010)
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Assuming 1 hour of labour @ $60/hr
	Total Measure Cost ($)	$105.00	$105.00	$105.00	$105.00	$105.00	$105.00	$105.00	$105.00	$105.00	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	11	11	11	11	11	11	11	11	11	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 34, January 2010.
	Baseline (yrs.)	11	11	11	11	11	11	11	11	11	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 34, January 2010.
Cost Savings ($/yr.)		$3	$3	$3	$3	$3	$3	$3	$3	$3	
Simple Payback (yrs.)		32.1	32.1	32.1	36.9	36.9	36.9	37.5	37.5	32.88	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$11	$11	$11	$9	$9	$9	$9	$9	$10	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$18	$18	$18	$16	$16	$16	$15	$15	$18	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$77	-$77	-$77	-$81	-$81	-$81	-$81	-$81	-$77	
Benefit/Cost Ratio		0.27	0.27	0.27	0.23	0.23	0.23	0.23	0.23	0.26	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	1	1	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%		
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	1	1	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	ENERGY STAR® standard for dishwashers to improve to 307 kWh/yr by July 1, 2011
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	

Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	1	1	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	1	1	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, VANCOUVER ISLAND - NATURAL GAS EFFICIENCY

Back to Index

High-Efficiency (ENERGY STAR®) Clothes Washers

		References/Notes
Description:	In January 2011, the ENERGY STAR® standard for clothes washers will be increased once again. As a result, very few top loading washers will meet ENERGY STAR® requirements. Instead, the overwhelming majority of ENERGY STAR® models will be front loading (horizontal axis) models. Compared to standard models, front loading washing machines use less hot water, less mechanical energy, and result in dryer energy savings due to faster spin cycle speeds.	
Baseline:	A standard 3.2 cu. ft. (90.6 L) top loading clothes washer	Link to minimum energy performance standards, which took effect on Jan. 1, 2007. Note: Top loading washer assumed since very few front loading models do not meet ENERGY STAR requirements
Upgrade:	An ENERGY STAR® certified, 3.2 cu. ft. (90.6 L) front loading clothes washer	Link to ENERGY STAR® standards -- new standards to take effect on Jan. 1, 2011

Baseline Reference:	1. Annual consumption, end use
Heating Fuel Type:	All Fuels (Average Fuel Mix)
Main End Use:	Space Heating
Discount Rate:	7.38%
GHG Adder Incl.?	No
Resource Costs:	Baseload

= User Input
= Calculation

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.179	$1.179	$1.179	$1.179	$1.179	$1.179	$1.179	$1.179
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/m^3)	$0.010	$0.088	$0.088	$0.088	$0.088	$0.088	$0.088	$0.088	$0.088
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	67	67	67	53	53	53	61	61	65	
	Natural Gas (MJ/yr.)	6,375	6,375	6,375	5,669	5,669	5,669	6,017	6,017	6,264	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	42	42	42	33	33	33	38	38	41	
	Natural Gas (MJ/yr.)	4,016	4,016	4,016	3,571	3,571	3,571	3,791	3,791	3,946	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	25	25	25	20	20	20	23	23	24	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	2,359	2,359	2,359	2,097	2,097	2,097	2,226	2,226	2,318	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 25, January 2010.
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Material ($)	$450.00	$450.00	$450.00	$450.00	$450.00	$450.00	$450.00	$450.00	$450.00	Based on a scan of non-ENERGY STAR top-loading models available from various retailers (Note: Current ENERGY STAR models may not meet new standards) (2010). Top loading washer assumed since very few front loading models do not meet ENERGY STAR requirements.
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$300.00	$300.00	$300.00	$300.00	$300.00	$300.00	$300.00	$300.00	$300.00	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	14	14	14	14	14	14	14	14	14	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 24, January 2010.
	Baseline (yrs.)	14	14	14	14	14	14	14	14	14	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 24, January 2010.
Cost Savings ($/yr.)		$25	$25	$25	$22	$22	$22	$24	$24	$25	
Simple Payback (yrs.)		11.9	11.9	11.9	13.5	13.5	13.5	12.7	12.7	12.17	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$29	$29	$29	$23	$23	$23	$27	$27	$28	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$207	$207	$207	$184	$184	$184	$195	$195	$203	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$64	-$64	-$64	-$93	-$93	-$93	-$78	-$78	-$68	
Benefit/Cost Ratio		0.79	0.79	0.79	0.69	0.69	0.69	0.74	0.74	0.77	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	1	1	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	Link to ENERGY STAR® standards -- new standards to take effect on Jan. 1, 2011 (these stds assumed)
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	1	1	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	Assuming water savings increase is approx. proportional to increase in mechanical energy savings with new standards (DHW savings included in MEF (Modified Energy Factor)).
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	1	1	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	Savings due to higher spin speeds (dryer savings are incorporated into MEF (Modified Energy Factor)). Assuming savings are proportional to the mechanical energy savings.
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	

Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	1	1	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	6.7%	6.7%	6.7%	6.7%	6.7%	6.7%	6.7%	6.7%	6.7%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	1	1	20.4%	20.4%	20.4%	20.4%	20.4%	20.4%	20.4%	20.4%	20.4%	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, VANCOUVER ISLAND - NATURAL GAS EFFICIENCY

Back to Index

High-Efficiency Gas Clothes Dryers

Not used--moisture sensors have become common.

		References/Notes
Description:	The major distinction with energy-efficient gas clothes dryer models is that they incorporate termination controls to sense dryness and turn off automatically. The most efficient models have moisture sensors in the drum for sensing dryness, while other lower-cost and slightly less efficient models infer dryness by sensing the temperature of the exhaust air. The majority of the retail models currently available employ some type of dryness sensing technology but it is unclear how often these controls are used by homeowners.	
Baseline:	A gas clothes dryer with a temperature sensor	
Upgrade:	A gas clothes dryer with a moisture sensor. This option is no longer valid because almost all new gas dryers have moisture sensors.	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$500.00	$500.00	$500.00	$500.00	$500.00	$500.00	$500.00	$500.00	$500.00	Based on a retail scan of low-cost gas dryers with moisture sensors (2009)
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Material ($)	$450.00	$450.00	$450.00	$450.00	$450.00	$450.00	$450.00	$450.00	$450.00	Based on a retail scan of low-cost gas dryers without moisture sensors (2009)
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	18	18	18	18	18	18	18	18	18	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 58, January 2010.
	Baseline (yrs.)	18	18	18	18	18	18	18	18	18	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 58, January 2010.
Cost Savings ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Simple Payback (yrs.)		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$50	-$50	-$50	-$50	-$50	-$50	-$50	-$50	-$50	
Benefit/Cost Ratio		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	Savings for moisture sensor relative to temperature sensor, according to Citizen Gas, "Buyer's Guide: Natural Gas Clothes Dryers"
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	

Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Insulating Pool Covers

		References/Notes
Description:	Between 30% and 50% of the heat loss from a swimming pool is due to evaporation. In an outdoor pool, this heat loss either adds to the cost of heating the pool or shortens the swimming season. Evaporation also increases the quantity of chemicals that must be added to the pool. A pool cover can reduce evaporation and other heat losses but can also reduce heat gains depending on the design. An insulating vinyl pool cover is assumed for this analysis. Although substantially more expensive than the bubble type covers, insulating vinyl pool covers are much more robust and, thus, have much longer lifetimes. They are also more effective at trapping heat.	In SaskPower
Baseline:	A pool with no insulating cover	
Upgrade:	Installing a pool cover to reduce the heat loss from a heated pool	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	23,096	23,096	23,096	23,096	23,096	23,096	23,096	23,096	23,096	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	15,397	15,397	15,397	15,397	15,397	15,397	15,397	15,397	15,397	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$1,200.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00	Based on quotes from suppliers for a 50 m^2 pool with a manual reel. Cost also used in several previous studies, particularly TG 2005, when this cost was endorsed by TG staff.
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Installation cost included above
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$1,200.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	10	10	10	10	10	10	10	10	10	Reasonable lifetime assumed
	Baseline (yrs.)	-	-	-	-	-	-	-	-	-	
Cost Savings ($/yr.)		$151	$151	$151	$151	$151	$151	$151	$151	$151	
Simple Payback (yrs.)		8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	7.95	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$1,031	$1,031	$1,031	$1,031	$1,031	$1,031	$1,031	$1,031	$1,031	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$169	-$169	-$169	-$169	-$169	-$169	-$169	-$169	-$169	
Benefit/Cost Ratio		0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	1	1	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	CanREN, "How Can I best Manage My Pool's Energy Use?", 2002., mid range of 30-50% savings estimate used
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	

Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	1	1	26.4%	26.4%	26.4%	26.4%	26.4%	26.4%	26.4%	26.4%	26.4%	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, VANCOUVER ISLAND - NATURAL GAS EFFICIENCY

Back to Index

Heat Pump Pool Heaters

Not used--this is a fuel-switching measure.

		References/Notes
Description:	Air source heat pumps can be used to replace electric or gas-fired pool heaters. The principal of operation for these types of heat pumps is very similar to refrigerators and air conditioning units, in that they are used to transfer heat from one place to another. This allows them to be significantly more efficient than electric or gas-fired pool heaters, since these types of heaters generate heat rather than transferring it.	
Baseline:	A standard efficiency gas-fired pool heater	
Upgrade:	A heat pump pool heater. This option is not valid in this study because it is a fuel-switching measure.	

Baseline Reference:	1. Annual consumption, end use
Heating Fuel Type:	All Fuels (Average Fuel Mix)
Main End Use:	Space Heating
Discount Rate:	7.38%
GHG Adder Incl.?	No
Resource Costs:	Baseload

= User Input
= Calculation

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/m^3)	$0.010	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☑	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☑	Mobile (Existing) ☑	Mobile (New) ☑	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Nat. Gas (m3/yr.)	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	Approximate cost of an 80,000 BTU heat pump pool heater, based on a scan of models available from online retailers
	Upgrade, Installation ($)	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	Assuming 2 hours of labour @ $60/hr
	Baseline, Material ($)	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	Based on Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-81, April 16, 2009.
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Included in cost above
	Total Measure Cost ($)	$524.65	$524.65	$524.65	$524.65	$524.65	$524.65	$524.65	$524.65	$524.65	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	Assuming no incremental O&M
Lifetimes	Upgrade (yrs.)	10	10	10	10	10	10	10	10	10	Lifetime based on a US DOE website on heat pump pool heaters
	Baseline (yrs.)	7	7	7	7	7	7	7	7	7	US DOE suggests lifetime of 5 years or longer.
Cost Savings ($/yr.)		$377	$377	$377	$377	$377	$377	$377	$377	$377	
Simple Payback (yrs.)		1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.39	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$2,578	$2,578	$2,578	$2,578	$2,578	$2,578	$2,578	$2,578	$2,578	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		$2,053	$2,053	$2,053	$2,053	$2,053	$2,053	$2,053	$2,053	$2,053	
Benefit/Cost Ratio		4.91	4.91	4.91	4.91	4.91	4.91	4.91	4.91	4.91	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	This is where electricity increase would go, in fuel switching analysis.

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	1	1	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	Heat pump pool heater replaces all gas use for pool heating
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	

Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	1	1	66.1%	66.1%	66.1%	66.1%	66.1%	66.1%	66.1%	66.1%	66.1%	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, VANCOUVER ISLAND - NATURAL GAS EFFICIENCY

Back to Index

High-Efficiency Gas-Fired Pool Heaters

		References/Notes
Description:	High-efficiency pool heaters incorporate advanced heat exchangers, forced draft combustion systems, pilot-less ignitions and innovations in hydraulics, which results in performance efficiencies that range between 90% and 95%, compared to efficiencies of 80% to 85% for standard models.	
Baseline:	A standard efficiency gas-fired pool heater (82.5% efficiency assumed)	
Upgrade:	A high efficiency gas-fired pool heater (92.5% efficiency assumed)	

Baseline Reference:	1. Annual consumption, end use
Heating Fuel Type:	All Fuels (Average Fuel Mix)
Main End Use:	Space Heating
Discount Rate:	7.38%
GHG Adder Incl.?	No
Resource Costs:	Baseload

= User Input
= Calculation

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$0.733	$0.733	$0.733	$0.733	$0.733	$0.733	$0.733	$0.733
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/m^3)	$0.010	$0.048	$0.048	$0.048	$0.048	$0.048	$0.048	$0.048	$0.048
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☑	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☑	Mobile (Existing) ☑	Mobile (New) ☑	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	34,259	34,259	34,259	34,259	34,259	34,259	34,259	34,259	34,259	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Nat. Gas (m3/yr.)	4,234	4,234	4,234	4,234	4,234	4,234	4,234	4,234	4,234	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$2,900.00	$2,900.00	$2,900.00	$2,900.00	$2,900.00	$2,900.00	$2,900.00	$2,900.00	$2,900.00	Personal communication with Jandy pool heater manufacturers, 2008<-- consider updating
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	installation costs included above
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Cost of upgrade is incremental cost
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	installation costs included above
	Total Measure Cost ($)	$2,900.00	$2,900.00	$2,900.00	$2,900.00	$2,900.00	$2,900.00	$2,900.00	$2,900.00	$2,900.00	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Set to incremental since cost above is incremental
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	7	7	7	7	7	7	7	7	7	US DOE suggests lifetime of 5 years or longer for a conventional heater. No evidence that high efficiency lifetimes are different.
	Baseline (yrs.)	7	7	7	7	7	7	7	7	7	US DOE suggests lifetime of 5 years or longer.
Cost Savings ($/yr.)		$41	$41	$41	$41	$41	$41	$41	$41	$41	
Simple Payback (yrs.)		69.9	69.9	69.9	69.9	69.9	69.9	69.9	69.9	69.89	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$204	$204	$204	$204	$204	$204	$204	$204	$204	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$2,696	-$2,696	-$2,696	-$2,696	-$2,696	-$2,696	-$2,696	-$2,696	-$2,696	
Benefit/Cost Ratio		0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	1	1	11.0%	11.0%	11.0%	11.0%	11.0%	11.0%	11.0%	11.0%	11.0%	Difference between energy use of 82.5% and 92.5% heaters.
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	

Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	1	1	7.3%	7.3%	7.3%	7.3%	7.3%	7.3%	7.3%	7.3%	7.3%	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Solar Pool Heaters

		References/Notes
Description:	Unlike other types of solar hot water systems, solar pool heaters do not include storage tanks or heat exchangers, and, since they are only used in warmer weather, they generally employ unglazed solar collectors that are composed of a polymer. These collectors are mounted of the roofs of homes or in an unshaded part of the yard. The heat transfer fluid is usually pool water that is pumped directly into the array of collectors and flows within the polymer in a serpentine array in order to pick up heat. Although solar DHW systems do require a pump, its consumption is similar to that used in electric and gas-fired pool heaters. Solar pool heaters can completely offset the energy requirements of conventional pool heaters. And, since they are much simpler than solar DHW systems, they are also much more affordable.	
Baseline:	A standard efficiency gas-fired pool heater	
Upgrade:	A solar pool heater with an unglazed collector	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$3,450.00	$3,450.00	$3,450.00	$3,450.00	$3,450.00	$3,450.00	$3,450.00	$3,450.00	$3,450.00	Based on Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-81, April 16, 2009.
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Installation costs included above
	Baseline, Material ($)	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	Based on Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-81, April 16, 2009.
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Installation costs included above
	Total Measure Cost ($)	$3,450.00	$3,450.00	$3,450.00	$3,450.00	$3,450.00	$3,450.00	$3,450.00	$3,450.00	$3,450.00	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	20	20	20	20	20	20	20	20	20	Based on Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-81, April 16, 2009.
	Baseline (yrs.)	7	7	7	7	7	7	7	7	7	US DOE suggests lifetime of 5 years or longer.
Cost Savings ($/yr.)		$377	$377	$377	$377	$377	$377	$377	$377	$377	
Simple Payback (yrs.)		9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.15	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$4,301	$4,301	$4,301	$4,301	$4,301	$4,301	$4,301	$4,301	$4,301	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		$851	$851	$851	$851	$851	$851	$851	$851	$851	
Benefit/Cost Ratio		1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	1	1	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	

Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	**Sub End Use/Equipment (If Applicable)**	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
		Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	1	1	66.1%	66.1%	66.1%	66.1%	66.1%	66.1%	66.1%	66.1%	66.1%	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, VANCOUVER ISLAND - NATURAL GAS EFFICIENCY

Back to Index

Micro-Combined Heat and Power (CHP)

		References/Notes
Description:	Several types of micro-combustion heat and power (micro CHP) systems are either available or under development. These units all generate electrical power and capture the resulting "waste" heat for space and/or water heating. Reciprocating engine units such as the Honda Freewatt use a well-developed technology and can be scaled to a residential size. Power generate efficiencies range from 20-40% and up to 90% of the waste heat can be captured. Various sizing and control strategies can be used: for example, the amount of heat can be maximized or the amount of electricity can be maximized. This example assumes a unit such as the Honda Freewatt hydronic system, which has a 1.2 kW maximum electrical output and a 3.5 kW thermal output. Heat load following control is assumed to avoid fuel-switching, however power load following control is usually more economically attractive for applications involving seasonally varying loads. A back-up boiler is included in the Honda Freewatt package. Net-metering is assumed.	
Baseline:	Condensing gas-fired boiler (92% AFUE)	
Upgrade:	Installing a microturbine system in an average home, offsetting both the electric consumption from the grid and the amount of space and water heating that must be provided by a boiler. Note that this technology is not currently available in Canada.	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)								
Electricity ($/kWh)	$0.083	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	
Natural Gas ($/m^3)	$0.010	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-2,000	-2,000	-2,000	-2,000	-2,000	-2,000	-2,000	-2,000	-2,000	
	Natural Gas (m3/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Nat. Gas (m3/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$13,000.00	$13,000.00	$13,000.00	$13,000.00	$13,000.00	$13,000.00	$13,000.00	$13,000.00	$13,000.00	Cost is anecdotal, gleaned from websites. Waiting for confirmation from Honda. This technology is not available in Canada and is not expected to be soon.
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Above cost includes installation
	Baseline, Material ($)	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	Cost is base case cost of 82 AFUE boiler. Update if base case for condensing boiler is updated.
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Above cost includes installation
	Total Measure Cost ($)	$8,000.00	$8,000.00	$8,000.00	$8,000.00	$8,000.00	$8,000.00	$8,000.00	$8,000.00	$8,000.00	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	20	20	20	20	20	20	20	20	20	Lifetime not well established--lifetime of base case boiler assumed.
	Baseline (yrs.)	20	20	20	20	20	20	20	20	20	
Cost Savings ($/yr.)		$166	$166	$166	$166	$166	$166	$166	$166	$166	
Simple Payback (yrs.)		48.3	48.3	48.3	48.3	48.3	48.3	48.3	48.3	48.31	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$2,837	$2,837	$2,837	$2,837	$2,837	$2,837	$2,837	$2,837	$2,837	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$5,163	-$5,163	-$5,163	-$5,163	-$5,163	-$5,163	-$5,163	-$5,163	-$5,163	
Benefit/Cost Ratio		0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	-1									-	RETSreen run indicates that mCHP delivers about 7200 MJ per year with heat following control

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	RETScreen run indicates heat load following strategy uses about the same amount of gas a 92 AFUE boiler would use.
Domestic Hot Water (DHW)	-	0	0										RETScreen run indicates heat load following strategy uses about the same amount of gas a 92 AFUE boiler would use.
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	

Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	-1	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

INDEX

Tab Name	Measure Description	Average B/C Ratio
HEATING: SHELL MEASURES		
Attic Insulation	Improving the attic insulation in an average home by RSI-3.5 (R-20), through the addition of cellulose insulation	0.95
Wall Insulation	Improving the wall insulation in an average home by RSI-1.76 (R-10) to RSI-4.2 (R-24)	1.03
Slab Insulation	The addition of slab (basement floor) insulation in homes with unfinished basements. It is assumed that 2" polystyrene rigid foam insulation (RSI-1.76 (R-10)) is being added.	0.10
Basement Insulation	In average homes with basements, improving the foundation wall insulation by RSI-2.12 (R-12)	1.07
Crawl Space Insul.	In homes with crawlspaces, the addition of crawlspace insulation to bring the thermal resistance values up to RSI-2.1 (R-12)	0.36
Air Sealing	A comprehensive air sealing job, which results in an air tightness (ACH @ 50 Pa) improvement of 30%	0.49
Homeowner Air Sealing	A homeowner air sealing job, which results in an air tightness (ACH @ 50 Pa) improvement of 15-20%	0.89
Sealing & Insul. - Old Homes	Improve both the attic insulation and the air tightness (ACH@50 Pa) in an old home. It is assumed that the air tightness is improved by 30% and that RSI-3.52 (R-20) of attic insulation is added.	0.69
ESTAR Windows	In existing homes, replacing 50% of windows with ENERGY STAR windows from Zone D (double-glazed, argon fill, low-e coating, insulating spacer, vinyl frame, hinged). In hew homes, replacing 100% of windows.	0.28
Super Windows	In existing homes, replacing 50% of windows with super high-performance windows (triple-glazed, krypton fill, low-e and insulating coatings, insulating spacer, fiberglass frame, hinged). In new homes, replacing all of the windows with super high-performance windows.	0.66
HEATING: SHELL MEASURES (NEW HOMES)		
High-Perf. New Homes	A high-performance new home (EGH rating of 80 assumed). This option no longer applies as EGH of 80 is now the minimum.	0.00
Net Zero Ready Homes	A net-zero energy ready home (EGH rating of 86 assumed)	0.34
HEATING: EQUIPMENT		
Condensing Gas Furnaces	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 96%	0.32
Early Retire Gas Furnaces	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 90%	0.37
Condensing Gas Boilers	A condensing natural gas boiler (92% AFUE assumed)	0.28
Gas Fireplaces	A high efficiency natural gas fireplace (80% assumed)	3.16
Prog. Thermostats	Programmable thermostat installed on central forced-air natural gas furnace and electric space cooling system	7.07
Solar Make-Up Air	A 10 m2 solar pre-heated make-up air system, located on the south side of a home	0.20
HRVs	A high-efficiency heat recovery ventilator (HRV) (sensible efficiency of approximately 85%), in a home with central heating and cooling	0.33
Air Heat Pumps	A gas-fired air-source heat pump. This option is not valid because these units are not available in residential sizes.	0.00
Ground Heat Pumps	A gas-fired ground-source heat pump. This option is not valid because these units are not available in residential sizes.	0.00
Heating & DHW	An integrated heating and DHW system, with a condensing furnace (AFUE of 94), a condensing natural gas water heater (EF of 0.80 assumed), and an HRV with an efficiency similar to that in the base case (72%).	0.18
Heating & DHW (Hydronic)	An integrated heating and DHW system, with a condensing boiler (AFUE 92.7), a condensing natural gas water heater (EF of .85) and an HRV with an efficiency similar to that in the base case (72%).	0.35
WATER HEATING		
Condensing Gas DHW	A condensing natural gas water heater (EF of 0.80 assumed)	0.29
Tankless Gas DHW	A tankless natural gas hot water heater (EF of 0.82 assumed)	0.41
Solar DHW	Solar DHW systems use the energy of the sun to heat water. The primary components of a solar water heating system are a solar collector, a heat transfer fluid and a well-insulated storage tank. Due to Canada's colder climate and the higher likelihood of	0.24
DHW Tank Insulation	An insulating blanket installed on a hot water storage tank to reduce standby losses	1.04
DHW Pipe Insulation	Installing pipe insulation on the first meter of piping leading out of a hot water storage tank	17.77
DHW Heat Traps	Installing an external "S-type" pre-bent copper pipe heat trap on an gas-fired storage hot water heater. This option no longer applies because most new hot water heaters include an integrated heat trap.	0.00
Showerheads	An ultra low-flow showerhead with a 1.25 GPM (4.75) flow rate	10.03
Faucet Aerators	A 1.5 GPM (5.7 LPM) faucet aerator installed on the kitchen faucet	5.25
Wastewater Heat Recovery	A 60" wastewater heat recovery system	0.49
DHW Recirculation	A home with a DHW recirculation system installed on the point-of-use farthest away from the hot water tank	0.64
APPLIANCES		
ESTAR Dishwashers	An ENERGY STAR® certified, standard-sized new dishwasher	0.31
ESTAR Clothes Washers	An ENERGY STAR® certified, 3.2 cu. ft. (90.6 L) front loading clothes washer	0.96
Gas Clothes Dryers	A gas clothes dryer with a moisture sensor. This option is no longer valid because almost all new gas dryers have moisture sensors.	0.00
OTHER		
Pool Covers	Installing a pool cover to reduce the heat loss from a heated pool	0.86
Heat Pump Pool Heaters	A heat pump pool heater. This option is not valid in this study because it is a fuel-switching measure.	4.91
Efficient Pool Heaters	A high efficiency gas-fired pool heater (92.5% efficiency assumed)	0.07
Solar Pool Heaters	A solar pool heater with an unglazed collector	1.25
Micro-CHP	Installing a microturbine system in an average home, offsetting both the electric consumption from the grid and the amount of space and water heating that must be provided by a boiler. Note that this technology is not currently available in Canada.	0.35

Measure Name	Basis (Full/ Incremental)	Weighted Average	
		B/C Ratio	Measure TRC ($)
DHW Pipe Insulation	Full	17.77	$12
Ultra Low-Flow Showerheads	Full	10.03	$117
Programmable Thermostats (Central Heating and Cooling)	Full	7.07	$303
Faucet Aerators	Full	5.25	$64
Solar Pool Heaters	Full	1.25	$851
DHW Tank Insulation	Full	1.04	$1
Attic Insulation	Full	0.95	-$27
Homeowner Air Sealing/Weather Stripping/Caulking	Full	0.89	-$37
Insulating Pool Covers	Full	0.86	-$169
Air Leakage Sealing and Insulation (Old Homes)	Full	0.69	-$964
DHW Recirculation Systems (e.g. Metlund D'MAND®)	Full	0.64	-$188
Wastewater Heat Recovery Systems	Full	0.49	-$391
Professional Air Sealing/Weather Stripping/Caulking	Full	0.49	-$1,038
Crawl Space Insulation	Full	0.36	-$508
Net-Zero Ready Energy Homes	Full	0.34	-$7,508
Active Solar Water Heating Systems	Full	0.24	-$5,345
Solar Pre-Heated Make-Up Air Systems (e.g., SolarWall®)	Full	0.20	-$1,046
High-Performance Homes (EGH 80/R2000/ENERGY STAR®)	Full	0.00	-$5,210
High Efficiency Gas Fireplaces	Incr.	3.16	$325
Basement (Foundation) Insulation	Incr.	1.07	$123
Wall Insulation	Incr.	1.03	$69
High-Efficiency (ENERGY STAR®) Clothes Washers	Incr.	0.96	-$12
Super High-Performance Windows	Incr.	0.66	-$961
Point-of-Use (Tankless) Water Heaters (Gas)	Incr.	0.41	-$1,179
Early Retirement of Existing Gas Furnaces	Incr.	0.37	-$1,179
Micro-Combined Heat and Power (CHP)	Incr.	0.35	-$5,163
Integrated Heating and DHW (Hydronic Heating)	Incr.	0.35	-$3,926
High Efficiency Heat Recovery Ventilators (HRVs)	Incr.	0.33	-$400
High Efficiency Condensing Gas Furnaces	Incr.	0.32	-$999
High-Efficiency (ENERGY STAR®) Dishwashers	Incr.	0.31	-$72
Condensing Gas Water Heaters	Incr.	0.29	-$948
Zoned-Up Windows: (ENERGY STAR®) Rating for a Colder Zone	Incr.	0.28	-$1,239
Condensing Gas Boilers	Incr.	0.28	-$2,317
Integrated Heating and DHW (Forced Air Heating)	Incr.	0.18	-$5,116
Slab Insulation (Unfinished Basements)	Incr.	0.10	-$1,067
High-Efficiency Gas-Fired Pool Heaters	Incr.	0.07	-$2,696

Back to Index

Tab Name	Measure Name (Full)	General Measure Description	Baseline Description	Upgrade Description	
Attic Insulation	Attic Insulation	Insulation levels can be increased in attics by blowing insulation into the attic spaces to fill and cover the space within the roof frame. One technique is to make sure loose-fill or batt insulation fills the attic floor joists fully and then add an additional layer of unfaced fibreglass batt insulation across the joists. To reduce cost, it is also possible to blow in cellulose insulation on top of the existing insulation instead.	A home with average insulation in the attic	Improving the attic insulation in an average home by RSI-3.5 (R-20), through the addition of cellulose insulation	Cool
Wall Insulation	Wall Insulation	It can be challenging to retrofit wall insulation in existing homes since the inside surfaces of the exterior walls are already finished. It is sometimes possible to add insulation to a wall by blowing insulating materials into the wall cavity, if sufficient space exists. Alternatively, if the siding is old and due for replacement, rigid foam insulation can be added before the new siding is installed. In this situation, it would also be quite cost-effective to install a more effective vapour and air barrier (e.g., Dupont Tyvek®) to reduce the amount of air leakage through the walls.	A home with average wall insulation	Improving the wall insulation in an average home by RSI-1.76 (R-10) to RSI-4.2 (R-24)	Cool
Slab Insulation	Slab Insulation (Unfinished Basements)	Insulation can be added both under and on top of basement slab floors. However, in existing homes, only the latter is practical. It is assumed that additional insulation is added to the slab floor while the basement is being finished. This can be done by purchasing insulated subfloor panels or laying down extruded polystyrene rigid foam insulation.	Homes with unfinished basements	The addition of slab (basement floor) insulation in homes with unfinished basements. It is assumed that 2" polystyrene rigid foam insulation (RSI-1.76 (R-10)) is being added.	Cool
Basement Insulation	Basement (Foundation) Insulation	In many homes, the basement is often under-insulated or even left uninsulated. Increasing the insulation level in basements can be achieved in a number of ways, including constructing a new insulated frame wall, moving the existing frame wall to increase the insulation level, adding extra insulation to the existing frame wall, adding rigid board insulation to the exterior of the foundation, or using a combination of interior and exterior rigid board insulation. As a lower cost alternative, it is also possible to use polyurethane foam	A home with average insulation in the basement (foundation) walls	In average homes with basements, improving the foundation wall insulation by RSI-2.12 (R-12)	Cool
Crawl Space Insul.	Crawl Space Insulation	Insulation levels remain below code in many homes that include crawlspaces as part of the basement design. If the floor is exposed, it would first be necessary to install a vapour barrier (e.g., 6 mil (600 gauge/0.15 mm) polyurethane barrier). Polyurethane foam could then be applied to the ceiling of the crawlspace (or the outer walls if there are pipes running below the floor). In addition to increasing the insulation of the crawlspace, this would help to eliminate any air leaks. Co-benefits of improved crawlspace insulation include improved thermal comfort, fewer drafts, and less condensation.	Minimal crawlspace insulation in homes with crawlspaces	In homes with crawlspaces, the addition of crawlspace insulation to bring the thermal resistance values up to RSI-2.1 (R-12)	Cool
Air Sealing	Professional Air Sealing/Weather Stripping/Caulking	Air leakage sealing of building envelopes includes completion of a blower door test to quantify leakage levels and to identify the location of air leaks. Generally, major leakage occurs at window-to-wall interfaces, around doors (especially patio doors), through electrical and plumbing penetrations and at the top of foundation walls. Installation of sealant and gaskets are generally accepted methods for reducing air leakage in buildings. Other sources of air leaks include pot lights, wall-to-floor interfaces (i.e., top and bottom of baseboards) and bathroom and kitchen exhaust piping.	No action taken	A comprehensive air sealing job, which results in an air tightness (ACH @ 50 Pa) improvement of 30%	Cool
Homeowner Air Sealing	Homeowner Air Sealing/Weather Stripping/Caulking	Homeowner air leakage sealing does not include a blower door test to quantify leakage levels and to identify the location of air leaks. Homeowners are likely to identify leakage primarily in more visible areas of the envelope, for example, the major leakage at window-to-wall interfaces, around doors (especially patio doors), through electrical and plumbing penetrations and perhaps at the top of foundation walls. Installation of weather stripping, sealant and gaskets are the most likely methods to be used. Less visible sources of air leaks such as pot lights, wall-to-floor interfaces (i.e., top and bottom of baseboards), bathroom and kitchen exhaust piping, and leaks from the top of walls into the attic are less likely to be addressed by the homeowner	No action taken	A homeowner air sealing job, which results in an air tightness (ACH @ 50 Pa) improvement of 15-20%	Cool
Sealing & Insul. - Old Homes	Air Leakage Sealing and Insulation (Old Homes)	This measure is targeted at homes that are at least 30 years old, since many of these homes haven't had any work done to improve insulation and air-sealing deficiencies and it is generally most cost-effective to upgrade the insulation and the air sealing at the same time. This includes wall, attic, foundation, and crawlspace retrofits of older homes but, for the purposes of this analysis, it is assumed that a retrofit is being conducted on the attic. The air-sealing portion of the work could be accomplished by segmenting the attic. In each segment, the existing insulation could be moved to one side and polyurethane foam could be sprayed in (serves as an air sealant in addition to its insulating properties). It may also be necessary to install or refurbish top plates to prevent airflow into the attic through exterior wall cavities. Other considerations that would increase the cost of the air-sealing portion of the work and may be present in some homes include sealing pot lights and kitchen or bathroom exhaust piping. When completed, these measures would dramatically improve the air tightness of an older home. The attic insulation could subsequently be cost-effectively improved with cellulose insulation.	An older home with average air tightness and attic insulation (for that particular vintage)	Improve both the attic insulation and the air tightness (ACH@50 Pa) in an old home. It is assumed that the air tightness is improved by 30% and that RSI-3.52 (R-20) of attic insulation is added.	Cool
Zone Up Windows	Zoned-Up Windows: (ENERGY STAR®) Rating for a Colder Zone	High-performance windows incorporate a number of additional energy-saving features, including low-E (soft coating), insulating spacers, argon fill and low conductivity frames (which can be sliders, hinged or picture). These windows are certified based on their energy rating (ER), which is based on their tested energy performance, rather than on their specific combination of features. In this case, however, the Energy Star windows for a colder zone are specified instead of the Energy Star windows for the zone where the house is located - for example, Zone C Energy Star windows would be chosen for a house in Zone A. High-performance windows also provide occupant co-benefits, such as reduced interior noise, reduced air leakage, greater thermal comfort, and fewer condensation problems.	ENERGY STAR windows for Zone B (double glazed, argon fill, low-e coating, insulating spacer, vinyl frame, hinged)	In existing homes, replacing 50% of windows with ENERGY STAR windows from Zone D (double-glazed, argon fill, low-e coating, insulating spacer, vinyl frame, hinged). In hew homes, replacing 100% of windows.	Not cool
Super Windows	Super High-Performance Windows	In addition to low-E coating, argon fill and insulating spacers, super-high performance windows incorporate features such as triple glazing, transparent insulating films, and fibreglass frames.	Standard windows (double glazed, air fill, no coating, metal spacer, vinyl frame, slider with sash)	In existing homes, replacing 50% of windows with super high-performance windows (triple-glazed, krypton fill, low-e and insulating coatings, insulating spacer, fiberglass frame, hinged). In new homes, replacing all of the windows with super high-performance windows.	Cool
High-Perf. New Homes	High-Performance Homes (EGH 80/R2000/ENERGY STAR®)	There are several certification schemes for energy-efficient new homes that incorporate integrated design and multiple envelope measures. An EnerGuide for Houses (EGH) rating is a standard measure of a home's energy performance, calculated by a professional EGH advisor. The rating is based on information on the construction of the home and the results of a blower door test performed once the house has been built. The R2000 standard is one method of achieving an EGH 80 rating. However, R2000 homes are required to achieve an air tightness level of 1.5 ACH@50Pa, install a heat recovery ventilator (HRV), and meet other environmental requirements. This substantially increases the cost of the measure. The ENERGY STAR® for New Homes program has similar requirements and also requires that homes be rated EGH 80. Since these three high performance home standards all result in essentially the same energy performance, the costs assumed for the measure are those of the least expensive of the three. EGH 80 is the lowest cost, since it allows the builder the most flexibitility for achieving the energy performance.	An average new home (EGH rating of 76 assumed)	A high-performance new home (EGH rating of 80 assumed). This option no longer applies as EGH of 80 is now the minimum.	Cool
Net Zero Ready Homes	Net-Zero Ready Energy Homes	Net-zero energy homes (NZEH) produce at least as much energy as they consume. This is accomplished by incorporating on-site power generation, such as solar PV panels or small wind turbines, to offset electrical loads. However, the energy consumption of a NZEH is significantly lower, due to the addition of a wide array of energy efficiency features. Measures that are typically considered include increased insulation, super high-performance windows, ENERGY STAR® appliances, solar thermal space and/or water heating, heat pumps, and passive solar designs. This measure is designed to produce a highly efficient house that is ready to be turned into a NZEH with the addition of on-site renewable energy generation.	An average new home (Minimum EGH rating of 80 required)	A net-zero energy ready home (EGH rating of 86 assumed)	Cool
Condensing Gas Furnaces	High Efficiency Condensing Gas Furnaces	Federal legislation now requires that all residential furnaces meet the minimum performance standard of 90% AFUE . However, higher efficiency condensing furnaces are available. These furnaces include more advanced heat exchanger designs that extract more heat from the flue gases before they are exhausted.	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 90%	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 96%	Cool
Early Retire Gas Furnaces	Early Retirement of Existing Gas Furnaces	Federal legislation now requires that all residential furnaces meet the minimum performance standard of 90% AFUE . However, consumers with less efficient furnaces that still work may wait years before replacing them. Early retirement of existing furnaces that are still functional is an option. Energy savings only last until the old furnace would have been replaced, because after that the energy consumption of the base case and upgrade is the same. The consumer has the added peace of mind of having a new furnace that is less likely to break down in winter	Keep existing 77% efficient furnace until failure, assumed to be in 9 years; then replace with the same furnace as the upgrade	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 90%	Cool
Condensing Gas Boilers	Condensing Gas Boilers	High-efficiency condensing boilers feature advanced heat exchanger designs that extract more heat from the flue gases before they are exhausted. So much heat is extracted that the flue gases condense and must be discharged as a condensate rather than a gas. In retrofit applications where condensing boilers are replacing non-condensing units, it may be necessary to modify the radiating system. Otherwise, the units may not actually condense the flue gas and realize their full efficiency potential.	A non-condensing mid-efficiency natural gas boiler (82% AFUE assumed)	A condensing natural gas boiler (92% AFUE assumed)	Cool
Gas Fireplaces	High Efficiency Gas Fireplaces	All vented gas fireplaces sold in Canada must now be tested for their energy efficiency using the Canadian Standards Association CSA-P.4.1-02 standard if they are shipped across provincial lines. The energy-efficiency rating of the fireplace is printed on the EnerGuide label. EnerGuide does not set a minimum efficiency level, so savings are possible by using the EnerGuide label to choose the more efficient unit.	An average efficiency natural gas fireplace (60% assumed)	A high efficiency natural gas fireplace (80% assumed)	Cool
Prog. Thermostats	Programmable Thermostats (Central Heating and Cooling)	Digital programmable thermostats provide improved temperature setting accuracy and allow occupants to preset temperatures for various time periods. A 4ºC temperature setback is often assumed during night and unoccupied periods. However, utility studies have indicated that a lower average setback value should be used to reflect the fact that the thermostat's setback capabilities do not completely reflect how they are used. For example, some home occupants reliably set back manual thermostats while others do not use the setback features on their electronic thermostats.	Non-programmable thermostat installed on central forced-air natural gas furnace and electric space cooling system	Programmable thermostat installed on central forced-air natural gas furnace and electric space cooling system	Cool
Solar Make-Up Air	Solar Pre-Heated Make-Up Air Systems (e.g., SolarWall®)	Solar preheated ventilation systems preheat incoming ventilation air and reduce heat loss through the portion of the building shell covered by them. They consist of perforated steel or aluminum absorber sheets that are mounted vertically on a building's exterior surface and are ideally mounted on southerly facing walls, plus or minus 20 degrees. The dark coloured metal sheets that make up the system are mounted a small distance away from the building's surface, creating an air cavity. A negative pressure is created within the cavity by ventilation fans and air is drawn through small holes in the metal panels. On sunny winter days, these systems can raise incoming air temperatures by 25°C to 35°C. In summer months, ventilation air can be drawn directly from the outside through a bypass damper, while heated air is rejected through vents at the top of the air cavity. These systems are generally used in commercial and industrial applications but they have seen some limited residential use.	Homes with ducting and heat recovery ventilators (HRVs)	A 10 m2 solar pre-heated make-up air system, located on the south side of a home	Cool
HRVs	High Efficiency Heat Recovery Ventilators (HRVs)	Heat recovery ventilators (HRVs) are heat exchangers that are integrated into the centralized ventilation and exhaust systems of many newer homes. In the winter, they allow for incoming fresh air to be heated by outgoing stale air. Conversely, in homes with central air conditioning systems, they allow incoming fresh air to be cooled by outgoing stale air in the summer. High efficiency HRVs incorporate more effective heat exchangers. Some models also include desiccant wheels so that latent heat (i.e. humidity) can be transferred between the two air streams	A standard-efficiency (sensible efficiency of approximately 70%) heat recovery ventilator (HRV), in a home with central heating and cooling	A high-efficiency heat recovery ventilator (HRV) (sensible efficiency of approximately 85%), in a home with central heating and cooling	Cool
Air Heat Pumps	Gas-Fired Air-Source Heat Pumps	Early gas-fired heat pumps, such as the York Triathlon, were unsuccessful due to their bulky size and poor quality design. A new generation of gas absorption heat pumps (GAHPs) is currently available through Robur, an Italian manufacturer. These systems can either be ground-source or air-source (i.e., the heat sink may be either an underground fluid loop or an above ground heat exchanger coil). Air-source systems are substantially less expensive since they don't require drilling to install underground fluid loops. However, they can also be much less efficient than ground-source versions since their efficiency is a function of outside air temperature. Commercial-sized GAHP systems have been available in Canada since mid-2007 but residential-sized systems are rare in North America. It is hoped that residential-sized units will become more available in Canada within the study period, but the current manufacturers do not have specific plans at this time. It is estimated that air-source systems can operate at temperatures as low as -29°C and have annual efficiencies of 105% in cold winter locations. In more moderate winter climates, an efficiency of up to 129% is advertised. Unlike electric heat pump systems, GAHPs do not require any auxiliary heating equipment. In addition, the lack of a mechanical compressor extends their lifetime and allows air-source systems to withstand	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 90%	A gas-fired air-source heat pump. This option is not valid because these units are not available in residential sizes.	Cool

Ground Heat Pumps	Gas-Fired Ground-Source Heat Pumps	Early gas-fired heat pumps, such as the York Triathlon, were unsuccessful due to their bulky size and poor quality design. A new generation of gas absorption heat pumps (GAHPs) is currently available through Robur, an Italian manufacturer. These systems can either be ground-source or air-source (i.e., the heat sink may be either an underground fluid loop or an above ground heat exchanger coil). Air-source systems are substantially less expensive since they don't require drilling to install underground fluid loops. However, they can also be much less efficient than ground-source versions since their efficiency is a function of outside air temperature. Commercial-sized GAHP systems have been available in Canada since mid-2007 but residential-sized systems are not currently available outside of Europe. It is hoped that residential-sized units will become more available in Canada within the study period, but the current manufacturers do not have specific plans at this time. Ground-source GAHPs have efficiencies (COPs) ranging from 120% to 130% Unlike electric heat pump systems, GAHPs do not require any auxiliary heating equipment. In addition, the lack of a mechanical compressor extends their lifetime.	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 90%	A gas-fired ground-source heat pump. This option is not valid because these units are not available in residential sizes.	Cool
Heating & DHW	Integrated Heating and DHW (Forced Air Heating)	Integrated mechanical systems combine the most efficient technologies for residential space heating and domestic water heating into one package. For example, the Matrix system by NTI NY Thermal incorporates a condensing furnace, condensing boiler, condensing water heater and HRV all in one unit. Primary benefits of the integrated units include compact construction, lower cost of installation (only one set of gas, water and circulation connections are required), and lower installation and maintenance costs (once the technology is mature). Since the minimum performance standards for furnaces was brought up to 90% efficiency at the end of 2009, the base case system is a 90% efficient forced-air furnace and a standard efficiency natural gas tank-style water heater. With this baseline, the integrated system would offer little in the way of space heating savings, but it does still offer DHW savings because the integrated system would heat domestic water with	A 90% AFUE efficient forced-air condensing furnace, a standard efficiency natural gas tank-style water heater (EF of 0.62 or 0.64 assumed) and a standard efficiency HRV	An integrated heating and DHW system, with a condensing furnace (AFUE of 94), a condensing natural gas water heater (EF of 0.80 assumed), and an HRV with an efficiency similar to that in the base case (72%).	Cool
Heating & DHW (Hydronic)	Integrated Heating and DHW (Hydronic Heating)	Integrated mechanical systems combine the most efficient technologies for residential space heating and domestic water heating into one package. For example, the Matrix system by NTI NY Thermal incorporates a condensing furnace, condensing boiler, condensing water heater and HRV all in one unit. Primary benefits of the integrated units include compact construction, lower cost of installation (only one set of gas, water and circulation connections are required), and lower installation and maintenance costs (once the technology is mature). Water heating in the base case is assumed to be provided by a standard efficiency natural gas tank-style water heater (EF of 0.62 or 0.64), while space heating is provided by a non-condensing boiler, assumed to have an AFUE of 82% . The HRV in the base case is assumed to be of similar efficiency to the HRV in the	A non-condensing boiler with an AFUE of 82% and a standard efficiency natural gas tank-style water heater (EF of 0.62 or 0.64). An HRV of similar efficiency to the integrated unit (72%) is assumed.	An integrated heating and DHW system, with a condensing boiler (AFUE 92.7), a condensing natural gas water heater (EF of .85) and an HRV with an efficiency similar to that in the base case (72%).	Cool
Condensing Gas DHW	Condensing Gas Water Heaters	Condensing water heaters feature advanced heat exchanger designs that extract more heat from the flue gases before they are exhausted. So much heat is extracted that the flue gases condense and must be discharged as a condensate rather than a gas. As a result, the efficiency of these types of water heaters is significantly higher than standard water heaters.	A conventional storage natural gas hot water heater (EF of 0.62 or 0.64 assumed)	A condensing natural gas water heater (EF of 0.80 assumed)	Cool
Tankless Gas DHW	Point-of-Use (Tankless) Water Heaters (Gas)	Tankless water heaters heat water on demand, eliminating hot water storage. The absence of hot water storage reduces standby heat losses. The efficiency of tankless water heaters is generally improved by the addition of features such as modulating controls, electric spark ignitions and direct venting. The applicability of tankless gas-fired DHW systems is somewhat limited by venting constraints; the burner is significantly larger than for a standard water heater, so a larger vent is required. Some houses cannot accommodate the larger flue because of requirements for clearance from other structures, windows, etc.	A conventional storage natural gas hot water heater (EF of 0.60 assumed)	A tankless natural gas hot water heater (EF of 0.82 assumed)	Cool
Solar DHW	Active Solar Water Heating Systems	Solar DHW systems use the energy of the sun to heat water. The primary components of a solar water heating system are a solar collector, a heat transfer fluid and a well-insulated storage tank. Due to Canada's colder climate and the higher likelihood of freezing, active closed-loop systems are generally used. These systems use a pump to circulate a non-freezing heat transfer fluid through the collectors and then through a heat exchanger so that the thermal energy can be transferred to the water. Solar DHW are not generally sized to supply all of the annual requirement for water heating in the home, because if the system is sized for cloudy winter periods it will have enormous excess capacity during sunny summer periods, and will cost far too much to install. The system analyzed here meets approximately 2/3 of the annual requirements.	No solar water heating system installed	Solar DHW systems use the energy of the sun to heat water. The primary components of a solar water heating system are a solar collector, a heat transfer fluid and a well-insulated storage tank. Due to Canada's colder climate and the higher likelihood of	Cool
DHW Tank Insulation	DHW Tank Insulation	Pre-cut tank jackets/blankets (DHW tank insulation) are readily available and can be installed on hot water storage tanks to reduce standby heat losses. Caution is required to install blankets on gas water heaters, to avoid blocking the flue, the air intake to the burner, or the drain at the bottom. The thermostat should also remain uncovered.	No additional tank insulation installed on a conventional hot water storage tank	An insulating blanket installed on a hot water storage tank to reduce standby losses	Cool
DHW Pipe Insulation	DHW Pipe Insulation	Hot water pipe insulation reduces the distribution losses for DHW. In general, only the first one or two metres of pipe nearest the DHW tank are accessible enough to insulate. However, since the dominant loss is from the pipe transferring heat out of the tank and then losing it to the basement, the first meter of pipe is the most important and only worthwhile section of pipe to insulate. Insulating this section of piping affects both the delivery of hot water and the losses from the tank. Delivery temperature is slightly increased during a hot water draw, and the water in the piping does not lose its stored heat as quickly between draws	No insulation installed on the piping leading out of a hot water storage tank	Installing pipe insulation on the first meter of piping leading out of a hot water storage tank	Cool
DHW Heat Traps	DHW Heat Traps	This measure involves the installation of external "S-type" pre-bent copper pipe heat traps on both of the outlets ofwater heaters. This measure is only being considered during the installation of new tanks since it can be prohibitively expensive to bring in a plumber otherwise.	No heat trap installed on a new electric storage hot water heater	Installing an external "S-type" pre-bent copper pipe heat trap on an gas-fired storage hot water heater. This option no longer applies because most new hot water heaters include an integrated heat trap.	Cool
Showerheads	Ultra Low-Flow Showerheads	Ultra low-flow showerheads have aerators and flow restrictors to reduce water use. At 4.75 LPM (1.25 GPM), their flow rates are substantially lower than traditional low-flow fixtures, whose flow rates range between 7.6 LPM and 9.5 LPM (2.0-2.5 GPM).	A low-flow showerhead with a 2.0 GPM (7.6 LPM) flow rate (conservative estimate)	An ultra low-flow showerhead with a 1.25 GPM (4.75) flow rate	Cool
Faucet Aerators	Faucet Aerators	Aerators can easily be attached to most faucets to restrict the flow rate of water flowing from them. This can result in savings to both water consumption and DHW energy.	No faucet aerator installed on the kitchen faucet	A 1.5 GPM (5.7 LPM) faucet aerator installed on the kitchen faucet	Cool
Wastewater Heat Recovery	Wastewater Heat Recovery Systems	Residential wastewater heat recovery systems transfer the waste heat from drains to preheat make-up water. These systems work well only for DHW uses in which the hot water use and the draining of wastewater are simultaneous. Thus, in homes, application to anything other than showers is difficult. Heat recovery systems incorporate shell-and-tube heat exchangers that typically have efficiencies in the range of 40% to 55%, depending on factors such as design, material, overall length, and fluid flow rate.	No wastewater heat recovery system installed	A 60" wastewater heat recovery system	Cool
DHW Recirculation	DHW Recirculation Systems (e.g. Metlund D'MAND®)	When turning on the hot water tap, it often takes a long time before hot water begins to flow. DHW recirculation systems can be used to pump hot water to a faucet at the demand of a user, getting hot water to the fixture four to five times quicker than traditional systems. Water that is in the hot water lines is pumped back to the water heater either through the cold water lines or through a dedicated line. This pumping continues until the temperature of the hot water at the point of use reaches a specified value. In retrofit situations, this pumping system is generally installed at the faucet that is furthest away from the water heater and the system is enabled by remote activation from the other points of use. Along with improved convenience and water savings (since water isn't flushed down the drain), energy savings are achieved since the water that is pumped back to the water heater is generally warmer than city water. In addition, since the pump gets water to the fixture more quickly, there is an overall reduction of hot water use.	A home with no DHW recirculation system	A home with a DHW recirculation system installed on the point-of-use farthest away from the hot water tank	Cool
ESTAR Dishwashers	High-Efficiency (ENERGY STAR®) Dishwashers	ENERGY STAR® dishwashers save energy by using improved technology for the primary wash cycle and by using less hot water to clean. Features include more effective washing action, energy-efficient motors, and sensors that determine the length of the wash cycle and the temperature of the water necessary to clean the dishes. In addition, some advanced dishwashers can sense and adjust for the amount of soil on dishes, using only as much water as necessary. These savings affect both the energy used for heating the water and the mechanical energy of the dishwasher	A standard-sized new dishwasher	An ENERGY STAR® certified, standard-sized new dishwasher	Cool
ESTAR Clothes Washers	High-Efficiency (ENERGY STAR®) Clothes Washers	In January 2011, the ENERGY STAR® standard for clothes washers will be increased once again. As a result, very few top loading washers will meet ENERGY STAR® requirements. Instead, the overwhelming majority of ENERGY STAR® models will be front loading (horizontal axis) models. Compared to standard models, front loading washing machines use less hot water, less mechanical energy, and result in dryer energy savings due to faster spin cycle speeds	A standard 3.2 cu. ft. (90.6 L) top loading clothes washer	An ENERGY STAR® certified, 3.2 cu. ft. (90.6 L) front loading clothes washer	Cool
Gas Clothes Dryers	High-Efficiency Gas Clothes Dryers	The major distinction with energy-efficient gas clothes dryer models is that they incorporate termination controls to sense dryness and turn off automatically. The most efficient models have moisture sensors in the drum for sensing dryness, while other lower-cost and slightly less efficient models infer dryness by sensing the temperature of the exhaust air. The majority of the retail models currently available employ some type of dryness sensing technology but it is unclear how often these controls are used by homeowners	A gas clothes dryer with a temperature sensor	A gas clothes dryer with a moisture sensor. This option is no longer valid because almost all new gas dryers have moisture sensors.	Cool
Pool Covers	Insulating Pool Covers	Between 30% and 50% of the heat loss from a swimming pool is due to evaporation. In an outdoor pool, this heat loss either adds to the cost of heating the pool or shortens the swimming season. Evaporation also increases the quantity of chemicals that must be added to the pool. A pool cover can reduce evaporation and other heat losses but can also reduce heat gains depending on the design. An insulating vinyl pool cover is assumed for this analysis. Although substantially more expensive than the bubble type covers, insulating vinyl pool covers are much more robust and, thus, have much longer lifetimes. They are also more effective at trapping heat	A pool with no insulating cover	Installing a pool cover to reduce the heat loss from a heated pool	Cool
Heat Pump Pool Heaters	Heat Pump Pool Heaters	Air source heat pumps can be used to replace electric or gas-fired pool heaters. The principal of operation for these types of heat pumps is very similar to refrigerators and air conditioning units, in that they are used to transfer heat from one place to another. This allows them to be significantly more efficient than electric or gas-fired pool heaters, since these types of heaters generate heat rather than transferring it.	A standard efficiency gas-fired pool heater	A heat pump pool heater. This option is not valid in this study because it is a fuel-switching measure.	Cool
Efficient Pool Heaters	High-Efficiency Gas-Fired Pool Heaters	High-efficiency pool heaters incorporate advanced heat exchangers, forced draft combustion systems, pilot-less ignitions and innovations in hydraulics, which results in performance efficiencies that range between 90% and 95%, compared to efficiencies of 80% to 85% for standard models.	A standard efficiency gas-fired pool heater (82.5% efficiency assumed)	A high efficiency gas-fired pool heater (92.5% efficiency assumed)	Cool
Solar Pool Heaters	Solar Pool Heaters	Unlike other types of solar hot water systems, solar pool heaters do not include storage tanks or heat exchangers, and, since they are only used in warmer weather, they generally employ unglazed solar collectors that are composed of a polymer. These collectors are mounted of the roofs of homes or in an unshaded part of the yard. The heat transfer fluid is usually pool water that is pumped directly into the array of collectors and flows within the polymer in a serpentine array in order to pick up heat. Although solar DHW systems do require a pump, its consumption is similar to that used in electric and gas-fired pool heaters. Solar pool heaters can completely offset the energy requirements of conventional pool heaters. And,	A standard efficiency gas-fired pool heater	A solar pool heater with an unglazed collector	Cool
Micro-CHP	Micro-Combined Heat and Power (CHP)	Several types of micro-combustion heat and power (micro CHP) systems are either available or under development. These units all generate electrical power and capture the resulting "waste" heat for space and/or water heating. Reciprocating engine units such as the Honda Freewatt use a well-developed technology and can be scaled to a residential size. Power generate efficiencies range from 20-40% and up to 90% of the waste heat can be captured. Various sizing and control strategies can be used: for example, the amount of heat can be maximized or the amount of electricity can be maximized. This example assumes a unit such as the Honda Freewatt hydronic system, which has a 1.2 kW maximum electrical output and a 3.5 kW thermal output. Heat load following control is assumed to avoid fuel-switching, however power load following control is usually more economically attractive for applications involving seasonally varying loads. A back-up boiler is included in the Honda Freewatt package. Net-metering is	Condensing gas-fired boiler (92% AFUE)	Installing a microturbine system in an average home, offsetting both the electric consumption from the grid and the amount of space and water heating that must be provided by a boiler. Note that this technology is not currently available in Canada.	Cool

MISCELLANEOUS INPUTS

Back to Index

Measure Sheet Title: TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Number of Sub-Sectors (1 to 15): 8

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Average
Sub-Sector Names:	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	9	10	11	12	13	14	15	Weighted Avg.

FUEL MIX

Space Heating

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	9	10	11	12	13	14	15	Weighted Avg.	References/Notes
Electricity	2.5%	2.5%	2.5%	4.7%	4.7%	4.7%	2.5%	2.5%								3.5%	
Natural Gas	94.6%	94.6%	94.6%	94.6%	94.6%	94.6%	94.6%	94.6%								94.6%	
Oil																0.0%	Not used
Wood																0.0%	Not used
Total	**97.2%**	**97.2%**	**97.2%**	**99.3%**	**99.3%**	**99.3%**	**97.2%**	**97.2%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**98.2%**	

DHW

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	9	10	11	12	13	14	15	Weighted Avg.	References/Notes
Electricity	38.0%	38.0%	38.0%	38.1%	38.1%	38.1%	38.3%	38.3%								38.0%	
Natural Gas	61.2%	61.2%	61.2%	60.8%	60.8%	60.8%	61.2%	61.2%								61.0%	
Oil																0.0%	Not used
Total	**99.2%**	**99.2%**	**99.2%**	**98.9%**	**98.9%**	**98.9%**	**99.5%**	**99.5%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**99.0%**	

Cooking

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	9	10	11	12	13	14	15	Weighted Avg.	References/Notes
Electricity	61.5%	61.5%	61.5%	71.4%	71.4%	71.4%	64.8%	64.8%								66.2%	
Natural Gas	38.5%	38.5%	38.5%	28.6%	28.6%	28.6%	35.2%	35.2%								33.8%	
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**100.0%**	

Clothes Dryers

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	9	10	11	12	13	14	15	Weighted Avg.	References/Notes
Electricity	92.1%	92.1%	92.1%	95.0%	95.0%	95.0%	93.1%	93.1%								93.5%	
Natural Gas	7.9%	7.9%	7.9%	5.0%	5.0%	5.0%	6.9%	6.9%								6.5%	
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**100.0%**	

Pools and Spas

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	9	10	11	12	13	14	15	Weighted Avg.	References/Notes
Electricity	79.1%	79.1%	79.1%	79.1%	79.1%	79.1%	79.1%	79.1%								79.1%	
Natural Gas	20.9%	20.9%	20.9%	20.9%	20.9%	20.9%	20.9%	20.9%								20.9%	
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**100.0%**	

HEATING PENALTY/ COOLING BENEFITS

Mix of Heating Fuels (for heating penalty and cooling benefits calculations)

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	9	10	11	12	13	14	15	Weighted Avg.	References/Notes
Electricity	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%								0.0%	Not used
Natural Gas	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%								0.0%	Not used
Oil	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%								0.0%	Not used
Wood	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%								0.0%	Not used
Total	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	

Average Heating System Efficiency by Fuel

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	9	10	11	12	13	14	15	Weighted Avg.	References/Notes
Electricity	110.0%	110.0%	110.0%	110.0%	110.0%	110.0%	100.0%	100.0%								109.9%	Not used
Natural Gas	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%								85.0%	Not used
Oil	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%								75.0%	Not used

Average Cooling System Efficiency by Fuel

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	9	10	11	12	13	14	15	Weighted Avg.	References/Notes
Electricity	300.0%	300.0%	300.0%	300.0%	300.0%	300.0%	300.0%	300.0%								300.0%	Not used

HOUSING STOCK

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	9	10	11	12	13	14	15	Weighted Avg.	References/Notes
Occupancy Rates	3.1	3.1	3.1	2.4	2.4	2.4	1.9	1.9								2.8	Stats Canada, values for Vancouver
Distribution of Housing Types	6.5%	59.3%	38.0%	1.1%	32.2%	61.1%	0.9%	0.9%								N/A	

ECONOMIC PARAMETERS

Back to Index

Customer Resource Costs

Electric Energy ($/kWh)	$0.083
Electric Demand ($/kW)	
Natural Gas ($/MJ)	$0.010
Oil ($/L)	
Water ($/1000L)	

Sources:

Electricity: Residential retail cost of electricity and demand taken from the spreadsheet "20100111_Planning Tool with Partners_TGVI_Res.xlsx" provided by Terasen

Gas: TGI rate taken from the spreadsheet "20100111_Planning Tool with Partners_TGVI_Res.xlsx" provided by Terasen

Oil: Cost not used

Water: Cost not used

GHG Adder Inputs

	Electricity (kWh)	Natural Gas (m^3)	Fuel Oil (L)	Water (1000L)	
			Not used	Not used	
GHG Cost, 2010 ($/tonne CO_2e)					Not used--GHG costs already in avoided cost
GHG Cost, 2011 ($/tonne CO_2e)					Not used--GHG costs already in avoided cost
GHG Cost, 2012+ ($/tonne CO_2e)					Not used--GHG costs already in avoided cost
Emissions Coefficient (tonnes CO_2e/unit)	0.0000	0			Not used--GHG costs already in avoided cost
GHG Adder, 2010 ($/unit)	0.0000	0	0.0000	0.0000	Not used--GHG costs already in avoided cost
GHG Adder, 2011 ($/unit)	0.0000	0	0.0000	0.0000	Not used--GHG costs already in avoided cost
GHG Adder, 2012+ ($/unit)	0.0000	0	0.0000	0.0000	Not used--GHG costs already in avoided cost

- Electricity emissions factors based on BC emission factors presented on http://www.ec.gc.ca/ges-ghg/default.asp?lang=En&n=EAF0E96A-1#section11, from Environment Canada; *National Inventory Report (1990-2008): Greenhouse Gas Sources and Sinks in Canada* , May 2008.

- Natural gas emissions factors based on BC emission factors presented on http://www.ec.gc.ca/ges-ghg/default.asp?lang=En&n=AC2B7641-1 from Environment Canada; *National Inventory Report (1990-2008): Greenhouse Gas Sources and Sinks in Canada* , May 2008.

Other Economic Parameters

Discount Rate	7.38%

AVOIDED COSTS (2009)

Back to Index

GHG Adder	No	**Note:** GHG adders already added to avoided costs
Inflation Factor	N/A	**Note:** Not currently being used
Discount Rate	7.38%	

YEAR	ELECTRICITY (ENERGY) ☑				ELECTRICITY (DEMAND) ☐				NATURAL GAS ☑				FUEL OIL ☐		WATER ☐	
	Baseload		Peak		Baseload		Peak		Baseload		Weather Sensitive		Rates	NPV	Rates	NPV
	Rates	NPV	Rates	NPV	Rates	NPV	Rates	NPV	Rates	NPV	Rates	NPV				
1	0.1284	0.1284	0.1584	0.1584	0.0000	0.0000	0.0000	0.0000	0.0065	0.0065	0.3407	0.3407	0.00000	0.00000	0.00000	0.00000
2	0.1284	0.2480	0.1584	0.3059	0.0000	0.0000	0.0000	0.0000	0.0070	0.0130	0.3251	0.6434	0.00000	0.00000	0.00000	0.00000
3	0.1284	0.3593	0.1584	0.4433	0.0000	0.0000	0.0000	0.0000	0.0080	0.0200	0.3324	0.9317	0.00000	0.00000	0.00000	0.00000
4	0.1284	0.4630	0.1584	0.5712	0.0000	0.0000	0.0000	0.0000	0.0090	0.0272	0.3265	1.1954	0.00000	0.00000	0.00000	0.00000
5	0.1284	0.5596	0.1584	0.6904	0.0000	0.0000	0.0000	0.0000	0.0096	0.0344	0.3408	1.4517	0.00000	0.00000	0.00000	0.00000
6	0.1284	0.6496	0.1584	0.8013	0.0000	0.0000	0.0000	0.0000	0.0101	0.0415	0.3535	1.6993	0.00000	0.00000	0.00000	0.00000
7	0.1284	0.7333	0.1584	0.9046	0.0000	0.0000	0.0000	0.0000	0.0105	0.0483	0.3599	1.9341	0.00000	0.00000	0.00000	0.00000
8	0.1284	0.8113	0.1584	1.0009	0.0000	0.0000	0.0000	0.0000	0.0108	0.0548	0.3557	2.1501	0.00000	0.00000	0.00000	0.00000
9	0.1284	0.8840	0.1584	1.0905	0.0000	0.0000	0.0000	0.0000	0.0110	0.0611	0.3626	2.3553	0.00000	0.00000	0.00000	0.00000
10	0.1284	0.9516	0.1584	1.1739	0.0000	0.0000	0.0000	0.0000	0.0112	0.0670	0.3697	2.5500	0.00000	0.00000	0.00000	0.00000
11	0.1284	1.0146	0.1584	1.2517	0.0000	0.0000	0.0000	0.0000	0.0114	0.0726	0.3769	2.7349	0.00000	0.00000	0.00000	0.00000
12	0.1284	1.0733	0.1584	1.3240	0.0000	0.0000	0.0000	0.0000	0.0116	0.0779	0.3842	2.9105	0.00000	0.00000	0.00000	0.00000
13	0.1284	1.1279	0.1584	1.3914	0.0000	0.0000	0.0000	0.0000	0.0119	0.0829	0.3917	3.0771	0.00000	0.00000	0.00000	0.00000
14	0.1284	1.1788	0.1584	1.4542	0.0000	0.0000	0.0000	0.0000	0.0121	0.0877	0.3993	3.2354	0.00000	0.00000	0.00000	0.00000
15	0.1284	1.2262	0.1584	1.5127	0.0000	0.0000	0.0000	0.0000	0.0123	0.0923	0.4071	3.3856	0.00000	0.00000	0.00000	0.00000
16	0.1284	1.2703	0.1584	1.5671	0.0000	0.0000	0.0000	0.0000	0.0125	0.0966	0.4150	3.5282	0.00000	0.00000	0.00000	0.00000
17	0.1284	1.3114	0.1584	1.6178	0.0000	0.0000	0.0000	0.0000	0.0128	0.1007	0.4231	3.6636	0.00000	0.00000	0.00000	0.00000
18	0.1284	1.3497	0.1584	1.6650	0.0000	0.0000	0.0000	0.0000	0.0130	0.1045	0.4313	3.7922	0.00000	0.00000	0.00000	0.00000
19	0.1284	1.3853	0.1584	1.7090	0.0000	0.0000	0.0000	0.0000	0.0133	0.1082	0.4397	3.9143	0.00000	0.00000	0.00000	0.00000
20	0.1284	1.4185	0.1584	1.7499	0.0000	0.0000	0.0000	0.0000	0.0135	0.1117	0.4483	4.0302	0.00000	0.00000	0.00000	0.00000
21	0.1284	1.4494	0.1584	1.7881	0.0000	0.0000	0.0000	0.0000	0.0139	0.1151	0.4570	4.1402	0.00000	0.00000	0.00000	0.00000
22	0.1284	1.4782	0.1584	1.8236	0.0000	0.0000	0.0000	0.0000	0.0143	0.1183	0.4659	4.2446	0.00000	0.00000	0.00000	0.00000
23	0.1284	1.5050	0.1584	1.8566	0.0000	0.0000	0.0000	0.0000	0.0146	0.1213	0.4750	4.3438	0.00000	0.00000	0.00000	0.00000
24	0.1284	1.5300	0.1584	1.8874	0.0000	0.0000	0.0000	0.0000	0.0150	0.1242	0.4843	4.4380	0.00000	0.00000	0.00000	0.00000
25	0.1284	1.5532	0.1584	1.9161	0.0000	0.0000	0.0000	0.0000	0.0154	0.1270	0.4937	4.5274	0.00000	0.00000	0.00000	0.00000
26	0.1284	1.5749	0.1584	1.9428	0.0000	0.0000	0.0000	0.0000	0.0157	0.1297	0.5033	4.6122	0.00000	0.00000	0.00000	0.00000
27	0.1284	1.5950	0.1584	1.9677	0.0000	0.0000	0.0000	0.0000	0.0161	0.1322	0.5131	4.6928	0.00000	0.00000	0.00000	0.00000
28	0.1284	1.6138	0.1584	1.9909	0.0000	0.0000	0.0000	0.0000	0.0165	0.1346	0.5231	4.7693	0.00000	0.00000	0.00000	0.00000
29	0.1284	1.6313	0.1584	2.0124	0.0000	0.0000	0.0000	0.0000	0.0168	0.1369	0.5333	4.8419	0.00000	0.00000	0.00000	0.00000
30	0.1284	1.6476	0.1584	2.0325	0.0000	0.0000	0.0000	0.0000	0.0172	0.1391	0.5419	4.9107	0.00000	0.00000	0.00000	0.00000

AVOIDED COSTS (2009) - RAW INPUTS

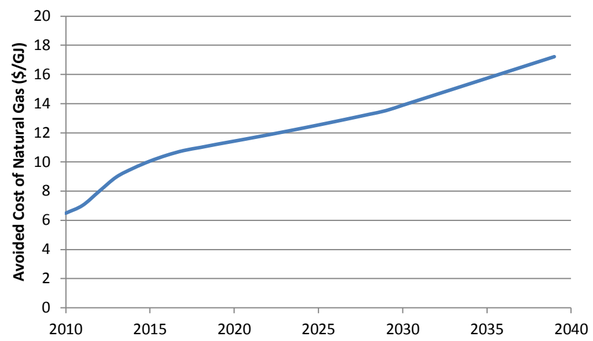
Back to Index

GHG Adder	N/A	**Note:** Not to be modified here
Inflation Factor	N/A	**Note:** Not currently being used
Discount Rate	7.38%	

Units are $/MJ

YEAR	ELECTRICITY (ENERGY)				ELECTRICITY (DEMAND)				NATURAL GAS				FUEL OIL		WATER	
	Baseload		Peak		Baseload		Peak		Baseload		Weather Sensitive		Rates	NPV	Rates	NPV
	Rates	NPV	Rates	NPV	Rates	NPV	Rates	NPV	Rates	NPV	Rates	NPV				
			Not used		Not used		Not used				Not used		Not used		Not used	
1	0.1284	0.1284	0.1584	0.1584	15.0000	15.0000	15.0000	15.0000	0.0065	0.0065	0.3407	0.3407	0.75000	0.75000	1.68504	1.68504
2	0.1284	0.2480	0.1584	0.3059	15.1000	29.0622	15.1000	29.0622	0.0070	0.0130	0.3251	0.6434	0.76000	1.45777	1.71705	3.28408
3	0.1284	0.3593	0.1584	0.4433	15.2000	42.2447	15.2000	42.2447	0.0080	0.0200	0.3324	0.9317	0.77000	2.12556	1.74967	4.80151
4	0.1284	0.4630	0.1584	0.5712	15.3000	54.6019	15.3000	54.6019	0.0090	0.0272	0.3265	1.1954	0.78000	2.75554	1.78292	6.24151
5	0.1284	0.5596	0.1584	0.6904	15.4000	66.1851	15.4000	66.1851	0.0096	0.0344	0.3408	1.4517	0.79000	3.34974	1.81679	7.60802
6	0.1284	0.6496	0.1584	0.8013	15.5000	77.0422	15.5000	77.0422	0.0101	0.0415	0.3535	1.6993	0.80000	3.91011	1.85131	8.90479
7	0.1284	0.7333	0.1584	0.9046	15.6000	87.2184	15.6000	87.2184	0.0105	0.0483	0.3599	1.9341	0.81000	4.43849	1.88649	10.13538
8	0.1284	0.8113	0.1584	1.0009	15.7000	96.7559	15.7000	96.7559	0.0108	0.0548	0.3557	2.1501	0.82000	4.93662	1.92233	11.30317
9	0.1284	0.8840	0.1584	1.0905	15.8000	105.6945	15.8000	105.6945	0.0110	0.0611	0.3626	2.3553	0.83000	5.40618	1.95886	12.41136
10	0.1284	0.9516	0.1584	1.1739	15.9000	114.0715	15.9000	114.0715	0.0112	0.0670	0.3697	2.5500	0.84000	5.84874	1.99607	13.46300
11	0.1284	1.0146	0.1584	1.2517	16.0000	121.9218	16.0000	121.9218	0.0114	0.0726	0.3769	2.7349	0.85000	6.26579	2.03400	14.46096
12	0.1284	1.0733	0.1584	1.3240	16.1000	129.2782	16.1000	129.2782	0.0116	0.0779	0.3842	2.9105	0.86000	6.65874	2.07265	15.40800
13	0.1284	1.1279	0.1584	1.3914	16.2000	136.1716	16.2000	136.1716	0.0119	0.0829	0.3917	3.0771	0.87000	7.02894	2.11203	16.30671
14	0.1284	1.1788	0.1584	1.4542	16.3000	142.6309	16.3000	142.6309	0.0121	0.0877	0.3993	3.2354	0.88000	7.37766	2.15215	17.15955
15	0.1284	1.2262	0.1584	1.5127	16.4000	148.6831	16.4000	148.6831	0.0123	0.0923	0.4071	3.3856	0.89000	7.70611	2.19304	17.96887
16	0.1284	1.2703	0.1584	1.5671	16.5000	154.3538	16.5000	154.3538	0.0125	0.0966	0.4150	3.5282	0.90000	8.01542	2.23471	18.73689
17	0.1284	1.3114	0.1584	1.6178	16.6000	159.6667	16.6000	159.6667	0.0128	0.1007	0.4231	3.6636	0.91000	8.30667	2.27717	19.46571
18	0.1284	1.3497	0.1584	1.6650	16.7000	164.6443	16.7000	164.6443	0.0130	0.1045	0.4313	3.7922	0.92000	8.58088	2.32044	20.15734
19	0.1284	1.3853	0.1584	1.7090	16.8000	169.3075	16.8000	169.3075	0.0133	0.1082	0.4397	3.9143	0.93000	8.83903	2.36453	20.81367
20	0.1284	1.4185	0.1584	1.7499	16.9000	173.6761	16.9000	173.6761	0.0135	0.1117	0.4483	4.0302	0.94000	9.08201	2.40945	21.43651
21	0.1284	1.4494	0.1584	1.7881	17.0000	177.7686	17.0000	177.7686	0.0139	0.1151	0.4570	4.1402	0.95000	9.31071	2.45523	22.02756
22	0.1284	1.4782	0.1584	1.8236	17.1000	181.6021	17.1000	181.6021	0.0143	0.1183	0.4659	4.2446	0.96000	9.52593	2.50188	22.58844
23	0.1284	1.5050	0.1584	1.8566	17.2000	185.1931	17.2000	185.1931	0.0146	0.1213	0.4750	4.3438	0.97000	9.72844	2.54942	23.12071
24	0.1284	1.5300	0.1584	1.8874	17.3000	188.5568	17.3000	188.5568	0.0150	0.1242	0.4843	4.4380	0.98000	9.91898	2.59786	23.62581
25	0.1284	1.5532	0.1584	1.9161	17.4000	191.7073	17.4000	191.7073	0.0154	0.1270	0.4937	4.5274	0.99000	10.09824	2.64722	24.10513
26	0.1284	1.5749	0.1584	1.9428	17.5000	194.6582	17.5000	194.6582	0.0157	0.1297	0.5033	4.6122	1.00000	10.26686	2.69751	24.55999
27	0.1284	1.5950	0.1584	1.9677	17.6000	197.4220	17.6000	197.4220	0.0161	0.1322	0.5131	4.6928	1.01000	10.42546	2.74877	24.99164
28	0.1284	1.6138	0.1584	1.9909	17.7000	200.0105	17.7000	200.0105	0.0165	0.1346	0.5231	4.7693	1.02000	10.57463	2.80099	25.40126
29	0.1284	1.6313	0.1584	2.0124	17.8000	202.4346	17.8000	202.4346	0.0168	0.1369	0.5333	4.8419	1.03000	10.71490	2.85421	25.78997
30	0.1284	1.6476	0.1584	2.0325	17.9000	204.7049	17.9000	204.7049	0.0172	0.1391	0.5419	4.9107	1.04000	10.84681	2.90844	26.15885

2010	6.490252		1
2011	7.025272	0.53502	2
2012	8.005337	0.980065	3
2013	8.966252	0.960915	4
2014	9.567327	0.601075	5
2015	10.06053	0.493207	6
2016	10.46367	0.403134	7
2017	10.78438	0.320707	8
2018	10.99733	0.212952	9
2019	11.22083	0.223501	10
2020	11.42842	0.207588	11
2021	11.64064	0.212223	12
2022	11.8576	0.216965	13
2023	12.07942	0.221816	14
2024	12.3062	0.22678	15
2025	12.53806	0.23186	16
2026	12.77512	0.237057	17
2027	13.01749	0.242375	18
2028	13.26531	0.247816	19
2029	13.51869	0.253384	20
2030	13.88861	0.369918	21
2031	14.25853	0.369918	22
2032	14.62845	0.369918	23
2033	14.99836	0.369918	24
2034	15.36828	0.369918	25
2035	15.7382	0.369918	26 df
2036	16.10812	0.369918	27
2037	16.47803	0.369918	28
2038	16.84795	0.369918	29
2039	17.21787	0.369918	30
2040	17.58779	0.369918	31
2041	17.95771	0.369918	32
2042	18.32762	0.369918	33
2043	18.69754	0.369918	34
2044	19.06746	0.369918	35
2045	19.43738	0.369918	36
2046	19.8073	0.369918	37
2047	20.17721	0.369918	38
2048	20.54713		



Baseline Consumption (Case 1)

Back to Index

BASIS/TAG: 1. Annual consumption, end use
DESCRIPTION: Annual energy consumption, at the end use level
UNIT: /yr.

CONVERSION FACTORS:

Electricity (kWh to MJ):	3.60	
Natural Gas (m^3 to MJ):	39.62	Not used
Fuel Oil (L to MJ):	36.74	Not used

NATURAL UNITS:

Electricity

#	Main End Use	Sub End Use/Equipment (If Applicable)	% of Main End-Use (Default)	Average Consumption (kWh/yr.)									References/Notes
				Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
1	**Ventilation and Circulation**		**100.0%**	600.0	800.0	768.3	400.0	400.0	384.2	241.3	231.7	588.7	
2	**Space Cooling**		**100.0%**	277.6	277.6	266.6	165.2	165.2	158.6	176.0	169.0	219.5	
3	**Clothes Washers**		**100.0%**	64.0	64.0	64.0	48.2	48.2	48.2	51.0	51.0	56.4	
4	**Dishwashers**		**100.0%**	75.0	75.0	75.0	57.6	57.6	57.6	60.0	60.0	66.7	
5	**Other Electric Loads**		**100.0%**	2,000.0	2,000.0	2,000.0	2,000.0	2,000.0	2,000.0	2,000.0	2,000.0	2,000.0	Value based on electricity generated by micro-CHP measure
6			**100.0%**									0.0	
7			**100.0%**									0.0	
8			**100.0%**									0.0	
9			**100.0%**									0.0	
10			**100.0%**									0.0	
11			**100.0%**									0.0	
12			**100.0%**									0.0	
13			**100.0%**									0.0	
14			**100.0%**									0.0	
15			**100.0%**									0.0	
16			**100.0%**									0.0	
17			**100.0%**									0.0	
18			**100.0%**									0.0	
19			**100.0%**									0.0	
20			**100.0%**									0.0	
21			**100.0%**									0.0	
22			**100.0%**									0.0	
23			**100.0%**									0.0	
24			**100.0%**									0.0	
25			**100.0%**									0.0	
26			**100.0%**									0.0	
27			**100.0%**									0.0	
28			**100.0%**									0.0	
29			**100.0%**									0.0	
30			**100.0%**									0.0	
31			**100.0%**									0.0	
32			**100.0%**									0.0	
33			**100.0%**									0.0	
34			**100.0%**									0.0	
35			**100.0%**									0.0	
36			**100.0%**									0.0	
37			**100.0%**									0.0	
38			**100.0%**									0.0	
39			**100.0%**									0.0	
40			**100.0%**									0.0	

Natural Gas

#	Main End Use	Sub End Use/Equipment (If Applicable)	% of Main End-Use (Default)	Average Consumption (m3/yr.)									References/Notes
				Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
1	**Space Heating**		**100.0%**	103,566.2	87,600.4	87,600.4	61,905.6	54,833.5	54,833.5	68,576.1	68,576.1	72,530.9	
2	**Domestic Hot Water (DHW)**		**100.0%**	21,577.9	21,577.9	21,577.9	18,219.1	18,219.1	18,219.1	18,785.2	18,785.2	19,967.9	
3	Domestic Hot Water (DHW)	Clothes Washers	18.0%	3,884.0	3,884.0	3,884.0	3,279.4	3,279.4	3,279.4	3,381.3	3,381.3	3,594.2	DHW end-use breakdown based on several studies, as outlined in baseline report
4	Domestic Hot Water (DHW)	Showers	26.0%	5,610.3	5,610.3	5,610.3	4,737.0	4,737.0	4,737.0	4,884.1	4,884.1	5,191.7	DHW end-use breakdown based on several studies, as outlined in baseline report
5	Domestic Hot Water (DHW)	Faucets	19.0%	4,099.8	4,099.8	4,099.8	3,461.6	3,461.6	3,461.6	3,569.2	3,569.2	3,793.9	DHW end-use breakdown based on several studies, as outlined in baseline report
6	Domestic Hot Water (DHW)	Baths	4.0%	863.1	863.1	863.1	728.8	728.8	728.8	751.4	751.4	798.7	DHW end-use breakdown based on several studies, as outlined in baseline report
7	Domestic Hot Water (DHW)	Dishwashers	12.0%	2,589.3	2,589.3	2,589.3	2,186.3	2,186.3	2,186.3	2,254.2	2,254.2	2,396.2	DHW end-use breakdown based on several studies, as outlined in baseline report
8	Domestic Hot Water (DHW)	Leaks	6.0%	1,294.7	1,294.7	1,294.7	1,093.1	1,093.1	1,093.1	1,127.1	1,127.1	1,198.1	DHW end-use breakdown based on several studies, as outlined in baseline report
9	Domestic Hot Water (DHW)	Tank (Standby) Losses	7.5%	1,618.3	1,618.3	1,618.3	1,366.4	1,366.4	1,366.4	1,408.9	1,408.9	1,497.6	DHW end-use breakdown based on several studies, as outlined in baseline report
10	Domestic Hot Water (DHW)	Pipe Losses	7.5%	1,618.3	1,618.3	1,618.3	1,366.4	1,366.4	1,366.4	1,408.9	1,408.9	1,497.6	DHW end-use breakdown based on several studies, as outlined in baseline report
11	**Fireplaces**		**100.0%**	24,593.5	24,593.5	24,593.5	16,231.7	16,231.7	16,231.7	16,231.7	16,231.7	20,572.0	
12	**Cooking**		**100.0%**	5,989.4	5,989.4	5,989.4	5,064.8	5,064.8	5,064.8	5,229.5	5,229.5	5,546.3	
13	Cooking	Cooktops	40.0%	2,395.8	2,395.8	2,395.8	2,025.9	2,025.9	2,025.9	2,091.8	2,091.8	2,218.5	
14	Cooking	Ovens	55.0%	3,294.2	3,294.2	3,294.2	2,785.7	2,785.7	2,785.7	2,876.2	2,876.2	3,050.5	
15	**Clothes Dryers**		**55.0%**	4,763.4	4,763.4	4,763.4	4,251.4	4,251.4	4,251.4	4,482.1	4,482.1	4,519.4	
16	**Pool and Spa Heaters**		**100.0%**	27,693.2	27,693.2	27,693.2	27,693.2	27,693.2	27,693.2	27,693.2	27,693.2	27,693.2	
17	Pool and Spa Heaters	**Pool Heaters**	139.0%	38,493.5	38,493.5	38,493.5	38,493.5	38,493.5	38,493.5	38,493.5	38,493.5	38,493.5	
18	Pool and Spa Heaters	**Spa Heaters**	71.5%	19,800.6	19,800.6	19,800.6	19,800.6	19,800.6	19,800.6	19,800.6	19,800.6	19,800.6	
19	**Other**		**100.0%**									0.0	
20			**100.0%**									0.0	
21			**100.0%**									0.0	
22			**100.0%**									0.0	
23			**100.0%**									0.0	
24			**100.0%**									0.0	
25			**100.0%**									0.0	
26			**100.0%**									0.0	
27			**100.0%**									0.0	
28			**100.0%**									0.0	
29			**100.0%**									0.0	
30			**100.0%**									0.0	
31			**100.0%**									0.0	
32			**100.0%**									0.0	
33			**100.0%**									0.0	
34			**100.0%**									0.0	
35			**100.0%**									0.0	
36			**100.0%**									0.0	
37			**100.0%**									0.0	
38			**100.0%**									0.0	
39			**100.0%**									0.0	
40			**100.0%**									0.0	

Oil

#	Main End Use	Sub End Use/Equipment (If Applicable)	% of Main End-Use (Default)	Average Consumption (L/yr.)									References/Notes
				Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
1	**Space Heating**		**100.0%**									0.0	
2	**Domestic Hot Water (DHW)**		**100.0%**									0.0	
3	Domestic Hot Water (DHW)	Clothes Washer	18.0%									0.0	DHW end-use breakdown based on several studies, as outlined in baseline report
4	Domestic Hot Water (DHW)	Showers	26.0%									0.0	DHW end-use breakdown based on several studies, as outlined in baseline report
5	Domestic Hot Water (DHW)	Faucets	19.0%									0.0	DHW end-use breakdown based on several studies, as outlined in baseline report
6	Domestic Hot Water (DHW)	Baths	4.0%									0.0	DHW end-use breakdown based on several studies, as outlined in baseline report
7	Domestic Hot Water (DHW)	Dishwasher	12.0%									0.0	DHW end-use breakdown based on several studies, as outlined in baseline report
8	Domestic Hot Water (DHW)	Leaks	6.0%									0.0	DHW end-use breakdown based on several studies, as outlined in baseline report
9	Domestic Hot Water (DHW)	Tank (Standby) Losses	7.5%									0.0	DHW end-use breakdown based on several studies, as outlined in baseline report
10	Domestic Hot Water (DHW)	Pipe Losses	7.5%									0.0	DHW end-use breakdown based on several studies, as outlined in baseline report
11			**100.0%**									0.0	
12			**100.0%**									0.0	
13			**100.0%**									0.0	
14			**100.0%**									0.0	
15			**100.0%**									0.0	
16			**100.0%**									0.0	
17			**100.0%**									0.0	
18			**100.0%**									0.0	
19			**100.0%**									0.0	
20			**100.0%**									0.0	
21			**100.0%**									0.0	
22			**100.0%**									0.0	
23			**100.0%**									0.0	
24			**100.0%**									0.0	
25			**100.0%**									0.0	
26			**100.0%**									0.0	
27			**100.0%**									0.0	
28			**100.0%**									0.0	
29			**100.0%**									0.0	
30			**100.0%**									0.0	
31			**100.0%**									0.0	
32			**100.0%**									0.0	
33			**100.0%**									0.0	
34			**100.0%**									0.0	
35			**100.0%**									0.0	
36			**100.0%**									0.0	
37			**100.0%**									0.0	
38			**100.0%**									0.0	
39			**100.0%**									0.0	
40			**100.0%**									0.0	

Water

#	Main End Use	Sub End Use/Equipment (If Applicable)	Approx. DHW % (Default)	Average Consumption (L/yr.)									References/Notes
				Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
1	Water	Clothes Washer	40.0%									0.0	Based on averaging overall water consumption (per capita, per day) values from two studies: - Resource Management Strategies Inc., "Regional Municipality of York:
2	Water	Showers	70.0%									0.0	

3	Water	Faucets	40.0%									0.0	Water Efficiency Master Plan Update, Final Report", pg. 15, April 27, 2007 - Canadian sites in American Water Works Association (AWWA) Research Foundation, "Residential End Uses of Water", pg. 107, 1999.
4	Water	Baths	70.0%									0.0	
5	Water	Dishwasher	100.0%									0.0	
6	Water	Leaks	25.0%									0.0	
7	Water	Tank (Standby) Losses	100.0%									0.0	
8	Water	Pipe Losses	100.0%									0.0	
9			**100.0%**									0.0	
10			**100.0%**									0.0	
11			**100.0%**									0.0	
12			**100.0%**									0.0	
13			**100.0%**									0.0	
14			**100.0%**									0.0	
15			**100.0%**									0.0	
16			**100.0%**									0.0	
17			**100.0%**									0.0	
18			**100.0%**									0.0	
19			**100.0%**									0.0	
20			**100.0%**									0.0	

COMMON UNITS: **Note:** Used since it may be more convenient to enter values in their natural units and then convert using the conversion factors above

Electricity

#	Main End Use	% of Main End-Use (Default)	Average Consumption (MJ/yr.)									References/Notes
			Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
1	**Ventilation and Circulation**		2,160.0	2,880.0	2,766.0	1,440.0	1,440.0	1,383.0	868.6	834.2	2,119.3	
2	**Space Cooling**		999.5	999.5	959.9	594.7	594.7	571.1	633.5	608.4	790.3	
3	**Clothes Washers**		230.4	230.4	230.4	173.4	173.4	173.4	183.6	183.6	203.1	
4	**Dishwashers**		270.0	270.0	270.0	207.4	207.4	207.4	216.0	216.0	240.0	
5	**Other Electric Loads**		7,200.0	7,200.0	7,200.0	7,200.0	7,200.0	7,200.0	7,200.0	7,200.0	7,200.0	Value based on electricity generated by micro-CHP measure
6											0.0	
7											0.0	
8											0.0	
9											0.0	
10											0.0	
11											0.0	
12											0.0	
13											0.0	
14											0.0	
15											0.0	
16											0.0	
17											0.0	
18											0.0	
19											0.0	
20											0.0	

Natural Gas

#	Main End Use	% of Main End-Use (Default)	Average Consumption (MJ/yr.)									References/Notes
			Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
1	**Space Heating**		103,566.2	87,600.4	87,600.4	61,905.6	54,833.5	54,833.5	68,576.1	68,576.1	72,530.9	
2	**Domestic Hot Water (DHW)**		21,577.9	21,577.9	21,577.9	18,219.1	18,219.1	18,219.1	18,785.2	18,785.2	19,967.9	
3	**Fireplaces**		24,593.5	24,593.5	24,593.5	16,231.7	16,231.7	16,231.7	16,231.7	16,231.7	20,572.0	
4	**Cooking**		5,989.4	5,989.4	5,989.4	5,064.8	5,064.8	5,064.8	5,229.5	5,229.5	5,546.3	
5	**Clothes Dryers**		4,763.4	4,763.4	4,763.4	4,251.4	4,251.4	4,251.4	4,482.1	4,482.1	4,519.4	
6	**Pools and Spa Heaters**		27,693.2	27,693.2	27,693.2	27,693.2	27,693.2	27,693.2	27,693.2	27,693.2	27,693.2	
7	**Other**										0.0	
8											0.0	
9											0.0	
10											0.0	
11											0.0	
12											0.0	
13											0.0	
14											0.0	
15											0.0	
16											0.0	
17											0.0	
18											0.0	
19											0.0	
20											0.0	

Oil

#	Main End Use	% of Main End-Use (Default)	Average Consumption (MJ/yr.)									References/Notes
			Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
1	**Space Heating**										0.0	
2	**Domestic Hot Water (DHW)**										0.0	
3											0.0	
4											0.0	
5											0.0	
6											0.0	
7											0.0	
8											0.0	
9											0.0	
10											0.0	
11											0.0	
12											0.0	
13											0.0	
14											0.0	
15											0.0	
16											0.0	
17											0.0	
18											0.0	
19											0.0	
20											0.0	

Baseline Consumption (Case 2)

Back to Index

BASIS/TAG: 2. Annual consumption, equip.
DESCRIPTION: Annual energy consumption, at the equipment level
UNIT: /yr.

CONVERSION FACTORS:

Electricity (kWh to MJ):	3.60
Natural Gas (m^3 to MJ):	39.62
Fuel Oil (L to MJ):	36.74

U.S. Department of Energy (DOE) Energy Information Administration (EIA), *International Energy Annual 1997,* DOE/EIA-0219 (97), 1997

NATURAL UNITS:

Electricity

#	Main End Use	Sub End Use/Equipment (If Applicable)	% of Main End-Use (Default)	Average Consumption (kWh/yr.)									References/Notes
				Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
1			100.0%									0.0	
2			100.0%									0.0	
3			100.0%									0.0	
4			100.0%									0.0	
5			100.0%									0.0	
6			100.0%									0.0	
7			100.0%									0.0	
8			100.0%									0.0	
9			100.0%									0.0	
10			100.0%									0.0	
11			100.0%									0.0	
12			100.0%									0.0	
13			100.0%									0.0	
14			100.0%									0.0	
15			100.0%									0.0	
16			100.0%									0.0	
17			100.0%									0.0	
18			100.0%									0.0	
19			100.0%									0.0	
20			100.0%									0.0	
21			100.0%									0.0	
22			100.0%									0.0	
23			100.0%									0.0	
24			100.0%									0.0	
25			100.0%									0.0	
26			100.0%									0.0	
27			100.0%									0.0	
28			100.0%									0.0	
29			100.0%									0.0	
30			100.0%									0.0	
31			100.0%									0.0	
32			100.0%									0.0	
33			100.0%									0.0	
34			100.0%									0.0	
35			100.0%									0.0	
36			100.0%									0.0	
37			100.0%									0.0	
38			100.0%									0.0	
39			100.0%									0.0	
40			100.0%									0.0	

Natural Gas

#	Main End Use	Sub End Use/Equipment (If Applicable)	% of Main End-Use (Default)	Average Consumption (m3/yr.)									References/Notes
				Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
1			100.0%									0.0	
2			100.0%									0.0	
3			100.0%									0.0	
4			100.0%									0.0	
5			100.0%									0.0	
6			100.0%									0.0	
7			100.0%									0.0	
8			100.0%									0.0	
9			100.0%									0.0	
10			100.0%									0.0	
11			100.0%									0.0	
12			100.0%									0.0	
13			100.0%									0.0	
14			100.0%									0.0	
15			100.0%									0.0	
16			100.0%									0.0	
17			100.0%									0.0	
18			100.0%									0.0	
19			100.0%									0.0	
20			100.0%									0.0	
21			100.0%									0.0	
22			100.0%									0.0	
23			100.0%									0.0	
24			100.0%									0.0	
25			100.0%									0.0	
26			100.0%									0.0	
27			100.0%									0.0	
28			100.0%									0.0	
29			100.0%									0.0	
30			100.0%									0.0	
31			100.0%									0.0	
32			100.0%									0.0	
33			100.0%									0.0	
34			100.0%									0.0	
35			100.0%									0.0	
36			100.0%									0.0	
37			100.0%									0.0	
38			100.0%									0.0	
39			100.0%									0.0	
40			100.0%									0.0	

Oil

#	Main End Use	Sub End Use/Equipment (If Applicable)	% of Main End-Use (Default)	Average Consumption (L/yr.)									References/Notes
				Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
1			100.0%									0.0	
2			100.0%									0.0	
3			100.0%									0.0	
4			100.0%									0.0	
5			100.0%									0.0	
6			100.0%									0.0	
7			100.0%									0.0	
8			100.0%									0.0	
9			100.0%									0.0	
10			100.0%									0.0	
11			100.0%									0.0	
12			100.0%									0.0	
13			100.0%									0.0	
14			100.0%									0.0	
15			100.0%									0.0	
16			100.0%									0.0	
17			100.0%									0.0	
18			100.0%									0.0	
19			100.0%									0.0	
20			100.0%									0.0	
21			100.0%									0.0	
22			100.0%									0.0	
23			100.0%									0.0	
24			100.0%									0.0	
25			100.0%									0.0	
26			100.0%									0.0	
27			100.0%									0.0	
28			100.0%									0.0	
29			100.0%									0.0	
30			100.0%									0.0	
31			100.0%									0.0	
32			100.0%									0.0	
33			100.0%									0.0	
34			100.0%									0.0	
35			100.0%									0.0	
36			100.0%									0.0	
37			100.0%									0.0	
38			100.0%									0.0	
39			100.0%									0.0	
40			100.0%									0.0	

Water

#	Main End Use	Sub End Use/Equipment (If Applicable)	Approx. DHW % (Default)	Average Consumption (L/yr.)									References/Notes
				Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
1			100.0%									0.0	
2			100.0%									0.0	
3			100.0%									0.0	
4			100.0%									0.0	
5			100.0%									0.0	
6			100.0%									0.0	
7			100.0%									0.0	
8			100.0%									0.0	
9			100.0%									0.0	
10			100.0%									0.0	
11			100.0%									0.0	
12			100.0%									0.0	
13			100.0%									0.0	
14			100.0%									0.0	
15			100.0%									0.0	
16			100.0%									0.0	
17			100.0%									0.0	
18			100.0%									0.0	
19			100.0%									0.0	
20			100.0%									0.0	

COMMON UNITS: **Note:** Used since it may be more convenient to enter values in their natural units and then convert using the conversion factors above

Electricity

#	Main End Use	% of Main End-Use (Default)	Average Consumption (kWh/yr.)									References/Notes
			Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
1	0										0.0	
2	0										0.0	
3	0										0.0	
4	0										0.0	
5	0										0.0	
6	0										0.0	
7	0										0.0	
8	0										0.0	
9	0										0.0	
10	0										0.0	
11	0										0.0	
12	0										0.0	
13	0										0.0	
14	0										0.0	
15	0										0.0	
16	0										0.0	
17	0										0.0	
18	0										0.0	
19	0										0.0	
20	0										0.0	

Natural Gas

#	Main End Use	% of Main End-Use (Default)	Average Consumption (kWh/yr.)									References/Notes
			Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
1	0										0.0	
2	0										0.0	
3	0										0.0	
4	0										0.0	
5	0										0.0	
6											0.0	
7											0.0	
8											0.0	
9											0.0	
10											0.0	
11											0.0	
12											0.0	
13											0.0	
14											0.0	
15											0.0	
16											0.0	
17											0.0	
18											0.0	
19											0.0	
20											0.0	

Oil

#	Main End Use	% of Main End-Use (Default)	Average Consumption (kWh/yr.)									References/Notes
			Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
1	0										0.0	
2	0										0.0	
3											0.0	
4											0.0	
5											0.0	
6											0.0	
7											0.0	
8											0.0	
9											0.0	
10											0.0	
11											0.0	
12											0.0	
13											0.0	
14											0.0	
15											0.0	
16											0.0	
17											0.0	
18											0.0	
19											0.0	
20											0.0	

End Use Numbering	Baseline 1 End Use	Line Lookup for Baseline 1	Baseline 2 End Use	Line Lookup for Baseline 2
1	Space heating	1	Space heating	1
2	Space cooling	-1	Space cooling	-1
3	Ventilation and Circulation	-1	Ventilation and	-1
4	Domestic hot water (DHW)	2	Domestic hot water	2
5	Fireplace	3	Fireplace	3
6	Cooking	4	Cooking	4
7	Dishwasher	-1	Dishwasher	-1
8	Clothes washer	-1	Clothes washer	-1
9	Clothes dryer	5	Clothes dryer	5
10	Pool & spa heaters	6	Pool & spa heaters	6
11	Other gas uses	7	Other gas uses	7
12	Other electrical internal loads	-1	Other electrical	-1
13		-1		-1
14		-1		-1
15		-1		-1
16		-1		-1
17		-1		-1
18		-1		-1
19		-1		-1
20		-1		-1

End Use Numbering	Baseline 1 End Use	Line Lookup for Baseline 1	Baseline 2 End Use	Line Lookup for Baseline 2
1	Space heating	-1	Space heating	-1
2	Space cooling	2	Space cooling	2
3	Ventilation and Circulation	1	Ventilation and	1
4	Domestic hot water (DHW)	-1	Domestic hot water	-1
5	Fireplace	-1	Fireplace	-1
6	Cooking	-1	Cooking	-1
7	Dishwasher	4	Dishwasher	4
8	Clothes washer	3	Clothes washer	3
9	Clothes dryer	-1	Clothes dryer	-1
10	Pool & spa heaters	-1	Pool & spa heaters	-1
11	Other gas uses	-1	Other gas uses	-1
12	Other electrical internal loads	5	Other electrical	5
13		-1		-1
14		-1		-1
15		-1		-1
16		-1		-1
17		-1		-1
18		-1		-1
19		-1		-1
20		-1		-1

Measure Information		Applicability										Savings by End Use																				
Measure #	Technology	Climate Zone	Building Type(s)	Exist	Reno	New	Life	Cost	Benefit/Cost Ratio	Economic Screen	Basis	Space heating	Space cooling	Ventilation and Circulation	Domestic hot water (DHW)	Fireplace	Cooking	Dishwasher	Clothes washer	Clothes dryer	Pool & spa heaters	Other gas uses	Other electrical internal loads									
1	Attic Insulation	3	Detached (Pre-1976)	y	y		30.0	$675	1.38	Pass	Full	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2	Attic Insulation	3	Detached (Post-1976)	y	y		30.0	$713	0.95	Fail	Full	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3	Attic Insulation	3	Attached (Pre-1976)	y	y		30.0	$450	1.24	Pass	Full	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4	Attic Insulation	3	Attached (Post-1976)	y	y		30.0	$488	0.85	Fail	Full	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5	Attic Insulation	3	Mobile (Existing)	y	y		30.0	$525	1.05	Pass	Full	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6	Wall Insulation	3	Detached (Pre-1976)	y	y		30.0	$2,000	1.23	Pass	Incr.	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
7	Wall Insulation	3	Detached (Post-1976)	y	y		30.0	$2,000	1.08	Pass	Incr.	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
8	Wall Insulation	3	Attached (Pre-1976)	y	y		30.0	$1,500	0.99	Fail	Incr.	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
9	Wall Insulation	3	Attached (Post-1976)	y	y		30.0	$1,500	0.88	Fail	Incr.	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
10	Wall Insulation	3	Mobile (Existing)	y	y		30.0	$1,500	1.06	Pass	Incr.	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
11	Slab Insulation	3	Detached (Pre-1976)	y	y		30.0	$1,125	0.18	Fail	Incr.	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12	Slab Insulation	3	Detached (Post-1976)	y	y		30.0	$1,275	0.11	Fail	Incr.	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
13	Slab Insulation	3	Attached (Pre-1976)	y	y		30.0	$975	0.12	Fail	Incr.	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
14	Slab Insulation	3	Attached (Post-1976)	y	y		30.0	$1,050	0.08	Fail	Incr.	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
15	Basement Insulation	3	Detached (Pre-1976)	y	y		30.0	$1,400	1.31	Pass	Incr.	12%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
16	Basement Insulation	3	Detached (Post-1976)	y	y		30.0	$1,500	1.16	Pass	Incr.	13%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
17	Basement Insulation	3	Attached (Pre-1976)	y	y		30.0	$900	1.02	Pass	Incr.	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
18	Basement Insulation	3	Attached (Post-1976)	y	y		30.0	$1,000	0.86	Fail	Incr.	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
19	Crawl Space Insul.	3	Detached (Pre-1976)	y	y		30.0	$800	0.47	Fail	Full	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
20	Crawl Space Insul.	3	Detached (Post-1976)	y	y		30.0	$800	0.41	Fail	Full	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21	Crawl Space Insul.	3	Attached (Pre-1976)	y	y		30.0	$800	0.29	Fail	Full	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22	Crawl Space Insul.	3	Attached (Post-1976)	y	y		30.0	$800	0.25	Fail	Full	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23	Air Sealing	3	Detached (Pre-1976)	y	y		25.0	$1,800	0.72	Fail	Full	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
24	Air Sealing	3	Detached (Post-1976)	y	y		25.0	$1,800	0.55	Fail	Full	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
25	Air Sealing	3	Attached (Pre-1976)	y	y		25.0	$1,800	0.44	Fail	Full	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
26	Air Sealing	3	Attached (Post-1976)	y	y		25.0	$1,800	0.34	Fail	Full	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
27	Air Sealing	3	Mobile (Existing)	y	y		25.0	$1,800	0.42	Fail	Full	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
28	Homeowner Air Sealing	3	Detached (Pre-1976)	y	y		10.0	$200	1.32	Pass	Full	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
29	Homeowner Air Sealing	3	Detached (Post-1976)	y	y		10.0	$200	1.00	Fail	Full	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
30	Homeowner Air Sealing	3	Attached (Pre-1976)	y	y		10.0	$200	0.80	Fail	Full	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
31	Homeowner Air Sealing	3	Attached (Post-1976)	y	y		10.0	$200	0.61	Fail	Full	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
32	Homeowner Air Sealing	3	Mobile (Existing)	y	y		10.0	$200	0.77	Fail	Full	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
33	Sealing & Insul. - Old Homes	3	Detached (Pre-1976)	y	y		25.0	$3,000	0.72	Fail	Full	17%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
34	Sealing & Insul. - Old Homes	3	Attached (Pre-1976)	y	y		25.0	$2,500	0.51	Fail	Full	17%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
35	Zone Up Windows	3	Detached (Pre-1976)	y	y		25.0	$1,000	0.34	Fail	Incr.	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
36	Zone Up Windows	3	Detached (Post-1976)	y	y		25.0	$1,200	0.35	Fail	Incr.	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
37	Zone Up Windows	3	Detached (New)			y	25.0	$2,600	0.27	Fail	Incr.	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
38	Zone Up Windows	3	Attached (Pre-1976)	y	y		25.0	$800	0.26	Fail	Incr.	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
39	Zone Up Windows	3	Attached (Post-1976)	y	y		25.0	$960	0.27	Fail	Incr.	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
40	Zone Up Windows	3	Attached (New)			y	25.0	$2,080	0.21	Fail	Incr.	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
41	Zone Up Windows	3	Mobile (Existing)	y	y		25.0	$720	0.38	Fail	Incr.	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
42	Zone Up Windows	3	Mobile (New)			y	25.0	$1,600	0.32	Fail	Incr.	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
43	Super Windows	3	Detached (Pre-1976)	y	y		25.0	$1,500	0.82	Fail	Incr.	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
44	Super Windows	3	Detached (Post-1976)	y	y		25.0	$1,800	0.88	Fail	Incr.	13%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
45	Super Windows	3	Detached (New)			y	25.0	$3,900	0.60	Fail	Incr.	19%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
46	Super Windows	3	Attached (Pre-1976)	y	y		25.0	$1,200	0.62	Fail	Incr.	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
47	Super Windows	3	Attached (Post-1976)	y	y		25.0	$1,440	0.68	Fail	Incr.	13%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
48	Super Windows	3	Attached (New)			y	25.0	$3,120	0.46	Fail	Incr.	19%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
49	Super Windows	3	Mobile (Existing)	y	y		25.0	$1,080	0.86	Fail	Incr.	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
50	Super Windows	3	Mobile (New)			y	25.0	$2,400	0.72	Fail	Incr.	19%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
51	High-Perf. New Homes	3	Detached (New)			y	30.0	$6,000	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
52	High-Perf. New Homes	3	Attached (New)			y	30.0	$4,800	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
53	High-Perf. New Homes	3	Mobile (New)			y	30.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
54	Net Zero Ready Homes	3	Detached (New)			y	30.0	$14,000	0.35	Fail	Full	30%	0%	0%	30%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
55	Net Zero Ready Homes	3	Attached (New)			y	30.0	$9,800	0.33	Fail	Full	30%	0%	0%	30%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
56	Net Zero Ready Homes	3	Mobile (New)			y	30.0	$9,800	0.38	Fail	Full	30%	0%	0%	30%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
57	Condensing Gas Furnaces	3	Detached (Pre-1976)	y	y		18.0	$1,477	0.46	Fail	Incr.	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
58	Condensing Gas Furnaces	3	Detached (Post-1976)	y	y		18.0	$1,477	0.39	Fail	Incr.	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
59	Condensing Gas Furnaces	3	Detached (New)			y	18.0	$1,477	0.39	Fail	Incr.	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
60	Condensing Gas Furnaces	3	Attached (Pre-1976)	y	y		18.0	$1,477	0.28	Fail	Incr.	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
61	Condensing Gas Furnaces	3	Attached (Post-1976)	y	y		18.0	$1,477	0.24	Fail	Incr.	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
62	Condensing Gas Furnaces	3	Attached (New)			y	18.0	$1,477	0.24	Fail	Incr.	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
63	Condensing Gas Furnaces	3	Mobile (Existing)	y	y		18.0	$1,477	0.31	Fail	Incr.	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
64	Condensing Gas Furnaces	3	Mobile (New)			y	18.0	$1,477	0.31	Fail	Incr.	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
65	Early Retire Gas Furnaces	3	Detached (Pre-1976)	y	y		9.0	$1,864	0.49	Fail	Incr.	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
66	Early Retire Gas Furnaces	3	Detached (Post-1976)	y	y		9.0	$1,864	0.41	Fail	Incr.	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
67	Early Retire Gas Furnaces	3	Attached (Pre-1976)	y	y		9.0	$1,864	0.29	Fail	Incr.	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
68	Early Retire Gas Furnaces	3	Attached (Post-1976)	y	y		9.0	$1,864	0.26	Fail	Incr.	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
69	Early Retire Gas Furnaces	3	Mobile (Existing)	y	y		9.0	$1,864	0.32	Fail	Incr.	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
70	Condensing Gas Boilers	3	Detached (Pre-1976)	y	y		20.0	$3,200	0.39	Fail	Incr.	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
71	Condensing Gas Boilers	3	Detached (Post-1976)	y	y		20.0	$3,200	0.33	Fail	Incr.	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
72	Condensing Gas Boilers	3	Detached (New)			y	20.0	$3,200	0.33	Fail	Incr.	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
73	Condensing Gas Boilers	3	Attached (Pre-1976)	y	y		20.0	$3,200	0.24	Fail	Incr.	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
74	Condensing Gas Boilers	3	Attached (Post-1976)	y	y		20.0	$3,200	0.21	Fail	Incr.	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
75	Condensing Gas Boilers	3	Attached (New)			y	20.0	$3,200	0.21	Fail	Incr.	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
76	Condensing Gas Boilers	3	Mobile (Existing)	y	y		20.0	$3,200	0.26	Fail	Incr.	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
77	Condensing Gas Boilers	3	Mobile (New)			y	20.0	$3,200	0.26	Fail	Incr.	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
78	Gas Fireplaces	3	Detached (Pre-1976)	y	y		15.0	$150	3.78	Pass	Incr.	0%	0%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
79	Gas Fireplaces	3	Detached (Post-1976)	y	y		15.0	$150	3.78	Pass	Incr.	0%	0%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
80	Gas Fireplaces	3	Detached (New)			y	15.0	$150	3.78	Pass	Incr.	0%	0%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
81	Gas Fireplaces	3	Attached (Pre-1976)	y	y		15.0	$150	2.50	Pass	Incr.	0%	0%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
82	Gas Fireplaces	3	Attached (Post-1976)	y	y		15.0	$150	2.50	Pass	Incr.	0%	0%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
83	Gas Fireplaces	3	Attached (New)			y	15.0	$150	2.50	Pass	Incr.	0%	0%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
84	Gas Fireplaces	3	Mobile (Existing)	y	y		15.0	$150	2.50	Pass	Incr.	0%	0%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
85	Gas Fireplaces	3	Mobile (New)			y	15.0	$150	2.50	Pass	Incr.	0%	0%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
86	Prog. Thermostats	3	Detached (Pre-1976)	y	y		11.0	$50	10.03	Pass	Full	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
87	Prog. Thermostats	3	Detached (Post-1976)	y	y		11.0	$50	8.56	Pass	Full	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
88	Prog. Thermostats	3	Detached (New)			y	11.0	$50	8.55	Pass	Full	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
89	Prog. Thermostats	3	Attached (Pre-1976)	y	y		11.0	$50	6.00	Pass	Full	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
90	Prog. Thermostats	3	Attached (Post-1976)	y	y		11.0	$50	5.34	Pass	Full	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
91	Prog. Thermostats	3	Attached (New)			y	11.0	$50	5.33	Pass	Full	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
92	Prog. Thermostats	3	Mobile (Existing)	y	y		11.0	$50	6.61	Pass	Full	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
93	Prog. Thermostats	3	Mobile (New)			y	11.0	$50	6.61	Pass	Full	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
94	Solar Make-Up Air	3	Detached (Pre-1976)	y	y		40.0	$1,300	0.27	Fail	Full	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
95	Solar Make-Up Air	3	Detached (Post-1976)	y	y		40.0	$1,300	0.24	Fail	Full	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
96	Solar Make-Up Air	3	Detached (New)			y	40.0	$1,300	0.24	Fail	Full	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
97	Solar Make-Up Air	3	Attached (Pre-1976)	y	y		40.0	$1,300	0.16	Fail	Full	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
98	Solar Make-Up Air	3	Attached (Post-1976)	y	y		40.0	$1,300	0.15	Fail	Full	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
99	Solar Make-Up Air	3	Attached (New)			y	40.0	$1,300	0.15	Fail	Full	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
100	Solar Make-Up Air	3	Mobile (Existing)	y	y		40.0	$1,300	0.18	Fail	Full	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
101	Solar Make-Up Air	3	Mobile (New)			y	40.0	$1,300	0.18	Fail	Full	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
102	HRVs	3	Detached (Pre-1976)	y	y		15.0	$600	0.46	Fail	Incr.	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
103	HRVs	3	Detached (Post-1976)	y	y		15.0	$600	0.41	Fail	Incr.	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
104	HRVs	3	Detached (New)			y	15.0	$600	0.41	Fail	Incr.	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
105	HRVs	3	Attached (Pre-1976)	y	y		15.0	$600	0.28	Fail	Incr.	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
106	HRVs	3	Attached (Post-1976)	y	y		15.0	$600	0.25	Fail	Incr.	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
107	HRVs	3	Attached (New)			y	15.0	$600	0.25	Fail	Incr.	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
108	HRVs	3	Mobile (Existing)	y	y		15.0	$600	0.30	Fail	Incr.	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
109	HRVs	3	Mobile (New)			y	15.0	$600	0.30	Fail	Incr.	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
110	Air Heat Pumps	3	Detached (Pre-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
111	Air Heat Pumps	3	Detached (Post-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
112	Air Heat Pumps	3	Detached (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
113	Air Heat Pumps	3	Attached (Pre-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
114	Air Heat Pumps	3	Attached (Post-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
115	Air Heat Pumps	3	Attached (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
116	Air Heat Pumps	3	Mobile (Existing)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
117	Air Heat Pumps	3	Mobile (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
118	Ground Heat Pumps	3	Detached (Pre-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
119	Ground Heat Pumps	3	Detached (Post-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
120	Ground Heat Pumps	3	Detached (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
121	Ground Heat Pumps	3	Attached (Pre-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
122	Ground Heat Pumps	3	Attached (Post-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
123	Ground Heat Pumps	3	Attached (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
124	Ground Heat Pumps	3	Mobile (Existing)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
125	Ground Heat Pumps	3	Mobile (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
126	Heating & DHW	3	Detached (Pre-1976)	y	y		18.0	$8,506	0.13	Fail	Incr.	4%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
127	Heating & DHW	3	Detached (Post-1976)	y	y		18.0	$8,506	0.12	Fail	Incr.	4%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
128	Heating & DHW	3	Detached (New)			y	18.0	$3,506	0.29	Fail	Incr.	4%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
129	Heating & DHW	3	Attached (Pre-1976)	y	y		18.0	$8,506	0.09	Fail	Incr.	4%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
130	Heating & DHW	3	Attached (Post-1976)	y	y		18.0	$8,506	0.09	Fail	Incr.	4%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
131	Heating & DHW	3	Attached (New)			y	18.0	$3,506	0.22	Fail	Incr.	4%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
132	Heating & DHW	3	Mobile (Existing)	y	y		18.0	$8,506	0.09	Fail	Incr.	4%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
133	Heating & DHW	3	Mobile (New)			y	18.0	$3,506	0.23	Fail	Incr.	4%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
134	Heating & DHW (Hydronic)	3	Detached (Pre-1976)	y	y		20.0	$8,000	0.25	Fail	Incr.	12%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
135	Heating & DHW (Hydronic)	3	Detached (Post-1976)	y	y		20.0	$8,000	0.23	Fail	Incr.	12%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
136	Heating & DHW (Hydronic)	3	Detached (New)			y	20.0	$3,000	0.61	Fail	Incr.	12%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
137	Heating & DHW (Hydronic)	3	Attached (Pre-1976)	y	y		20.0	$8,000	0.17	Fail	Incr.	12%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
138	Heating & DHW (Hydronic)	3	Attached (Post-1976)	y	y		20.0	$8,000	0.16	Fail	Incr.	12%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
139	Heating & DHW (Hydronic)	3	Attached (New)			y	20.0	$3,000	0.43	Fail	Incr.	12%	0%	0%	27%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
140	Heating & DHW (Hydronic)	3	Mobile (Existing)	y	y		20.0	$8,000	0.18	Fail	Incr.	12%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
141	Heating & DHW (Hydronic)	3	Mobile (New)			y	20.0	$3,000	0.48	Fail	Incr.	12%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
142	Condensing Gas DHW	3	Detached (Pre-1976)	y	y		13.0	$1,567	0.26	Fail	Incr.	0%	0%	0%	23%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
143	Condensing Gas DHW	3	Detached (Post-1976)	y	y		13.0	$1,567	0.26	Fail	Incr.	0%	0%	0%	23%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
144	Condensing Gas DHW	3	Detached (New)			y	13.0	$1,073	0.38	Fail	Incr.	0%	0%	0%	23%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
145	Condensing Gas DHW	3	Attached (Pre-1976)	y	y		13.0	$1,567	0.22	Fail	Incr.	0%	0%	0%	23%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
146	Condensing Gas DHW	3	Attached (Post-1976)	y	y		13.0	$1,567	0.22	Fail	Incr.	0%	0%	0%	23%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
147	Condensing Gas DHW	3	Attached (New)			y	13.0	$1,073	0.32	Fail	Incr.	0%	0%	0%	23%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
148	Condensing Gas DHW	3	Mobile (Existing)	y	y		13.0	$1,567	0.20	Fail	Incr.	0%	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
149	Condensing Gas DHW	3	Mobile (New)			y	13.0	$1,073	0.29	Fail	Incr.	0%	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
150	Tankless Gas DHW	3	Detached (Pre-1976)	y	y		20.0	$2,274	0.37	Fail	Incr.	0%	0%	0%	35%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
151	Tankless Gas DHW	3	Detached (Post-1976)	y	y		20.0	$2,274	0.37	Fail	Incr.	0%	0%	0%	35%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
152	Tankless Gas DHW	3	Detached (New)			y	20.0	$1,646	0.51	Fail	Incr.	0%	0%	0%	35%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
153	Tankless Gas DHW	3	Attached (Pre-1976)	y	y		20.0	$2,274	0.31	Fail	Incr.	0%	0%	0%	35%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
154	Tankless Gas DHW	3	Attached (Post-1976)	y	y		20.0	$2,274	0.31	Fail	Incr.	0%	0%	0%	35%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
155	Tankless Gas DHW	3	Attached (New)			y	20.0	$1,646	0.43	Fail	Incr.	0%	0%	0%	35%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
156	Tankless Gas DHW	3	Mobile (Existing)	y	y		20.0	$2,274	0.32	Fail	Incr.	0%	0%	0%	35%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
157	Tankless Gas DHW	3	Mobile (New)			y	20.0	$1,646	0.45	Fail	Incr.	0%	0%	0%	35%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
158	Solar DHW	3	Detached (Pre-1976)	y	y		25.0	$7,000	0.25	Fail	Full	0%	0%	0%	63%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
159	Solar DHW	3	Detached (Post-1976)	y	y		25.0	$7,000	0.25	Fail	Full	0%	0%	0%	63%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
160	Solar DHW	3	Detached (New)			y	25.0	$7,000	0.25	Fail	Full	0%	0%	0%	63%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
161	Solar DHW	3	Attached (Pre-1976)	y	y		25.0	$7,000	0.22	Fail	Full	0%	0%	0%	68%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
162	Solar DHW	3	Attached (Post-1976)	y	y		25.0	$7,000	0.22	Fail	Full	0%	0%	0%	68%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
163	Solar DHW	3	Attached (New)			y	25.0	$7,000	0.22	Fail	Full	0%	0%	0%	68%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
164	Solar DHW	3	Mobile (Existing)	y	y		25.0	$7,000	0.25	Fail	Full	0%	0%	0%	73%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%
165	Solar DHW	3	Mobile (New)			y	25.0	$7,000	0.25	Fail	Full	0%	0%	0%	73%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%
166	DHW Tank Insulation	3	Detached (Pre-1976)	y	y		13.0	$35	0.96	Fail	Full	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
167	DHW Tank Insulation	3	Detached (Post-1976)	y	y		13.0	$35	0.96	Fail	Full	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
168	DHW Tank Insulation	3	Detached (New)			y	13.0	$35	0.96	Fail	Full	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
169	DHW Tank Insulation	3	Attached (Pre-1976)	y	y		13.0	$25	1.13	Pass	Full	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
170	DHW Tank Insulation	3	Attached (Post-1976)	y	y		13.0	$25	1.13	Pass	Full	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
171	DHW Tank Insulation	3	Attached (New)			y	13.0	$25	1.13	Pass	Full	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
172	DHW Tank Insulation	3	Mobile (Existing)	y	y		13.0	$25	1.17	Pass	Full	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
173	DHW Tank Insulation	3	Mobile (New)			y	13.0	$25	1.17	Pass	Full	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
174	DHW Pipe Insulation	3	Detached (Pre-1976)	y	y		15.0	$1	19.20	Pass	Full	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
175	DHW Pipe Insulation	3	Detached (Post-1976)	y	y		15.0	$1	19.20	Pass	Full	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
176	DHW Pipe Insulation	3	Detached (New)			y	15.0	$1	19.20	Pass	Full	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
177	DHW Pipe Insulation	3	Attached (Pre-1976)	y	y		15.0	$1	16.21	Pass	Full	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
178	DHW Pipe Insulation	3	Attached (Post-1976)	y	y		15.0	$1	16.21	Pass	Full	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
179	DHW Pipe Insulation	3	Attached (New)			y	15.0	$1	16.21	Pass	Full	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
180	DHW Pipe Insulation	3	Mobile (Existing)	y	y		15.0	$1	16.71	Pass	Full	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
181	DHW Pipe Insulation	3	Mobile (New)			y	15.0	$1	16.71	Pass	Full	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
182	DHW Heat Traps	3	Detached (New)			y	13.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
183	DHW Heat Traps	3	Attached (New)			y	13.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
184	DHW Heat Traps	3	Mobile (New)			y	13.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
185	Showerheads	3	Detached (Pre-1976)	y	y		10.0	$13	10.84	Pass	Full	0%	0%	0%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
186	Showerheads	3	Detached (Post-1976)	y	y		10.0	$13	10.84	Pass	Full	0%	0%	0%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
187	Showerheads	3	Detached (New)			y	10.0	$13	10.84	Pass	Full	0%	0%	0%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
188	Showerheads	3	Attached (Pre-1976)	y	y		10.0	$13	9.15	Pass	Full	0%	0%	0%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
189	Showerheads	3	Attached (Post-1976)	y	y		10.0	$13	9.15	Pass	Full	0%	0%	0%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
190	Showerheads	3	Attached (New)			y	10.0	$13	9.15	Pass	Full	0%	0%	0%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
191	Showerheads	3	Mobile (Existing)	y	y		10.0	$13	9.44	Pass	Full	0%	0%	0%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
192	Showerheads	3	Mobile (New)			y	10.0	$13	9.44	Pass	Full	0%	0%	0%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
193	Faucet Aerators	3	Detached (Pre-1976)	y	y		10.0	$15	5.67	Pass	Full	0%	0%	0%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
194	Faucet Aerators	3	Detached (Post-1976)	y	y		10.0	$15	5.67	Pass	Full	0%	0%	0%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
195	Faucet Aerators	3	Detached (New)			y	10.0	$15	5.67	Pass	Full	0%	0%	0%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
196	Faucet Aerators	3	Attached (Pre-1976)	y	y		10.0	$15	4.79	Pass	Full	0%	0%	0%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
197	Faucet Aerators	3	Attached (Post-1976)	y	y		10.0	$15	4.79	Pass	Full	0%	0%	0%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
198	Faucet Aerators	3	Attached (New)			y	10.0	$15	4.79	Pass	Full	0%	0%	0%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
199	Faucet Aerators	3	Mobile (Existing)	y	y		10.0	$15	4.94	Pass	Full	0%	0%	0%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
200	Faucet Aerators	3	Mobile (New)			y	10.0	$15	4.94	Pass	Full	0%	0%	0%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
201	Wastewater Heat Recovery	3	Detached (Pre-1976)	y	y		30.0	$800	0.51	Fail	Full	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
202	Wastewater Heat Recovery	3	Detached (Post-1976)	y	y		30.0	$800	0.51	Fail	Full	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
203	Wastewater Heat Recovery	3	Detached (New)			y	30.0	$800	0.51	Fail	Full	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
204	Wastewater Heat Recovery	3	Attached (Pre-1976)	y	y		30.0	$731	0.47	Fail	Full	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
205	Wastewater Heat Recovery	3	Attached (Post-1976)	y	y		30.0	$731	0.47	Fail	Full	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
206	Wastewater Heat Recovery	3	Attached (New)			y	30.0	$731	0.47	Fail	Full	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
207	Wastewater Heat Recovery	3	Mobile (Existing)	y	y		30.0	$731	0.48	Fail	Full	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
208	Wastewater Heat Recovery	3	Mobile (New)			y	30.0	$731	0.48	Fail	Full	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
209	DHW Recirculation	3	Detached (Pre-1976)	y	y		18.0	$570	0.63	Fail	Full	0%	0%	0%	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%

210	DHW Recirculation	3	Detached (Post-1976)	y	y		18.0	$570	0.63	Fail	Full	0%	0%	0%	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
211	DHW Recirculation	3	Detached (New)			y	18.0	$570	0.63	Fail	Full	0%	0%	0%	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
212	DHW Recirculation	3	Attached (Pre-1976)	y	y		18.0	$470	0.65	Fail	Full	0%	0%	0%	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
213	DHW Recirculation	3	Attached (Post-1976)	y	y		18.0	$470	0.65	Fail	Full	0%	0%	0%	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
214	DHW Recirculation	3	Attached (New)			y	18.0	$470	0.65	Fail	Full	0%	0%	0%	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
215	DHW Recirculation	3	Mobile (Existing)	y	y		18.0	$470	0.67	Fail	Full	0%	0%	0%	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
216	DHW Recirculation	3	Mobile (New)			y	18.0	$470	0.67	Fail	Full	0%	0%	0%	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
217	ESTAR Dishwashers	3	Detached (Pre-1976)	y	y		11.0	$105	0.34	Fail	Incr.	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
218	ESTAR Dishwashers	3	Detached (Post-1976)	y	y		11.0	$105	0.34	Fail	Incr.	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
219	ESTAR Dishwashers	3	Detached (New)			y	11.0	$105	0.34	Fail	Incr.	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
220	ESTAR Dishwashers	3	Attached (Pre-1976)	y	y		11.0	$105	0.28	Fail	Incr.	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
221	ESTAR Dishwashers	3	Attached (Post-1976)	y	y		11.0	$105	0.28	Fail	Incr.	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
222	ESTAR Dishwashers	3	Attached (New)			y	11.0	$105	0.28	Fail	Incr.	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
223	ESTAR Dishwashers	3	Mobile (Existing)	y	y		11.0	$105	0.29	Fail	Incr.	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
224	ESTAR Dishwashers	3	Mobile (New)			y	11.0	$105	0.29	Fail	Incr.	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
225	ESTAR Clothes Washers	3	Detached (Pre-1976)	y	y		14.0	$300	1.03	Pass	Incr.	0%	0%	0%	7%	0%	0%	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
226	ESTAR Clothes Washers	3	Detached (Post-1976)	y	y		14.0	$300	1.03	Pass	Incr.	0%	0%	0%	7%	0%	0%	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
227	ESTAR Clothes Washers	3	Detached (New)			y	14.0	$300	1.03	Pass	Incr.	0%	0%	0%	7%	0%	0%	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
228	ESTAR Clothes Washers	3	Attached (Pre-1976)	y	y		14.0	$300	0.88	Fail	Incr.	0%	0%	0%	7%	0%	0%	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
229	ESTAR Clothes Washers	3	Attached (Post-1976)	y	y		14.0	$300	0.88	Fail	Incr.	0%	0%	0%	7%	0%	0%	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
230	ESTAR Clothes Washers	3	Attached (New)			y	14.0	$300	0.88	Fail	Incr.	0%	0%	0%	7%	0%	0%	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
231	ESTAR Clothes Washers	3	Mobile (Existing)	y	y		14.0	$300	0.92	Fail	Incr.	0%	0%	0%	7%	0%	0%	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
232	ESTAR Clothes Washers	3	Mobile (New)			y	14.0	$300	0.92	Fail	Incr.	0%	0%	0%	7%	0%	0%	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
233	Gas Clothes Dryers	3	Detached (Pre-1976)	y	y		18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
234	Gas Clothes Dryers	3	Detached (Post-1976)	y	y		18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
235	Gas Clothes Dryers	3	Detached (New)			y	18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
236	Gas Clothes Dryers	3	Attached (Pre-1976)	y	y		18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
237	Gas Clothes Dryers	3	Attached (Post-1976)	y	y		18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
238	Gas Clothes Dryers	3	Attached (New)			y	18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
239	Gas Clothes Dryers	3	Mobile (Existing)	y	y		18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
240	Gas Clothes Dryers	3	Mobile (New)			y	18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
241	Pool Covers	3	Detached (Pre-1976)	y	y		10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	26%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
242	Pool Covers	3	Detached (Post-1976)	y	y		10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	26%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
243	Pool Covers	3	Detached (New)			y	10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	26%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
244	Pool Covers	3	Attached (Pre-1976)	y	y		10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	26%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
245	Pool Covers	3	Attached (Post-1976)	y	y		10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	26%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
246	Pool Covers	3	Attached (New)			y	10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	26%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
247	Pool Covers	3	Mobile (Existing)	y	y		10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	26%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
248	Pool Covers	3	Mobile (New)			y	10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	26%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
249	Heat Pump Pool Heaters	3	Detached (Pre-1976)	y	y		10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
250	Heat Pump Pool Heaters	3	Detached (Post-1976)	y	y		10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
251	Heat Pump Pool Heaters	3	Detached (New)			y	10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
252	Heat Pump Pool Heaters	3	Attached (Pre-1976)	y	y		10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
253	Heat Pump Pool Heaters	3	Attached (Post-1976)	y	y		10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
254	Heat Pump Pool Heaters	3	Attached (New)			y	10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
255	Heat Pump Pool Heaters	3	Mobile (Existing)	y	y		10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
256	Heat Pump Pool Heaters	3	Mobile (New)			y	10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
257	Efficient Pool Heaters	3	Detached (Pre-1976)	y	y		7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
258	Efficient Pool Heaters	3	Detached (Post-1976)	y	y		7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
259	Efficient Pool Heaters	3	Detached (New)			y	7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
260	Efficient Pool Heaters	3	Attached (Pre-1976)	y	y		7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
261	Efficient Pool Heaters	3	Attached (Post-1976)	y	y		7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
262	Efficient Pool Heaters	3	Attached (New)			y	7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
263	Efficient Pool Heaters	3	Mobile (Existing)	y	y		7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
264	Efficient Pool Heaters	3	Mobile (New)			y	7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
265	Solar Pool Heaters	3	Detached (Pre-1976)	y	y		20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
266	Solar Pool Heaters	3	Detached (Post-1976)	y	y		20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
267	Solar Pool Heaters	3	Detached (New)			y	20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
268	Solar Pool Heaters	3	Attached (Pre-1976)	y	y		20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
269	Solar Pool Heaters	3	Attached (Post-1976)	y	y		20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
270	Solar Pool Heaters	3	Attached (New)			y	20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
271	Solar Pool Heaters	3	Mobile (Existing)	y	y		20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
272	Solar Pool Heaters	3	Mobile (New)			y	20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	66%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
273	Micro-CHP	3	Detached (Pre-1976)	y	y		20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
274	Micro-CHP	3	Detached (Post-1976)	y	y		20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
275	Micro-CHP	3	Detached (New)			y	20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
276	Micro-CHP	3	Attached (Pre-1976)	y	y		20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
277	Micro-CHP	3	Attached (Post-1976)	y	y		20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
278	Micro-CHP	3	Attached (New)			y	20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
279	Micro-CHP	3	Mobile (Existing)	y	y		20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
280	Micro-CHP	3	Mobile (New)			y	20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Measure Information		Applicability										Savings by End Use																				
Measure #	Technology	Climate Zone	Building Type(s)	Exist	Reno	New	Life	Cost	Benefit/Cost Ratio	Economic Screen	Basis	Space heating	Space cooling	Ventilation and Circulation	Domestic hot water (DHW)	Fireplace	Cooking	Dishwasher	Clothes washer	Clothes dryer	Pool & spa heaters	Other gas uses	Other electrical internal loads									
1	Attic Insulation	3	Detached (Pre-1976)	y	y		30.0	$675	1.38	Pass	Full	0%	3%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2	Attic Insulation	3	Detached (Post-1976)	y	y		30.0	$713	0.95	Fail	Full	0%	2%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3	Attic Insulation	3	Attached (Pre-1976)	y	y		30.0	$450	1.24	Pass	Full	0%	3%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4	Attic Insulation	3	Attached (Post-1976)	y	y		30.0	$488	0.85	Fail	Full	0%	2%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5	Attic Insulation	3	Mobile (Existing)	y	y		30.0	$525	1.05	Pass	Full	0%	2%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6	Wall Insulation	3	Detached (Pre-1976)	y	y		30.0	$2,000	1.23	Pass	Incr.	0%	3%	15%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
7	Wall Insulation	3	Detached (Post-1976)	y	y		30.0	$2,000	1.08	Pass	Incr.	0%	3%	15%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
8	Wall Insulation	3	Attached (Pre-1976)	y	y		30.0	$1,500	0.99	Fail	Incr.	0%	3%	15%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
9	Wall Insulation	3	Attached (Post-1976)	y	y		30.0	$1,500	0.88	Fail	Incr.	0%	3%	15%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
10	Wall Insulation	3	Mobile (Existing)	y	y		30.0	$1,500	1.06	Pass	Incr.	0%	3%	15%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
11	Slab Insulation	3	Detached (Pre-1976)	y	y		30.0	$1,125	0.18	Fail	Incr.	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12	Slab Insulation	3	Detached (Post-1976)	y	y		30.0	$1,275	0.11	Fail	Incr.	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
13	Slab Insulation	3	Attached (Pre-1976)	y	y		30.0	$975	0.12	Fail	Incr.	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
14	Slab Insulation	3	Attached (Post-1976)	y	y		30.0	$1,050	0.08	Fail	Incr.	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
15	Basement Insulation	3	Detached (Pre-1976)	y	y		30.0	$1,400	1.31	Pass	Incr.	0%	0%	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
16	Basement Insulation	3	Detached (Post-1976)	y	y		30.0	$1,500	1.16	Pass	Incr.	0%	0%	12%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
17	Basement Insulation	3	Attached (Pre-1976)	y	y		30.0	$900	1.02	Pass	Incr.	0%	0%	8%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
18	Basement Insulation	3	Attached (Post-1976)	y	y		30.0	$1,000	0.86	Fail	Incr.	0%	0%	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
19	Crawl Space Insul.	3	Detached (Pre-1976)	y	y		30.0	$800	0.47	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
20	Crawl Space Insul.	3	Detached (Post-1976)	y	y		30.0	$800	0.41	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21	Crawl Space Insul.	3	Attached (Pre-1976)	y	y		30.0	$800	0.29	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22	Crawl Space Insul.	3	Attached (Post-1976)	y	y		30.0	$800	0.25	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23	Air Sealing	3	Detached (Pre-1976)	y	y		25.0	$1,800	0.72	Fail	Full	0%	1%	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
24	Air Sealing	3	Detached (Post-1976)	y	y		25.0	$1,800	0.55	Fail	Full	0%	1%	8%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
25	Air Sealing	3	Attached (Pre-1976)	y	y		25.0	$1,800	0.44	Fail	Full	0%	1%	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
26	Air Sealing	3	Attached (Post-1976)	y	y		25.0	$1,800	0.34	Fail	Full	0%	1%	8%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
27	Air Sealing	3	Mobile (Existing)	y	y		25.0	$1,800	0.42	Fail	Full	0%	1%	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
28	Homeowner Air Sealing	3	Detached (Pre-1976)	y	y		10.0	$200	1.32	Pass	Full	0%	0%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
29	Homeowner Air Sealing	3	Detached (Post-1976)	y	y		10.0	$200	1.00	Fail	Full	0%	1%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
30	Homeowner Air Sealing	3	Attached (Pre-1976)	y	y		10.0	$200	0.80	Fail	Full	0%	0%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
31	Homeowner Air Sealing	3	Attached (Post-1976)	y	y		10.0	$200	0.61	Fail	Full	0%	1%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
32	Homeowner Air Sealing	3	Mobile (Existing)	y	y		10.0	$200	0.77	Fail	Full	0%	0%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
33	Sealing & Insul. - Old Homes	3	Detached (Pre-1976)	y	y		25.0	$3,000	0.72	Fail	Full	0%	3%	15%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
34	Sealing & Insul. - Old Homes	3	Attached (Pre-1976)	y	y		25.0	$2,500	0.51	Fail	Full	0%	3%	15%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
35	Zone Up Windows	3	Detached (Pre-1976)	y	y		25.0	$1,000	0.34	Fail	Incr.	0%	1%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
36	Zone Up Windows	3	Detached (Post-1976)	y	y		25.0	$1,200	0.35	Fail	Incr.	0%	1%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
37	Zone Up Windows	3	Detached (New)			y	25.0	$2,600	0.27	Fail	Incr.	0%	2%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
38	Zone Up Windows	3	Attached (Pre-1976)	y	y		25.0	$800	0.26	Fail	Incr.	0%	1%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
39	Zone Up Windows	3	Attached (Post-1976)	y	y		25.0	$960	0.27	Fail	Incr.	0%	1%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
40	Zone Up Windows	3	Attached (New)			y	25.0	$2,080	0.21	Fail	Incr.	0%	2%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
41	Zone Up Windows	3	Mobile (Existing)	y	y		25.0	$720	0.38	Fail	Incr.	0%	1%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
42	Zone Up Windows	3	Mobile (New)			y	25.0	$1,600	0.32	Fail	Incr.	0%	2%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
43	Super Windows	3	Detached (Pre-1976)	y	y		25.0	$1,500	0.82	Fail	Incr.	0%	8%	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
44	Super Windows	3	Detached (Post-1976)	y	y		25.0	$1,800	0.88	Fail	Incr.	0%	10%	13%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
45	Super Windows	3	Detached (New)			y	25.0	$3,900	0.60	Fail	Incr.	0%	17%	19%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
46	Super Windows	3	Attached (Pre-1976)	y	y		25.0	$1,200	0.62	Fail	Incr.	0%	8%	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
47	Super Windows	3	Attached (Post-1976)	y	y		25.0	$1,440	0.68	Fail	Incr.	0%	10%	13%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
48	Super Windows	3	Attached (New)			y	25.0	$3,120	0.46	Fail	Incr.	0%	17%	19%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
49	Super Windows	3	Mobile (Existing)	y	y		25.0	$1,080	0.86	Fail	Incr.	0%	9%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
50	Super Windows	3	Mobile (New)			y	25.0	$2,400	0.72	Fail	Incr.	0%	17%	19%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
51	High-Perf. New Homes	3	Detached (New)			y	30.0	$6,000	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
52	High-Perf. New Homes	3	Attached (New)			y	30.0	$4,800	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
53	High-Perf. New Homes	3	Mobile (New)			y	30.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
54	Net Zero Ready Homes	3	Detached (New)			y	30.0	$14,000	0.35	Fail	Full	0%	0%	30%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
55	Net Zero Ready Homes	3	Attached (New)			y	30.0	$9,800	0.33	Fail	Full	0%	0%	30%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
56	Net Zero Ready Homes	3	Mobile (New)			y	30.0	$9,800	0.38	Fail	Full	0%	0%	30%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
57	Condensing Gas Furnaces	3	Detached (Pre-1976)	y	y		18.0	$1,477	0.46	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
58	Condensing Gas Furnaces	3	Detached (Post-1976)	y	y		18.0	$1,477	0.39	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
59	Condensing Gas Furnaces	3	Detached (New)			y	18.0	$1,477	0.39	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
60	Condensing Gas Furnaces	3	Attached (Pre-1976)	y	y		18.0	$1,477	0.28	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
61	Condensing Gas Furnaces	3	Attached (Post-1976)	y	y		18.0	$1,477	0.24	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
62	Condensing Gas Furnaces	3	Attached (New)			y	18.0	$1,477	0.24	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
63	Condensing Gas Furnaces	3	Mobile (Existing)	y	y		18.0	$1,477	0.31	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
64	Condensing Gas Furnaces	3	Mobile (New)			y	18.0	$1,477	0.31	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
65	Early Retire Gas Furnaces	3	Detached (Pre-1976)	y	y		9.0	$1,864	0.49	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
66	Early Retire Gas Furnaces	3	Detached (Post-1976)	y	y		9.0	$1,864	0.41	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
67	Early Retire Gas Furnaces	3	Attached (Pre-1976)	y	y		9.0	$1,864	0.29	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
68	Early Retire Gas Furnaces	3	Attached (Post-1976)	y	y		9.0	$1,864	0.26	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
69	Early Retire Gas Furnaces	3	Mobile (Existing)	y	y		9.0	$1,864	0.32	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
70	Condensing Gas Boilers	3	Detached (Pre-1976)	y	y		20.0	$3,200	0.39	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
71	Condensing Gas Boilers	3	Detached (Post-1976)	y	y		20.0	$3,200	0.33	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
72	Condensing Gas Boilers	3	Detached (New)			y	20.0	$3,200	0.33	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
73	Condensing Gas Boilers	3	Attached (Pre-1976)	y	y		20.0	$3,200	0.24	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
74	Condensing Gas Boilers	3	Attached (Post-1976)	y	y		20.0	$3,200	0.21	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
75	Condensing Gas Boilers	3	Attached (New)			y	20.0	$3,200	0.21	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
76	Condensing Gas Boilers	3	Mobile (Existing)	y	y		20.0	$3,200	0.26	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
77	Condensing Gas Boilers	3	Mobile (New)			y	20.0	$3,200	0.26	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
78	Gas Fireplaces	3	Detached (Pre-1976)	y	y		15.0	$150	3.78	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
79	Gas Fireplaces	3	Detached (Post-1976)	y	y		15.0	$150	3.78	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
80	Gas Fireplaces	3	Detached (New)			y	15.0	$150	3.78	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
81	Gas Fireplaces	3	Attached (Pre-1976)	y	y		15.0	$150	2.50	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
82	Gas Fireplaces	3	Attached (Post-1976)	y	y		15.0	$150	2.50	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
83	Gas Fireplaces	3	Attached (New)			y	15.0	$150	2.50	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
84	Gas Fireplaces	3	Mobile (Existing)	y	y		15.0	$150	2.50	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
85	Gas Fireplaces	3	Mobile (New)			y	15.0	$150	2.50	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
86	Prog. Thermostats	3	Detached (Pre-1976)	y	y		11.0	$50	10.03	Pass	Full	0%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
87	Prog. Thermostats	3	Detached (Post-1976)	y	y		11.0	$50	8.56	Pass	Full	0%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
88	Prog. Thermostats	3	Detached (New)			y	11.0	$50	8.55	Pass	Full	0%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
89	Prog. Thermostats	3	Attached (Pre-1976)	y	y		11.0	$50	6.00	Pass	Full	0%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
90	Prog. Thermostats	3	Attached (Post-1976)	y	y		11.0	$50	5.34	Pass	Full	0%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
91	Prog. Thermostats	3	Attached (New)			y	11.0	$50	5.33	Pass	Full	0%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
92	Prog. Thermostats	3	Mobile (Existing)	y	y		11.0	$50	6.61	Pass	Full	0%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
93	Prog. Thermostats	3	Mobile (New)			y	11.0	$50	6.61	Pass	Full	0%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
94	Solar Make-Up Air	3	Detached (Pre-1976)	y	y		40.0	$1,300	0.27	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
95	Solar Make-Up Air	3	Detached (Post-1976)	y	y		40.0	$1,300	0.24	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
96	Solar Make-Up Air	3	Detached (New)			y	40.0	$1,300	0.24	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
97	Solar Make-Up Air	3	Attached (Pre-1976)	y	y		40.0	$1,300	0.16	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
98	Solar Make-Up Air	3	Attached (Post-1976)	y	y		40.0	$1,300	0.15	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
99	Solar Make-Up Air	3	Attached (New)			y	40.0	$1,300	0.15	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
100	Solar Make-Up Air	3	Mobile (Existing)	y	y		40.0	$1,300	0.18	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
101	Solar Make-Up Air	3	Mobile (New)			y	40.0	$1,300	0.18	Fail	Full	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
102	HRVs	3	Detached (Pre-1976)	y	y		15.0	$600	0.46	Fail	Incr.	0%	3%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
103	HRVs	3	Detached (Post-1976)	y	y		15.0	$600	0.41	Fail	Incr.	0%	3%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
104	HRVs	3	Detached (New)			y	15.0	$600	0.41	Fail	Incr.	0%	3%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
105	HRVs	3	Attached (Pre-1976)	y	y		15.0	$600	0.28	Fail	Incr.	0%	3%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
106	HRVs	3	Attached (Post-1976)	y	y		15.0	$600	0.25	Fail	Incr.	0%	3%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
107	HRVs	3	Attached (New)			y	15.0	$600	0.25	Fail	Incr.	0%	3%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
108	HRVs	3	Mobile (Existing)	y	y		15.0	$600	0.30	Fail	Incr.	0%	3%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
109	HRVs	3	Mobile (New)			y	15.0	$600	0.30	Fail	Incr.	0%	3%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
110	Air Heat Pumps	3	Detached (Pre-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
111	Air Heat Pumps	3	Detached (Post-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
112	Air Heat Pumps	3	Detached (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
113	Air Heat Pumps	3	Attached (Pre-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
114	Air Heat Pumps	3	Attached (Post-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
115	Air Heat Pumps	3	Attached (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
116	Air Heat Pumps	3	Mobile (Existing)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
117	Air Heat Pumps	3	Mobile (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
118	Ground Heat Pumps	3	Detached (Pre-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
119	Ground Heat Pumps	3	Detached (Post-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
120	Ground Heat Pumps	3	Detached (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
121	Ground Heat Pumps	3	Attached (Pre-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
122	Ground Heat Pumps	3	Attached (Post-1976)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
123	Ground Heat Pumps	3	Attached (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
124	Ground Heat Pumps	3	Mobile (Existing)	y	y		0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
125	Ground Heat Pumps	3	Mobile (New)			y	0.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
126	Heating & DHW	3	Detached (Pre-1976)	y	y		18.0	$8,506	0.13	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
127	Heating & DHW	3	Detached (Post-1976)	y	y		18.0	$8,506	0.12	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
128	Heating & DHW	3	Detached (New)			y	18.0	$3,506	0.29	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
129	Heating & DHW	3	Attached (Pre-1976)	y	y		18.0	$8,506	0.09	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
130	Heating & DHW	3	Attached (Post-1976)	y	y		18.0	$8,506	0.09	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
131	Heating & DHW	3	Attached (New)			y	18.0	$3,506	0.22	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
132	Heating & DHW	3	Mobile (Existing)	y	y		18.0	$8,506	0.09	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
133	Heating & DHW	3	Mobile (New)			y	18.0	$3,506	0.23	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
134	Heating & DHW (Hydronic)	3	Detached (Pre-1976)	y	y		20.0	$8,000	0.25	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
135	Heating & DHW (Hydronic)	3	Detached (Post-1976)	y	y		20.0	$8,000	0.23	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
136	Heating & DHW (Hydronic)	3	Detached (New)			y	20.0	$3,000	0.61	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
137	Heating & DHW (Hydronic)	3	Attached (Pre-1976)	y	y		20.0	$8,000	0.17	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
138	Heating & DHW (Hydronic)	3	Attached (Post-1976)	y	y		20.0	$8,000	0.16	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
139	Heating & DHW (Hydronic)	3	Attached (New)			y	20.0	$3,000	0.43	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
140	Heating & DHW (Hydronic)	3	Mobile (Existing)	y	y		20.0	$8,000	0.18	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
141	Heating & DHW (Hydronic)	3	Mobile (New)			y	20.0	$3,000	0.48	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
142	Condensing Gas DHW	3	Detached (Pre-1976)	y	y		13.0	$1,567	0.26	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
143	Condensing Gas DHW	3	Detached (Post-1976)	y	y		13.0	$1,567	0.26	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
144	Condensing Gas DHW	3	Detached (New)			y	13.0	$1,073	0.38	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
145	Condensing Gas DHW	3	Attached (Pre-1976)	y	y		13.0	$1,567	0.22	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
146	Condensing Gas DHW	3	Attached (Post-1976)	y	y		13.0	$1,567	0.22	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
147	Condensing Gas DHW	3	Attached (New)			y	13.0	$1,073	0.32	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
148	Condensing Gas DHW	3	Mobile (Existing)	y	y		13.0	$1,567	0.20	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
149	Condensing Gas DHW	3	Mobile (New)			y	13.0	$1,073	0.29	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
150	Tankless Gas DHW	3	Detached (Pre-1976)	y	y		20.0	$2,274	0.37	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
151	Tankless Gas DHW	3	Detached (Post-1976)	y	y		20.0	$2,274	0.37	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
152	Tankless Gas DHW	3	Detached (New)			y	20.0	$1,646	0.51	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
153	Tankless Gas DHW	3	Attached (Pre-1976)	y	y		20.0	$2,274	0.31	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
154	Tankless Gas DHW	3	Attached (Post-1976)	y	y		20.0	$2,274	0.31	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
155	Tankless Gas DHW	3	Attached (New)			y	20.0	$1,646	0.43	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
156	Tankless Gas DHW	3	Mobile (Existing)	y	y		20.0	$2,274	0.32	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
157	Tankless Gas DHW	3	Mobile (New)			y	20.0	$1,646	0.45	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
158	Solar DHW	3	Detached (Pre-1976)	y	y		25.0	$7,000	0.25	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
159	Solar DHW	3	Detached (Post-1976)	y	y		25.0	$7,000	0.25	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
160	Solar DHW	3	Detached (New)			y	25.0	$7,000	0.25	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
161	Solar DHW	3	Attached (Pre-1976)	y	y		25.0	$7,000	0.22	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
162	Solar DHW	3	Attached (Post-1976)	y	y		25.0	$7,000	0.22	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
163	Solar DHW	3	Attached (New)			y	25.0	$7,000	0.22	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
164	Solar DHW	3	Mobile (Existing)	y	y		25.0	$7,000	0.25	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
165	Solar DHW	3	Mobile (New)			y	25.0	$7,000	0.25	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
166	DHW Tank Insulation	3	Detached (Pre-1976)	y	y		13.0	$35	0.96	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
167	DHW Tank Insulation	3	Detached (Post-1976)	y	y		13.0	$35	0.96	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
168	DHW Tank Insulation	3	Detached (New)			y	13.0	$35	0.96	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
169	DHW Tank Insulation	3	Attached (Pre-1976)	y	y		13.0	$25	1.13	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
170	DHW Tank Insulation	3	Attached (Post-1976)	y	y		13.0	$25	1.13	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
171	DHW Tank Insulation	3	Attached (New)			y	13.0	$25	1.13	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
172	DHW Tank Insulation	3	Mobile (Existing)	y	y		13.0	$25	1.17	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
173	DHW Tank Insulation	3	Mobile (New)			y	13.0	$25	1.17	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
174	DHW Pipe Insulation	3	Detached (Pre-1976)	y	y		15.0	$1	19.20	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
175	DHW Pipe Insulation	3	Detached (Post-1976)	y	y		15.0	$1	19.20	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
176	DHW Pipe Insulation	3	Detached (New)			y	15.0	$1	19.20	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
177	DHW Pipe Insulation	3	Attached (Pre-1976)	y	y		15.0	$1	16.21	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
178	DHW Pipe Insulation	3	Attached (Post-1976)	y	y		15.0	$1	16.21	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
179	DHW Pipe Insulation	3	Attached (New)			y	15.0	$1	16.21	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
180	DHW Pipe Insulation	3	Mobile (Existing)	y	y		15.0	$1	16.71	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
181	DHW Pipe Insulation	3	Mobile (New)			y	15.0	$1	16.71	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
182	DHW Heat Traps	3	Detached (New)			y	13.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
183	DHW Heat Traps	3	Attached (New)			y	13.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
184	DHW Heat Traps	3	Mobile (New)			y	13.0	$0	0.00	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
185	Showerheads	3	Detached (Pre-1976)	y	y		10.0	$13	10.84	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
186	Showerheads	3	Detached (Post-1976)	y	y		10.0	$13	10.84	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
187	Showerheads	3	Detached (New)			y	10.0	$13	10.84	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
188	Showerheads	3	Attached (Pre-1976)	y	y		10.0	$13	9.15	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
189	Showerheads	3	Attached (Post-1976)	y	y		10.0	$13	9.15	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
190	Showerheads	3	Attached (New)			y	10.0	$13	9.15	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
191	Showerheads	3	Mobile (Existing)	y	y		10.0	$13	9.44	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
192	Showerheads	3	Mobile (New)			y	10.0	$13	9.44	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
193	Faucet Aerators	3	Detached (Pre-1976)	y	y		10.0	$15	5.67	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
194	Faucet Aerators	3	Detached (Post-1976)	y	y		10.0	$15	5.67	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
195	Faucet Aerators	3	Detached (New)			y	10.0	$15	5.67	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
196	Faucet Aerators	3	Attached (Pre-1976)	y	y		10.0	$15	4.79	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
197	Faucet Aerators	3	Attached (Post-1976)	y	y		10.0	$15	4.79	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
198	Faucet Aerators	3	Attached (New)			y	10.0	$15	4.79	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
199	Faucet Aerators	3	Mobile (Existing)	y	y		10.0	$15	4.94	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
200	Faucet Aerators	3	Mobile (New)			y	10.0	$15	4.94	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
201	Wastewater Heat Recovery	3	Detached (Pre-1976)	y	y		30.0	$800	0.51	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
202	Wastewater Heat Recovery	3	Detached (Post-1976)	y	y		30.0	$800	0.51	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
203	Wastewater Heat Recovery	3	Detached (New)			y	30.0	$800	0.51	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
204	Wastewater Heat Recovery	3	Attached (Pre-1976)	y	y		30.0	$731	0.47	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
205	Wastewater Heat Recovery	3	Attached (Post-1976)	y	y		30.0	$731	0.47	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
206	Wastewater Heat Recovery	3	Attached (New)			y	30.0	$731	0.47	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
207	Wastewater Heat Recovery	3	Mobile (Existing)	y	y		30.0	$731	0.48	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
208	Wastewater Heat Recovery	3	Mobile (New)			y	30.0	$731	0.48	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
209	DHW Recirculation	3	Detached (Pre-1976)	y	y		18.0	$570	0.63	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

210	DHW Recirculation	3	Detached (Post-1976)	y	y		18.0	$570	0.63	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
211	DHW Recirculation	3	Detached (New)			y	18.0	$570	0.63	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
212	DHW Recirculation	3	Attached (Pre-1976)	y	y		18.0	$470	0.65	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
213	DHW Recirculation	3	Attached (Post-1976)	y	y		18.0	$470	0.65	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
214	DHW Recirculation	3	Attached (New)			y	18.0	$470	0.65	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
215	DHW Recirculation	3	Mobile (Existing)	y	y		18.0	$470	0.67	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
216	DHW Recirculation	3	Mobile (New)			y	18.0	$470	0.67	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
217	ESTAR Dishwashers	3	Detached (Pre-1976)	y	y		11.0	$105	0.34	Fail	Incr.	0%	0%	0%	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
218	ESTAR Dishwashers	3	Detached (Post-1976)	y	y		11.0	$105	0.34	Fail	Incr.	0%	0%	0%	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
219	ESTAR Dishwashers	3	Detached (New)			y	11.0	$105	0.34	Fail	Incr.	0%	0%	0%	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
220	ESTAR Dishwashers	3	Attached (Pre-1976)	y	y		11.0	$105	0.28	Fail	Incr.	0%	0%	0%	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
221	ESTAR Dishwashers	3	Attached (Post-1976)	y	y		11.0	$105	0.28	Fail	Incr.	0%	0%	0%	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
222	ESTAR Dishwashers	3	Attached (New)			y	11.0	$105	0.28	Fail	Incr.	0%	0%	0%	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
223	ESTAR Dishwashers	3	Mobile (Existing)	y	y		11.0	$105	0.29	Fail	Incr.	0%	0%	0%	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
224	ESTAR Dishwashers	3	Mobile (New)			y	11.0	$105	0.29	Fail	Incr.	0%	0%	0%	0%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
225	ESTAR Clothes Washers	3	Detached (Pre-1976)	y	y		14.0	$300	1.03	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	37%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
226	ESTAR Clothes Washers	3	Detached (Post-1976)	y	y		14.0	$300	1.03	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	37%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
227	ESTAR Clothes Washers	3	Detached (New)			y	14.0	$300	1.03	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	37%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
228	ESTAR Clothes Washers	3	Attached (Pre-1976)	y	y		14.0	$300	0.88	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	37%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
229	ESTAR Clothes Washers	3	Attached (Post-1976)	y	y		14.0	$300	0.88	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	37%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
230	ESTAR Clothes Washers	3	Attached (New)			y	14.0	$300	0.88	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	37%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
231	ESTAR Clothes Washers	3	Mobile (Existing)	y	y		14.0	$300	0.92	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	37%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
232	ESTAR Clothes Washers	3	Mobile (New)			y	14.0	$300	0.92	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	37%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
233	Gas Clothes Dryers	3	Detached (Pre-1976)	y	y		18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
234	Gas Clothes Dryers	3	Detached (Post-1976)	y	y		18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
235	Gas Clothes Dryers	3	Detached (New)			y	18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
236	Gas Clothes Dryers	3	Attached (Pre-1976)	y	y		18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
237	Gas Clothes Dryers	3	Attached (Post-1976)	y	y		18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
238	Gas Clothes Dryers	3	Attached (New)			y	18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
239	Gas Clothes Dryers	3	Mobile (Existing)	y	y		18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
240	Gas Clothes Dryers	3	Mobile (New)			y	18.0	$50	0.00	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
241	Pool Covers	3	Detached (Pre-1976)	y	y		10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
242	Pool Covers	3	Detached (Post-1976)	y	y		10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
243	Pool Covers	3	Detached (New)			y	10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
244	Pool Covers	3	Attached (Pre-1976)	y	y		10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
245	Pool Covers	3	Attached (Post-1976)	y	y		10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
246	Pool Covers	3	Attached (New)			y	10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
247	Pool Covers	3	Mobile (Existing)	y	y		10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
248	Pool Covers	3	Mobile (New)			y	10.0	$1,200	0.86	Fail	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
249	Heat Pump Pool Heaters	3	Detached (Pre-1976)	y	y		10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
250	Heat Pump Pool Heaters	3	Detached (Post-1976)	y	y		10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
251	Heat Pump Pool Heaters	3	Detached (New)			y	10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
252	Heat Pump Pool Heaters	3	Attached (Pre-1976)	y	y		10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
253	Heat Pump Pool Heaters	3	Attached (Post-1976)	y	y		10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
254	Heat Pump Pool Heaters	3	Attached (New)			y	10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
255	Heat Pump Pool Heaters	3	Mobile (Existing)	y	y		10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
256	Heat Pump Pool Heaters	3	Mobile (New)			y	10.0	$525	4.91	Pass	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
257	Efficient Pool Heaters	3	Detached (Pre-1976)	y	y		7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
258	Efficient Pool Heaters	3	Detached (Post-1976)	y	y		7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
259	Efficient Pool Heaters	3	Detached (New)			y	7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
260	Efficient Pool Heaters	3	Attached (Pre-1976)	y	y		7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
261	Efficient Pool Heaters	3	Attached (Post-1976)	y	y		7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
262	Efficient Pool Heaters	3	Attached (New)			y	7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
263	Efficient Pool Heaters	3	Mobile (Existing)	y	y		7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
264	Efficient Pool Heaters	3	Mobile (New)			y	7.0	$2,900	0.07	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
265	Solar Pool Heaters	3	Detached (Pre-1976)	y	y		20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
266	Solar Pool Heaters	3	Detached (Post-1976)	y	y		20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
267	Solar Pool Heaters	3	Detached (New)			y	20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
268	Solar Pool Heaters	3	Attached (Pre-1976)	y	y		20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
269	Solar Pool Heaters	3	Attached (Post-1976)	y	y		20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
270	Solar Pool Heaters	3	Attached (New)			y	20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
271	Solar Pool Heaters	3	Mobile (Existing)	y	y		20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
272	Solar Pool Heaters	3	Mobile (New)			y	20.0	$3,450	1.25	Pass	Full	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
273	Micro-CHP	3	Detached (Pre-1976)	y	y		20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
274	Micro-CHP	3	Detached (Post-1976)	y	y		20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
275	Micro-CHP	3	Detached (New)			y	20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
276	Micro-CHP	3	Attached (Pre-1976)	y	y		20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
277	Micro-CHP	3	Attached (Post-1976)	y	y		20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
278	Micro-CHP	3	Attached (New)			y	20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
279	Micro-CHP	3	Mobile (Existing)	y	y		20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
280	Micro-CHP	3	Mobile (New)			y	20.0	$8,000	0.35	Fail	Incr.	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Back to Index

Attic Insulation

		References/Notes
Description:	Insulation levels can be increased in attics by blowing insulation into the attic spaces to fill and cover the space within the roof frame. One technique is to make sure loose-fill or batt insulation fills the attic floor joists fully and then add an additional layer of unfaced fibreglass batt insulation across the joists. To reduce cost, it is also possible to blow in cellulose insulation on top of the existing insulation instead.	
Baseline:	A home with average insulation in the attic	
Upgrade:	Improving the attic insulation in an average home by RSI-3.5 (R-20), through the addition of cellulose insulation	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.648	$1.648		$1.648	$1.648		$1.648	
Electricity ($/kW)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	
Natural Gas ($/MJ)	$0.010	$0.139	$0.139		$0.139	$0.139		$0.139	
Oil ($/L)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	
Water ($/1000L)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☐	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☐	Mobile (Existing) ☑	Mobile (New) ☐	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	878	1,078		565	565		417		888	
	Natural Gas (MJ/yr.)	103,566	87,600		61,906	54,833		68,576		77,650	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Upgrade Consumption	Electricity (kWh/yr.)	838	1,037		539	545		402		855	
	Natural Gas (MJ/yr.)	97,352	83,220		58,191	52,092		64,804		73,690	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%		0%	0%		0%		0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%		0%	0%		0%		0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-		-	-		-		-	
	Electricity, Cooling (kWh/yr.)	-	-		-	-		-		-	
	Electricity, Total (kWh/yr.)	-	-		-	-		-		-	
	Natural Gas (MJ/yr.)	-	-		-	-		-		-	
	Oil (L/yr.)	-	-		-	-		-		-	
Winter Peak Hours-Use Factor		-	-		-	-		-		-	
Resource Savings	Electricity (kWh/yr.)	40	40		26	20		16		33	
	Electricity (kW peak)	-	-		-	-		-		-	
	Natural Gas (MJ/yr.)	6,214	4,380		3,714	2,742		3,772		3,960	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Cost Parameters	Upgrade, Material ($)	$675.00	$712.50		$450.00	$487.50		$525.00		$633.11	Consultations with utilities and contractors have suggested that an average cost of $0.75/ft^2 (material and installation) is reasonable. Average ceiling areas based on ecoENERGY database data for BC and HOT2000 modelling.
	Upgrade, Installation ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	Installation costs included above
	Baseline, Material ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	
	Baseline, Installation ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	
	Total Measure Cost ($)	$675.00	$712.50		$450.00	$487.50		$525.00		$633.11	
	Basis (Full/Incremental)	Full	Full		Full	Full		Full		Full	
Incremental O&M ($/yr.)		$0	$0		$0	$0		$0		$0	
Lifetimes	Upgrade (yrs.)	30	30		30	30		30		30	Approximate lifetime, based on previous Marbek energy efficiency potential studies
	Baseline (yrs.)	-	-		-	-		-		-	
Cost Savings ($/yr.)		$64	$46		$39	$29		$38		$42	
Simple Payback (yrs.)		10.5	15.4		11.7	17.1		13.7		15.56	
NPV of O&M Costs ($)		$0	$0		$0	$0		$0		$0	
Total Benefits ($)	Electric Energy	$66	$66		$43	$34		$26		$55	
	Electric Demand	$0	$0		$0	$0		$0		$0	
	Natural Gas	$864	$609		$517	$381		$525		$551	
	Oil	$0	$0		$0	$0		$0		$0	
	Water	$0	$0		$0	$0		$0		$0	
Measure TRC ($)		$255	-$37		$110	-$72		$25		-$27	
Benefit/Cost Ratio		1.38	0.95		1.24	0.85		1.05		0.95	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1		1	1		1		
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental		Incremental	Incremental		Incremental		
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	5.5%	4.5%		5.5%	4.5%		5.0%		4.6%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes.
Space Cooling	-	1	1	2.5%	1.5%		2.5%	1.5%		2.0%		1.6%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes.
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	6.0%	5.0%		6.0%	5.0%		5.5%		5.1%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes.
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heater	-	0	0									-	
Pool and Spa Heater	Pool Heaters	0	0									-	
Pool and Spa Heater	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	

Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	5.5%	4.5%		5.5%	4.5%		5.0%		4.6%	
Space Cooling	1	1	2.5%	1.5%		2.5%	1.5%		2.0%		1.6%	
Clothes Washers	0	0	-	-		-	-		-		-	
Dishwashers	0	0	-	-		-	-		-		-	
Other Electric Loads	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	6.0%	5.0%		6.0%	5.0%		5.5%		5.1%	
Domestic Hot Water (DHW)	0	0	-	-		-	-		-		-	
Fireplaces	0	0	-	-		-	-		-		-	
Cooking	0	0	-	-		-	-		-		-	
Clothes Dryers	0	0	-	-		-	-		-		-	
Pool and Spa Heaters	0	0	-	-		-	-		-		-	
Other	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-		-	-		-		-	
Domestic Hot Water (DHW)	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Wall Insulation

		References/Notes
Description:	It can be challenging to retrofit wall insulation in existing homes since the inside surfaces of the exterior walls are already finished. It is sometimes possible to add insulation to a wall by blowing insulating materials into the wall cavity, if sufficient space exists. Alternatively, if the siding is old and due for replacement, rigid foam insulation can be added before the new siding is installed. In this situation, it would also be quite cost-effective to install a more effective vapour and air barrier (e.g., Dupont Tyvek®) to reduce the amount of air leakage through the walls.	
Baseline:	A home with average wall insulation	
Upgrade:	Improving the wall insulation in an average home by RSI-1.76 (R-10) to RSI-4.2 (R-24)	Assumed that the homeowner is replacing the home's siding and improving the wall insulation on an incremental basis.

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.648	$1.648		$1.648	$1.648		$1.648	
Electricity ($/kW)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	
Natural Gas ($/MJ)	$0.010	$0.139	$0.139		$0.139	$0.139		$0.139	
Oil ($/L)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	
Water ($/1000L)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☐	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☐	Mobile (Existing) ☑	Mobile (New) ☐	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	878	1,078		565	565		417		888	
	Natural Gas (MJ/yr.)	103,566	87,600		61,906	54,833		68,576		77,650	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Upgrade Consumption	Electricity (kWh/yr.)	779	951		500	501		377		785	
	Natural Gas (MJ/yr.)	86,996	73,584		52,001	46,060		57,604		65,226	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%		0%	0%		0%		0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%		0%	0%		0%		0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-		-	-		-		-	
	Electricity, Cooling (kWh/yr.)	-	-		-	-		-		-	
	Electricity, Total (kWh/yr.)	-	-		-	-		-		-	
	Natural Gas (MJ/yr.)	-	-		-	-		-		-	
	Oil (L/yr.)	-	-		-	-		-		-	
Winter Peak Hours-Use Factor		-	-		-	-		-		-	
Resource Savings	Electricity (kWh/yr.)	98	127		65	64		41		103	
	Electricity (kW peak)	-	-		-	-		-		-	
	Natural Gas (MJ/yr.)	16,571	14,016		9,905	8,773		10,972		12,424	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Cost Parameters	Upgrade, Material ($)	$2,000.00	$2,000.00		$1,500.00	$1,500.00		$1,500.00		$1,829.11	Approx. material and installation costs, based on private communication with Tony Woods, CanAm Building Envelope Specialists (2009)
	Upgrade, Installation ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	Installation costs included above
	Baseline, Material ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	
	Baseline, Installation ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	
	Total Measure Cost ($)	$2,000.00	$2,000.00		$1,500.00	$1,500.00		$1,500.00		$1,829.11	
	Basis (Full/Incremental)	Incr.	Incr.		Incr.	Incr.		Incr.		Incr.	Forced to incremental, because it would be done as part of siding replacement
Incremental O&M ($/yr.)		$0	$0		$0	$0		$0		$0	
Lifetimes	Upgrade (yrs.)	30	30		30	30		30		30	Approximate lifetime, based on previous Marbek energy efficiency potential studies
	Baseline (yrs.)	30	30		30	30		30		30	
Cost Savings ($/yr.)		$171	$148		$102	$91		$111		$130	
Simple Payback (yrs.)		11.7	13.5		14.6	16.4		13.5		14.35	
NPV of O&M Costs ($)		$0	$0		$0	$0		$0		$0	
Total Benefits ($)	Electric Energy	$162	$209		$107	$106		$67		$170	
	Electric Demand	$0	$0		$0	$0		$0		$0	
	Natural Gas	$2,305	$1,949		$1,378	$1,220		$1,526		$1,728	
	Oil	$0	$0		$0	$0		$0		$0	
	Water	$0	$0		$0	$0		$0		$0	
Measure TRC ($)		$467	$159		-$15	-$174		$93		$69	
Benefit/Cost Ratio		1.23	1.08		0.99	0.88		1.06		1.03	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1		1	1		1		
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental		Incremental	Incremental		Incremental		
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	15.0%	15.0%		15.0%	15.0%		15.0%		15.0%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes.
Space Cooling	-	1	1	3.0%	2.5%		3.0%	2.5%		2.5%		2.5%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes.
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	16.0%	16.0%		16.0%	16.0%		16.0%		16.0%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes.
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heater	-	0	0									-	
Pool and Spa Heater	Pool Heaters	0	0									-	
Pool and Spa Heater	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	

Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	15.0%	15.0%		15.0%	15.0%		15.0%		15.0%	
Space Cooling	1	1	3.0%	2.5%		3.0%	2.5%		2.5%		2.5%	
Clothes Washers	0	0	-	-		-	-		-		-	
Dishwashers	0	0	-	-		-	-		-		-	
Other Electric Loads	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	16.0%	16.0%		16.0%	16.0%		16.0%		16.0%	
Domestic Hot Water (DHW)	0	0	-	-		-	-		-		-	
Fireplaces	0	0	-	-		-	-		-		-	
Cooking	0	0	-	-		-	-		-		-	
Clothes Dryers	0	0	-	-		-	-		-		-	
Pool and Spa Heaters	0	0	-	-		-	-		-		-	
Other	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-		-	-		-		-	
Domestic Hot Water (DHW)	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Slab Insulation (Unfinished Basements)

		References/Notes
Description:	Insulation can be added both under and on top of basement slab floors. However, in existing homes, only the latter is practical. It is assumed that additional insulation is added to the slab floor while the basement is being finished. This can be done by purchasing insulated subfloor panels or laying down extruded polystyrene rigid foam insulation.	
Baseline:	Homes with unfinished basements	
Upgrade:	The addition of slab (basement floor) insulation in homes with unfinished basements. It is assumed that 2" polystyrene rigid foam insulation (RSI-1.76 (R-10)) is being added.	Assumed that the homeowner is finishing their basement and improving the slab/floor insulation on an incremental basis.

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.648	$1.648		$1.648	$1.648			
Electricity ($/kW)	$0.000	$0.000	$0.000		$0.000	$0.000			
Natural Gas ($/MJ)	$0.010	$0.139	$0.139		$0.139	$0.139			
Oil ($/L)	$0.000	$0.000	$0.000		$0.000	$0.000			
Water ($/1000L)	$0.000	$0.000	$0.000		$0.000	$0.000			

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☐	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☐	Mobile (Existing) ☐	Mobile (New) ☐	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	600	800		400	400				653	
	Natural Gas (MJ/yr.)	103,566	87,600		61,906	54,833				77,737	
	Oil (L/yr.)	-	-		-	-				-	
	Water (L/yr.)	-	-		-	-				-	
Upgrade Consumption	Electricity (kWh/yr.)	594	792		396	396				646	
	Natural Gas (MJ/yr.)	102,220	86,724		61,101	54,285				76,937	
	Oil (L/yr.)	-	-		-	-				-	
	Water (L/yr.)	-	-		-	-				-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%		0%	0%				0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%		0%	0%				0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-		-	-				-	
	Electricity, Cooling (kWh/yr.)	-	-		-	-				-	
	Electricity, Total (kWh/yr.)	-	-		-	-				-	
	Natural Gas (MJ/yr.)	-	-		-	-				-	
	Oil (L/yr.)	-	-		-	-				-	
Winter Peak Hours-Use Factor		-	-		-	-				-	
Resource Savings	Electricity (kWh/yr.)	6	8		4	4				7	
	Electricity (kW peak)	-	-		-	-				-	
	Natural Gas (MJ/yr.)	1,346	876		805	548				800	
	Oil (L/yr.)	-	-		-	-				-	
	Water (L/yr.)	-	-		-	-				-	
Cost Parameters	Upgrade, Material ($)	$1,125.00	$1,275.00		$975.00	$1,050.00				$1,188.83	Based on a retail scan (Home Depot), the cost of this type of insulation is ~$1.50/ft^2 ($16/m^2) (2010). Average basement areas based on ecoENERGY database data for BC and HOT2000 modelling.
	Upgrade, Installation ($)	$0.00	$0.00		$0.00	$0.00				$0.00	Assuming that additional labour costs are minimal since the basement is being finished
	Baseline, Material ($)	$0.00	$0.00		$0.00	$0.00				$0.00	
	Baseline, Installation ($)	$0.00	$0.00		$0.00	$0.00				$0.00	
	Total Measure Cost ($)	$1,125.00	$1,275.00		$975.00	$1,050.00				$1,188.83	
	Basis (Full/Incremental)	Incr.	Incr.		Incr.	Incr.				Incr.	Forced to incremental because it would be done as part of basement reno.
Incremental O&M ($/yr.)		$0	$0		$0	$0				$0	
Lifetimes	Upgrade (yrs.)	30	30		30	30				30	Approximate lifetime, based on previous Marbek energy efficiency potential studies
	Baseline (yrs.)	30	30		30	30				30	
Cost Savings ($/yr.)		$14	$9		$8	$6				$8	
Simple Payback (yrs.)		82.2	137.9		118.6	184.1				148.99	
NPV of O&M Costs ($)		$0	$0		$0	$0				$0	
Total Benefits ($)	Electric Energy	$10	$13		$7	$7				$11	
	Electric Demand	$0	$0		$0	$0				$0	
	Natural Gas	$187	$122		$112	$76				$111	
	Oil	$0	$0		$0	$0				$0	
	Water	$0	$0		$0	$0				$0	
Measure TRC ($)		-$928	-$1,140		-$856	-$967				-$1,067	
Benefit/Cost Ratio		0.18	0.11		0.12	0.08				0.10	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1		1	1				
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental		Incremental	Incremental				
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	1.0%	1.0%		1.0%	1.0%				1.0%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached homes.
Space Cooling	-	0	0									-	Space cooling savings are negligible, based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC.
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	1.3%	1.0%		1.3%	1.0%				1.0%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached homes.
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	

Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	1.0%	1.0%		1.0%	1.0%				1.0%	
Space Cooling	0	0	-	-		-	-				-	
Clothes Washers	0	0	-	-		-	-				-	
Dishwashers	0	0	-	-		-	-				-	
Other Electric Loads	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	1.3%	1.0%		1.3%	1.0%				1.0%	
Domestic Hot Water (DHW)	0	0	-	-		-	-				-	
Fireplaces	0	0	-	-		-	-				-	
Cooking	0	0	-	-		-	-				-	
Clothes Dryers	0	0	-	-		-	-				-	
Pool and Spa Heaters	0	0	-	-		-	-				-	
Other	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-		-	-				-	
Domestic Hot Water (DHW)	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Basement (Foundation) Insulation

		References/Notes
Description:	In many homes, the basement is often under-insulated or even left uninsulated. Increasing the insulation level in basements can be achieved in a number of ways, including constructing a new insulated frame wall, moving the existing frame wall to increase the insulation level, adding extra insulation to the existing frame wall, adding rigid board insulation to the exterior of the foundation, or using a combination of interior and exterior rigid board insulation. As a lower cost alternative, it is also possible to use polyurethane foam.	
Baseline:	A home with average insulation in the basement (foundation) walls	
Upgrade:	In average homes with basements, improving the foundation wall insulation by RSI-2.12 (R-12)	Assumed that the homeowner is finishing or refinishing the basement and improving the foundation insulation on an incremental basis.

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.648	$1.648		$1.648	$1.648			
Electricity ($/kW)	$0.000	$0.000	$0.000		$0.000	$0.000			
Natural Gas ($/MJ)	$0.010	$0.139	$0.139		$0.139	$0.139			
Oil ($/L)	$0.000	$0.000	$0.000		$0.000	$0.000			
Water ($/1000L)	$0.000	$0.000	$0.000		$0.000	$0.000			

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☐	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☐	Mobile (Existing) ☐	Mobile (New) ☐	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	878	1,078		565	565				893	
	Natural Gas (MJ/yr.)	103,566	87,600		61,906	54,833				77,737	
	Oil (L/yr.)	-	-		-	-				-	
	Water (L/yr.)	-	-		-	-				-	
Upgrade Consumption	Electricity (kWh/yr.)	812	986		533	531				822	
	Natural Gas (MJ/yr.)	91,138	76,212		55,715	49,076				68,164	
	Oil (L/yr.)	-	-		-	-				-	
	Water (L/yr.)	-	-		-	-				-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%		0%	0%				0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%		0%	0%				0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-		-	-				-	
	Electricity, Cooling (kWh/yr.)	-	-		-	-				-	
	Electricity, Total (kWh/yr.)	-	-		-	-				-	
	Natural Gas (MJ/yr.)	-	-		-	-				-	
	Oil (L/yr.)	-	-		-	-				-	
Winter Peak Hours-Use Factor		-	-		-	-				-	
Resource Savings	Electricity (kWh/yr.)	66	92		32	34				71	
	Electricity (kW peak)	-	-		-	-				-	
	Natural Gas (MJ/yr.)	12,428	11,388		6,191	5,758				9,572	
	Oil (L/yr.)	-	-		-	-				-	
	Water (L/yr.)	-	-		-	-				-	
Cost Parameters	Upgrade, Material ($)	$1,400.00	$1,500.00		$900.00	$1,000.00				$1,324.60	~$2.00/ft^2 (material and installation) for addition of R-12 to foundation insulation, based on private communication with Tony Woods, CanAm Building Envelope Specialists (2009), and assuming average foundation wall areas as per HOT2000 models and the ecoENERGY database.
	Upgrade, Installation ($)	$0.00	$0.00		$0.00	$0.00				$0.00	
	Baseline, Material ($)	$0.00	$0.00		$0.00	$0.00				$0.00	
	Baseline, Installation ($)	$0.00	$0.00		$0.00	$0.00				$0.00	
	Total Measure Cost ($)	$1,400.00	$1,500.00		$900.00	$1,000.00				$1,324.60	
	Basis (Full/Incremental)	Incr.	Incr.		Incr.	Incr.				Incr.	Forced to incremental because it would be done as part of basement reno.
Incremental O&M ($/yr.)		$0	$0		$0	$0				$0	
Lifetimes	Upgrade (yrs.)	30	30		30	30				30	Approximate lifetime, based on previous Marbek energy efficiency potential studies
	Baseline (yrs.)	30	30		30	30				30	
Cost Savings ($/yr.)		$127	$119		$63	$59				$100	
Simple Payback (yrs.)		11.0	12.6		14.2	16.9				13.89	
NPV of O&M Costs ($)		$0	$0		$0	$0				$0	
Total Benefits ($)	Electric Energy	$109	$152		$53	$56				$117	
	Electric Demand	$0	$0		$0	$0				$0	
	Natural Gas	$1,729	$1,584		$861	$801				$1,331	
	Oil	$0	$0		$0	$0				$0	
	Water	$0	$0		$0	$0				$0	
Measure TRC ($)		$437	$236		$14	-$143				$123	
Benefit/Cost Ratio		1.31	1.16		1.02	0.86				1.07	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1		1	1				
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental		Incremental	Incremental				
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	11.0%	11.5%		8.0%	8.5%				10.5%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings in attached homes are slightly lower since a smaller percentage of their wall areas is exposed to the outdoors.
Space Cooling	-	1	1									-	Space cooling savings are negligible, based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC.
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	12.0%	13.0%		10.0%	10.5%				12.1%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings in attached homes are slightly lower since a smaller percentage of their wall areas is exposed to the outdoors.
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	

Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	11.0%	11.5%		8.0%	8.5%				10.5%	
Space Cooling	1	1	-	-		-	-				-	
Clothes Washers	0	0	-	-		-	-				-	
Dishwashers	0	0	-	-		-	-				-	
Other Electric Loads	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	12.0%	13.0%		10.0%	10.5%				12.1%	
Domestic Hot Water (DHW)	0	0	-	-		-	-				-	
Fireplaces	0	0	-	-		-	-				-	
Cooking	0	0	-	-		-	-				-	
Clothes Dryers	0	0	-	-		-	-				-	
Pool and Spa Heaters	0	0	-	-		-	-				-	
Other	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-		-	-				-	
Domestic Hot Water (DHW)	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Crawl Space Insulation

		References/Notes
Description:	Insulation levels remain below code in many homes that include crawlspaces as part of the basement design. If the floor is exposed, it would first be necessary to install a vapour barrier (e.g., 6 mil (600 gauge/0.15 mm) polyurethane barrier). Polyurethane foam could then be applied to the ceiling of the crawlspace (or the outer walls if there are pipes running below the floor). In addition to increasing the insulation of the crawlspace, this would help to eliminate any air leaks. Co-benefits of improved crawlspace insulation include improved thermal comfort, fewer drafts, and less condensation.	
Baseline:	Minimal crawlspace insulation in homes with crawlspaces	
Upgrade:	In homes with crawlspaces, the addition of crawlspace insulation to bring the thermal resistance values up to RSI-2.1 (R-12)	

Baseline Reference:	1. Annual consumption, end use
Heating Fuel Type:	All Fuels (Average Fuel Mix)
Main End Use:	Space Heating
Discount Rate:	7.38%
GHG Adder Incl.?	No
Resource Costs:	Baseload

= User Input
= Calculation

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.648	$1.648		$1.648	$1.648			
Electricity ($/kW)	$0.000	$0.000	$0.000		$0.000	$0.000			
Natural Gas ($/MJ)	$0.010	$0.139	$0.139		$0.139	$0.139			
Oil ($/L)	$0.000	$0.000	$0.000		$0.000	$0.000			
Water ($/1000L)	$0.000	$0.000	$0.000		$0.000	$0.000			

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☐	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☐	Mobile (Existing) ☐	Mobile (New) ☐	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	600	800		400	400				653	
	Natural Gas (MJ/yr.)	103,566	87,600		61,906	54,833				77,737	
	Oil (L/yr.)	-	-		-	-				-	
	Water (L/yr.)	-	-		-	-				-	
Upgrade Consumption	Electricity (kWh/yr.)	588	784		392	392				640	
	Natural Gas (MJ/yr.)	100,977	85,410		60,358	53,463				75,793	
	Oil (L/yr.)	-	-		-	-				-	
	Water (L/yr.)	-	-		-	-				-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%		0%	0%				0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%		0%	0%				0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-		-	-				-	
	Electricity, Cooling (kWh/yr.)	-	-		-	-				-	
	Electricity, Total (kWh/yr.)	-	-		-	-				-	
	Natural Gas (MJ/yr.)	-	-		-	-				-	
	Oil (L/yr.)	-	-		-	-				-	
Winter Peak Hours-Use Factor		-	-		-	-				-	
Resource Savings	Electricity (kWh/yr.)	12	16		8	8				13	
	Electricity (kW peak)	-	-		-	-				-	
	Natural Gas (MJ/yr.)	2,589	2,190		1,548	1,371				1,943	
	Oil (L/yr.)	-	-		-	-				-	
	Water (L/yr.)	-	-		-	-				-	
Cost Parameters	Upgrade, Material ($)	$800.00	$800.00		$800.00	$800.00				$800.00	Approx. material and installation costs, based on cost estimates from recent studies (i.e. 40 ft of walls x 4 ft high assumed) (2009)
	Upgrade, Installation ($)	$0.00	$0.00		$0.00	$0.00				$0.00	Installation costs included above
	Baseline, Material ($)	$0.00	$0.00		$0.00	$0.00				$0.00	
	Baseline, Installation ($)	$0.00	$0.00		$0.00	$0.00				$0.00	
	Total Measure Cost ($)	$800.00	$800.00		$800.00	$800.00				$800.00	
	Basis (Full/Incremental)	Full	Full		Full	Full				Full	
Incremental O&M ($/yr.)		$0	$0		$0	$0				$0	
Lifetimes	Upgrade (yrs.)	30	30		30	30				30	
	Baseline (yrs.)	-	-		-	-				-	
Cost Savings ($/yr.)		$26	$23		$16	$14				$20	
Simple Payback (yrs.)		30.3	35.1		50.5	56.8				41.99	
NPV of O&M Costs ($)		$0	$0		$0	$0				$0	
Total Benefits ($)	Electric Energy	$20	$26		$13	$13				$22	
	Electric Demand	$0	$0		$0	$0				$0	
	Natural Gas	$360	$305		$215	$191				$270	
	Oil	$0	$0		$0	$0				$0	
	Water	$0	$0		$0	$0				$0	
Measure TRC ($)		-$420	-$469		-$572	-$596				-$508	
Benefit/Cost Ratio		0.47	0.41		0.29	0.25				0.36	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1		1	1				
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental		Incremental	Incremental				
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	2.0%	2.0%		2.0%	2.0%				2.0%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached homes.
Space Cooling	-	0	0									-	Space cooling savings are negligible, based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC.
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	2.5%	2.5%		2.5%	2.5%				2.5%	Based on HOT2000 modeling results of average single detached homes with crawl spaces (different vintages) in BC. Assuming savings are similar in attached homes.
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heater	-	0	0									-	
Pool and Spa Heater	Pool Heaters	0	0									-	
Pool and Spa Heater	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	

Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	2.0%	2.0%		2.0%	2.0%				2.0%	
Space Cooling	0	0	-	-		-	-				-	
Clothes Washers	0	0	-	-		-	-				-	
Dishwashers	0	0	-	-		-	-				-	
Other Electric Loads	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	2.5%	2.5%		2.5%	2.5%				2.5%	
Domestic Hot Water (DHW)	0	0	-	-		-	-				-	
Fireplaces	0	0	-	-		-	-				-	
Cooking	0	0	-	-		-	-				-	
Clothes Dryers	0	0	-	-		-	-				-	
Pool and Spa Heaters	0	0	-	-		-	-				-	
Other	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-		-	-				-	
Domestic Hot Water (DHW)	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-		-	-				-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

Professional Air Sealing/Weather Stripping/Caulking

		References/Notes
Description:	Air leakage sealing of building envelopes includes completion of a blower door test to quantify leakage levels and to identify the location of air leaks. Generally, major leakage occurs at window-to-wall interfaces, around doors (especially patio doors), through electrical and plumbing penetrations and at the top of foundation walls. Installation of sealant and gaskets are generally accepted methods for reducing air leakage in buildings. Other sources of air leaks include pot lights, wall-to-floor interfaces (i.e., top and bottom of baseboards) and bathroom and kitchen exhaust piping.	
Baseline:	No action taken	
Upgrade:	A comprehensive air sealing job, which results in an air tightness (ACH @ 50 Pa) improvement of 30%	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.553	$1.553		$1.553	$1.553		$1.553	
Electricity ($/kW)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	
Natural Gas ($/MJ)	$0.010	$0.127	$0.127		$0.127	$0.127		$0.127	
]	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	
Water ($/1000L)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☐	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☐	Mobile (Existing) ☑	Mobile (New) ☐	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	878	1,078		565	565		417		888	
	Natural Gas (MJ/yr.)	103,566	87,600		61,906	54,833		68,576		77,650	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Upgrade Consumption	Electricity (kWh/yr.)	822	1,011		528	532		396		833	
	Natural Gas (MJ/yr.)	92,692	79,716		55,405	49,898		62,061		70,547	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%		0%	0%		0%		0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%		0%	0%		0%		0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-		-	-		-		-	
	Electricity, Cooling (kWh/yr.)	-	-		-	-		-		-	
	Electricity, Total (kWh/yr.)	-	-		-	-		-		-	
	Natural Gas (MJ/yr.)	-	-		-	-		-		-	
	Oil (L/yr.)	-	-		-	-		-		-	
Winter Peak Hours-Use Factor		-	-		-	-		-		-	
Resource Savings	Electricity (kWh/yr.)	55	67		37	34		21		55	
	Electricity (kW peak)	-	-		-	-		-		-	
	Natural Gas (MJ/yr.)	10,874	7,884		6,500	4,935		6,515		7,103	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Cost Parameters	Upgrade, Material ($)	$1,800.00	$1,800.00		$1,800.00	$1,800.00		$1,800.00		$1,800.00	Approx. mateial and installation costs, based on personal communication with Tony Woods, CanAm Building Envelope Specialists (material & installation) (2009). Assuming similar cost for all housing types.
	Upgrade, Installation ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	Installation costs included above
	Baseline, Material ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	
	Baseline, Installation ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	
	Total Measure Cost ($)	$1,800.00	$1,800.00		$1,800.00	$1,800.00		$1,800.00		$1,800.00	
	Basis (Full/Incremental)	Full	Full		Full	Full		Full		Full	
Incremental O&M ($/yr.)		$20	$20		$20	$20		$20		$20	Approximate annual cost to maintain weatherstripping, caulking, etc.
Lifetimes	Upgrade (yrs.)	25	25		25	25		25		25	Approximate lifetime, based on previous Marbek energy efficiency potential studies
	Baseline (yrs.)	-	-		-	-		-		-	
Cost Savings ($/yr.)		$91	$63		$47	$31		$46		$54	
Simple Payback (yrs.)		19.7	28.7		38.5	57.8		39.5		37.66	
NPV of O&M Costs ($)		$225	$225		$225	$225		$225		$225	
Total Benefits ($)	Electric Energy	$86	$104		$57	$52		$33		$85	
	Electric Demand	$0	$0		$0	$0		$0		$0	
	Natural Gas	$1,381	$1,001		$826	$627		$827		$902	
	Oil	$0	$0		$0	$0		$0		$0	
	Water	$0	$0		$0	$0		$0		$0	
Measure TRC ($)		-$558	-$920		-$1,142	-$1,346		-$1,165		-$1,038	
Benefit/Cost Ratio		0.72	0.55		0.44	0.34		0.42		0.49	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1		1	1		1		
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental		Incremental	Incremental		Incremental		
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	9.0%	8.0%		9.0%	8.0%		8.5%		8.1%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached homes.
Space Cooling	-	1	1	0.5%	1.0%		0.5%	1.0%		0.5%		1.0%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached homes.
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	10.5%	9.0%		10.5%	9.0%		9.5%		9.1%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached homes.
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	

Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	9.0%	8.0%		9.0%	8.0%		8.5%		8.1%	
Space Cooling	1	1	0.5%	1.0%		0.5%	1.0%		0.5%		1.0%	
Clothes Washers	0	0	-	-		-	-		-		-	
Dishwashers	0	0	-	-		-	-		-		-	
Other Electric Loads	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	10.5%	9.0%		10.5%	9.0%		9.5%		9.1%	
Domestic Hot Water (DHW)	0	0	-	-		-	-		-		-	
Fireplaces	0	0	-	-		-	-		-		-	
Cooking	0	0	-	-		-	-		-		-	
Clothes Dryers	0	0	-	-		-	-		-		-	
Pool and Spa Heaters	0	0	-	-		-	-		-		-	
Other	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-		-	-		-		-	
Domestic Hot Water (DHW)	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

Homeowner Air Sealing/Weather Stripping/Caulking

		References/Notes
Description:	Homeowner air leakage sealing does not include a blower door test to quantify leakage levels and to identify the location of air leaks. Homeowners are likely to identify leakage primarily in more visible areas of the envelope, for example, the major leakage at window-to-wall interfaces, around doors (especially patio doors), through electrical and plumbing penetrations and perhaps at the top of foundation walls. Installation of weather stripping, sealant and gaskets are the most likely methods to be used. Less visible sources of air leaks such as pot lights, wall-to-floor interfaces (i.e., top and bottom of baseboards), bathroom and kitchen exhaust piping, and leaks from the top of walls into the attic are less likely to be addressed by the homeowner.	
Baseline:	No action taken	
Upgrade:	A homeowner air sealing job, which results in an air tightness (ACH @ 50 Pa) improvement of 15-20%	

Baseline Reference:	1. Annual consumption, end use
Heating Fuel Type:	All Fuels (Average Fuel Mix)
Main End Use:	Space Heating
Discount Rate:	7.38%
GHG Adder Incl.?	No
Resource Costs:	Baseload

= User Input
= Calculation

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$0.952	$0.952		$0.952	$0.952		$0.952	
Electricity ($/kW)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	
Natural Gas ($/MJ)	$0.010	$0.067	$0.067		$0.067	$0.067		$0.067	
]	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	
Water ($/1000L)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☐	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☐	Mobile (Existing) ☑	Mobile (New) ☐	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	878	1,078		565	565		417		888	
	Natural Gas (MJ/yr.)	103,566	87,600		61,906	54,833		68,576		77,650	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Upgrade Consumption	Electricity (kWh/yr.)	846	1,039		544	546		405		857	
	Natural Gas (MJ/yr.)	97,352	83,095		58,191	52,013		64,853		73,591	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%		0%	0%		0%		0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%		0%	0%		0%		0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-		-	-		-		-	
	Electricity, Cooling (kWh/yr.)	-	-		-	-		-		-	
	Electricity, Total (kWh/yr.)	-	-		-	-		-		-	
	Natural Gas (MJ/yr.)	-	-		-	-		-		-	
	Oil (L/yr.)	-	-		-	-		-		-	
Winter Peak Hours-Use Factor		-	-		-	-		-		-	
Resource Savings	Electricity (kWh/yr.)	32	38		21	19		12		31	
	Electricity (kW peak)	-	-		-	-		-		-	
	Natural Gas (MJ/yr.)	6,214	4,505		3,714	2,820		3,723		4,059	3800 MJ from Innes Hood report for LiveSmartBC 2010 business case, March 2010
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Cost Parameters	Upgrade, Material ($)	$200.00	$200.00		$200.00	$200.00		$200.00		$200.00	Innes Hood report for LiveSmartBC 2010 business case, March 2010
	Upgrade, Installation ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	Installation costs included above
	Baseline, Material ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	
	Baseline, Installation ($)	$0.00	$0.00		$0.00	$0.00		$0.00		$0.00	
	Total Measure Cost ($)	$200.00	$200.00		$200.00	$200.00		$200.00		$200.00	
	Basis (Full/Incremental)	Full	Full		Full	Full		Full		Full	
Incremental O&M ($/yr.)		$20	$20		$20	$20		$20		$20	Approximate annual cost to maintain weatherstripping, caulking, etc.
Lifetimes	Upgrade (yrs.)	10	10		10	10		10		10	Innes Hood report for LiveSmartBC 2010 business case, March 2010
	Baseline (yrs.)	-	-		-	-		-		-	
Cost Savings ($/yr.)		$44	$27		$18	$9		$17		$22	
Simple Payback (yrs.)		4.6	7.3		11.0	21.7		11.4		11.84	
NPV of O&M Costs ($)		$138	$138		$138	$138		$138		$138	
Total Benefits ($)	Electric Energy	$30	$36		$20	$18		$12		$30	
	Electric Demand	$0	$0		$0	$0		$0		$0	
	Natural Gas	$416	$302		$249	$189		$249		$272	
	Oil	$0	$0		$0	$0		$0		$0	
	Water	$0	$0		$0	$0		$0		$0	
Measure TRC ($)		$108	$0		-$69	-$131		-$77		-$37	
Benefit/Cost Ratio		1.32	1.00		0.80	0.61		0.77		0.89	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1		1	1		1		
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental		Incremental	Incremental		Incremental		
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	5.1%	4.6%		5.1%	4.6%		4.9%		4.6%	Based on ratio of heating savings below to heating savings on Air Sealing tab, times electric savings on Air Sealing tab
Space Cooling	-	1	1	0.3%	0.6%		0.3%	0.6%		0.3%		0.5%	Based on ratio of heating savings below to heating savings on Air Sealing tab, times electric savings on Air Sealing tab
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	6.0%	5.1%		6.0%	5.1%		5.4%		5.2%	3800 MJ from Innes Hood report for LiveSmartBC 2010 business case, March 2010
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	

Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	5.1%	4.6%		5.1%	4.6%		4.9%		4.6%	
Space Cooling	1	1	0.3%	0.6%		0.3%	0.6%		0.3%		0.5%	
Clothes Washers	0	0	-	-		-	-		-		-	
Dishwashers	0	0	-	-		-	-		-		-	
Other Electric Loads	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	6.0%	5.1%		6.0%	5.1%		5.4%		5.2%	
Domestic Hot Water (DHW)	0	0	-	-		-	-		-		-	
Fireplaces	0	0	-	-		-	-		-		-	
Cooking	0	0	-	-		-	-		-		-	
Clothes Dryers	0	0	-	-		-	-		-		-	
Pool and Spa Heaters	0	0	-	-		-	-		-		-	
Other	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-		-	-		-		-	
Domestic Hot Water (DHW)	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

Air Leakage Sealing and Insulation (Old Homes)

		References/Notes
Description:	This measure is targeted at homes that are at least 30 years old, since many of these homes haven't had any work done to improve insulation and air-sealing deficiencies and it is generally most cost-effective to upgrade the insulation and the air sealing at the same time. This includes wall, attic, foundation, and crawlspace retrofits of older homes but, for the purposes of this analysis, it is assumed that a retrofit is being conducted on the attic. The air-sealing portion of the work could be accomplished by segmenting the attic. In each segment, the existing insulation could be moved to one side and polyurethane foam could be sprayed in (serves as an air sealant in addition to its insulating properties). It may also be necessary to install or refurbish top plates to prevent airflow into the attic through exterior wall cavities. Other considerations that would increase the cost of the air-sealing portion of the work and may be present in some homes include sealing pot lights and kitchen or bathroom exhaust piping. When completed, these measures would dramatically improve the air tightness of an older home. The attic insulation could subsequently be cost-effectively improved with cellulose insulation.	
Baseline:	An older home with average air tightness and attic insulation (for that particular vintage)	
Upgrade:	Improve both the attic insulation and the air tightness (ACH@50 Pa) in an old home. It is assumed that the air tightness is improved by 30% and that RSI-3.52 (R-20) of attic insulation is added.	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.553			$1.553				
Electricity ($/kW)	$0.000	$0.000			$0.000				
Natural Gas ($/MJ)	$0.010	$0.127			$0.127				
Oil ($/L)	$0.000	$0.000			$0.000				
Water ($/1000L)	$0.000	$0.000			$0.000				

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☐	Detached (New) ☐	Attached (Pre-1976) ☑	Attached (Post-1976) ☐	Attached (New) ☐	Mobile (Existing) ☐	Mobile (New) ☐	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	878			565					834	
	Natural Gas (MJ/yr.)	103,566			61,906					97,701	
	Oil (L/yr.)	-			-					-	
	Water (L/yr.)	-			-					-	
Upgrade Consumption	Electricity (kWh/yr.)	781			501					741	
	Natural Gas (MJ/yr.)	86,478			51,691					81,580	
	Oil (L/yr.)	-			-					-	
	Water (L/yr.)	-			-					-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%			0%					0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%			0%					0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-			-					-	
	Electricity, Cooling (kWh/yr.)	-			-					-	
	Electricity, Total (kWh/yr.)	-			-					-	
	Natural Gas (MJ/yr.)	-			-					-	
	Oil (L/yr.)	-			-					-	
Winter Peak Hours-Use Factor		-			-					-	
Resource Savings	Electricity (kWh/yr.)	97			64					92	
	Electricity (kW peak)	-			-					-	
	Natural Gas (MJ/yr.)	17,088			10,214					16,121	
	Oil (L/yr.)	-			-					-	
	Water (L/yr.)	-			-					-	
Cost Parameters	Upgrade, Material ($)	$3,000.00			$2,500.00					$2,929.61	Cost is variable depending on the approach that is used. Estimate is based on recent communication with air sealing and insulation contractors (2010).
	Upgrade, Installation ($)	$0.00			$0.00					$0.00	
	Baseline, Material ($)	$0.00			$0.00					$0.00	
	Baseline, Installation ($)	$0.00			$0.00					$0.00	
	Total Measure Cost ($)	$3,000.00			$2,500.00					$2,929.61	
	Basis (Full/Incremental)	Full			Full					Full	
Incremental O&M ($/yr.)		$20			$20					$20	Approximate annual cost to maintain weather-stripping, caulking, etc.
Lifetimes	Upgrade (yrs.)	25			25					25	Approximate lifetime, based on previous Marbek energy efficiency potential studies
	Baseline (yrs.)	-			-					-	
Cost Savings ($/yr.)		$155			$85					$146	
Simple Payback (yrs.)		19.3			29.3					20.70	
NPV of O&M Costs ($)		$225			$225					$225	
Total Benefits ($)	Electric Energy	$151			$100					$143	
	Electric Demand	$0			$0					$0	
	Natural Gas	$2,171			$1,297					$2,048	
	Oil	$0			$0					$0	
	Water	$0			$0					$0	
Measure TRC ($)		-$904			-$1,328					-$964	
Benefit/Cost Ratio		0.72			0.51					0.69	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1			1					
Cost Flag (i.e. way measure is typically applied)	Incremental			Incremental					
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	15.0%			15.0%					15.0%	Based on HOT2000 modeling results of average pre-1976 single detached homes. Assuming savings are similar in attached homes.
Space Cooling	-	1	1	2.5%			2.5%					2.5%	Based on HOT2000 modeling results of average pre-1976 single detached homes. Assuming savings are similar in attached homes.
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	16.5%			16.5%					16.5%	Based on HOT2000 modeling results of average pre-1976 single detached homes. Assuming savings are similar in attached homes.
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment	Applies? (1=Yes; 0=No)	Measure Resource Savings (%)	References/Notes

Main End Use	Use/Equipment (If Applicable)	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	15.0%			15.0%					15.0%	
Space Cooling	1	1	2.5%			2.5%					2.5%	
Clothes Washers	0	0	-			-					-	
Dishwashers	0	0	-			-					-	
Other Electric Loads	0	0	-			-					-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	16.5%			16.5%					16.5%	
Domestic Hot Water (DHW)	0	0	-			-					-	
Fireplaces	0	0	-			-					-	
Cooking	0	0	-			-					-	
Clothes Dryers	0	0	-			-					-	
Pool and Spa Heaters	0	0	-			-					-	
Other	0	0	-			-					-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-			-					-	
Domestic Hot Water (DHW)	0	0	-			-					-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-			-					-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Zoned-Up Windows: (ENERGY STAR®) Rating for a Colder Zone

		References/Notes
Description:	High-performance windows incorporate a number of additional energy-saving features, including low-E (soft coating), insulating spacers, argon fill and low conductivity frames (which can be sliders, hinged or picture). These windows are certified based on their energy rating (ER), which is based on their tested energy performance, rather than on their specific combination of features. In this case, however, the Energy Star windows for a colder zone are specified instead of the Energy Star windows for the zone where the house is located - for example, Zone C Energy Star windows would be chosen for a house in Zone A. High-performance windows also provide occupant co-benefits, such as reduced interior noise, reduced air leakage, greater thermal comfort, and fewer condensation problems.	
Baseline:	ENERGY STAR windows for Zone B (double glazed, argon fill, low-e coating, insulating spacer, vinyl frame, hinged)	Assuming U-value of at least 1.8 W/m2 K (RSI of 0.56)
Upgrade:	In existing homes, replacing 50% of windows with ENERGY STAR windows from Zone D (double-glazed, argon fill, low-e coating, insulating spacer, vinyl frame, hinged). In hew homes, replacing 100% of windows.	Assuming windows with an approximate U-value of 1.4 W/m2 K (RSI of ~0.71), based on ENERGY STAR requirements for windows.

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.553	$1.553	$1.553	$1.553	$1.553	$1.553	$1.553	$1.553
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.127	$0.127	$0.127	$0.127	$0.127	$0.127	$0.127	$0.127
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	878	1,078	1,035	565	565	543	417	401	808	
	Natural Gas (MJ/yr.)	103,566	87,600	87,600	61,906	54,833	54,833	68,576	68,576	72,531	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	860	1,047	986	554	550	518	408	384	779	
	Natural Gas (MJ/yr.)	101,081	84,622	82,695	60,420	52,969	51,763	66,519	64,736	69,362	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	18	31	49	12	16	25	9	17	29	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	2,486	2,978	4,906	1,486	1,864	3,071	2,057	3,840	3,169	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$8,000.00	$9,600.00	$20,800.00	$6,400.00	$7,680.00	$16,640.00	$5,760.00	$12,800.00	$13,495.69	BCH program cost estimates are $1000 to $2000 per house, depending on number of windows done and number of Zones up. To match these numbers, we used $64/ft^2.
	Upgrade, Installation ($)	$1,875.00	$2,250.00	$4,875.00	$1,500.00	$1,800.00	$3,900.00	$1,350.00	$3,000.00	$3,163.05	Based on personal communication with SAWDAC (Siding and Window Dealers Association of Canada) in 2010, the installation cost of ENERGY STAR windows is about $15/ft^2
	Baseline, Material ($)	$7,000.00	$8,400.00	$18,200.00	$5,600.00	$6,720.00	$14,560.00	$5,040.00	$11,200.00	$11,808.73	Based on personal communication with SAWDAC (Siding and Window Dealers Association of Canada) in 2010, the material cost of ENERGY STAR windows is about $56/ft^2
	Baseline, Installation ($)	$1,875.00	$2,250.00	$4,875.00	$1,500.00	$1,800.00	$3,900.00	$1,350.00	$3,000.00	$3,163.05	Based on personal communication with SAWDAC (Siding and Window Dealers Association of Canada) in 2010, the installation cost of ENERGY STAR windows is about $15/ft^2
	Total Measure Cost ($)	$1,000.00	$1,200.00	$2,600.00	$800.00	$960.00	$2,080.00	$720.00	$1,600.00	$1,686.96	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	25	25	25	25	25	25	25	25	25	Approximate lifetime, based on previous Marbek energy efficiency potential studies and consistent with the market rate of window replacement
	Baseline (yrs.)	25	25	25	25	25	25	25	25	25	Approximate lifetime, based on previous Marbek energy efficiency potential studies
Cost Savings ($/yr.)		$26	$32	$52	$16	$20	$32	$21	$39	$33	
Simple Payback (yrs.)		38.7	37.8	49.9	51.5	49.1	64.7	34.4	41.0	50.23	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$28	$47	$76	$18	$24	$39	$15	$26	$45	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$316	$378	$623	$189	$237	$390	$261	$488	$403	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$657	-$774	-$1,901	-$593	-$699	-$1,651	-$444	-$1,086	-$1,239	
Benefit/Cost Ratio		0.34	0.35	0.27	0.26	0.27	0.21	0.38	0.32	0.28	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	2.4%	3.4%	5.6%	2.4%	3.4%	5.6%	3.0%	5.6%	4.5%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes. Further assuming that savings would scale with new homes (i.e. 100% of windows being replaced versus 50%). Then scaled down the savings: original figures were based on U-value improvement from 4.2 to 2.0, or 52% lower. This improvement from 2 to 1.6 is 20% lower. Therefore, savings percentage 40% of the original percentage is used.
Space Cooling	-	1	1	1.2%	1.2%	2.2%	1.2%	1.2%	2.2%	1.2%	2.2%	1.7%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes. Further assuming that savings would scale with new homes (i.e. 100% of windows being replaced versus 50%). Then scaled down the savings: original figures were based on U-value improvement from 4.2 to 2.0, or 52% lower. This improvement from 2 to 1.6 is 20% lower. Therefore, savings percentage 40% of the original percentage is used.
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	2.4%	3.4%	5.6%	2.4%	3.4%	5.6%	3.0%	5.6%	4.5%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes. Further assuming that savings would scale with new homes (i.e. 100% of windows being replaced versus 50%). Then scaled down the savings: original figures were based on U-value improvement from 4.2 to 2.0, or 52% lower. This improvement from 2 to 1.6 is 20% lower. Therefore, savings percentage 40% of the original percentage is used.
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	

Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	2.4%	3.4%	5.6%	2.4%	3.4%	5.6%	3.0%	5.6%	4.5%	
Space Cooling	1	1	1.2%	1.2%	2.2%	1.2%	1.2%	2.2%	1.2%	2.2%	1.7%	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	2.4%	3.4%	5.6%	2.4%	3.4%	5.6%	3.0%	5.6%	4.5%	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Super High-Performance Windows

		References/Notes
Description:	In addition to low-E coating, argon fill and insulating spacers, super-high performance windows incorporate features such as triple glazing, transparent insulating films, and fibreglass frames.	
Baseline:	Standard windows (double glazed, air fill, no coating, metal spacer, vinyl frame, slider with sash)	
Upgrade:	In existing homes, replacing 50% of windows with super high-performance windows (triple-glazed, krypton fill, low-e and insulating coatings, insulating spacer, fiberglass frame, hinged). In new homes, replacing all of the windows with super high-performance windows.	

Baseline Reference:	1. Annual consumption, end use
Heating Fuel Type:	All Fuels (Average Fuel Mix)
Main End Use:	Space Heating
Discount Rate:	7.38%
GHG Adder Incl.?	No
Resource Costs:	Baseload

= User Input
= Calculation

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.553	$1.553	$1.553	$1.553	$1.553	$1.553	$1.553	$1.553
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.127	$0.127	$0.127	$0.127	$0.127	$0.127	$0.127	$0.127
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	878	1,078	1,035	565	565	543	417	401	808	
	Natural Gas (MJ/yr.)	103,566	87,600	87,600	61,906	54,833	54,833	68,576	68,576	72,531	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	806	950	849	519	499	446	378	330	691	
	Natural Gas (MJ/yr.)	94,763	76,650	71,394	56,644	47,979	44,689	61,718	55,890	61,599	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	72	128	186	46	67	97	39	71	117	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	8,803	10,950	16,206	5,262	6,854	10,144	6,858	12,687	10,932	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$8,250.00	$9,900.00	$21,450.00	$6,600.00	$7,920.00	$17,160.00	$5,940.00	$13,200.00	$13,917.43	Based on personal communication with SAWDAC (Siding and Window Dealers Association of Canada) in 2010, the material cost of super high-performance windows is about $66/ft^2
	Upgrade, Installation ($)	$1,875.00	$2,250.00	$4,875.00	$1,500.00	$1,800.00	$3,900.00	$1,350.00	$3,000.00	$3,163.05	Based on personal communication with SAWDAC (Siding and Window Dealers Association of Canada) in 2010, the installation cost of super high-performance windows is about $15/ft^2
	Baseline, Material ($)	$6,875.00	$8,250.00	$17,875.00	$5,500.00	$6,600.00	$14,300.00	$4,950.00	$11,000.00	$11,597.86	Based on personal communication with SAWDAC (Siding and Window Dealers Association of Canada) in 2010, the material cost of std performance windows is about $55/ft^2
	Baseline, Installation ($)	$1,750.00	$2,100.00	$4,550.00	$1,400.00	$1,680.00	$3,640.00	$1,260.00	$2,800.00	$2,952.18	Based on personal communication with SAWDAC (Siding and Window Dealers Association of Canada) in 2010, the installation cost of std performance windows is about $14/ft^2
	Total Measure Cost ($)	$1,500.00	$1,800.00	$3,900.00	$1,200.00	$1,440.00	$3,120.00	$1,080.00	$2,400.00	$2,530.44	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	25	25	25	25	25	25	25	25	25	Approximate lifetime, based on previous Marbek energy efficiency potential studies
	Baseline (yrs.)	25	25	25	25	25	25	25	25	25	Approximate lifetime, based on previous Marbek energy efficiency potential studies
Cost Savings ($/yr.)		$92	$118	$174	$55	$73	$107	$70	$130	$117	
Simple Payback (yrs.)		16.3	15.3	22.4	21.7	19.8	29.0	15.3	18.4	21.64	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$112	$198	$289	$72	$103	$151	$61	$110	$181	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$1,118	$1,391	$2,058	$668	$871	$1,288	$871	$1,611	$1,389	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$270	-$211	-$1,552	-$460	-$466	-$1,680	-$148	-$679	-$961	
Benefit/Cost Ratio		0.82	0.88	0.60	0.62	0.68	0.46	0.86	0.72	0.66	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	8.5%	12.5%	18.5%	8.5%	12.5%	18.5%	10.0%	18.5%	15.3%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes. Further assuming that savings would scale with new homes (i.e. 100% of windows being replaced versus 50%)
Space Cooling	-	1	1	7.5%	10.0%	16.5%	7.5%	10.0%	16.5%	8.5%	16.5%	13.1%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes. Further assuming that savings would scale with new homes (i.e. 100% of windows being replaced versus 50%)
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	8.5%	12.5%	18.5%	8.5%	12.5%	18.5%	10.0%	18.5%	15.3%	Based on HOT2000 modeling results of average single detached homes (different housing types and vintages) in BC. Assuming savings are similar in attached and mobile homes. Further assuming that savings would scale with new homes (i.e. 100% of windows being replaced versus 50%)
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	8.5%	12.5%	18.5%	8.5%	12.5%	18.5%	10.0%	18.5%	15.3%	
Space Cooling	1	1	7.5%	10.0%	16.5%	7.5%	10.0%	16.5%	8.5%	16.5%	13.1%	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	8.5%	12.5%	18.5%	8.5%	12.5%	18.5%	10.0%	18.5%	15.3%	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

High-Performance Homes (EGH 80/R2000/ENERGY STAR®)

Not used--EGH 80 is now the minimum

		References/Notes
Description:	There are several certification schemes for energy-efficient new homes that incorporate integrated design and multiple envelope measures. An EnerGuide for Houses (EGH) rating is a standard measure of a home's energy performance, calculated by a professional EGH advisor. The rating is based on information on the construction of the home and the results of a blower door test performed once the house has been built. The R2000 standard is one method of achieving an EGH 80 rating. However, R2000 homes are required to achieve an air tightness level of 1.5 ACH@50Pa, install a heat recovery ventilator (HRV), and meet other environmental requirements. This substantially increases the cost of the measure. The ENERGY STAR® for New Homes program has similar requirements and also requires that homes be rated EGH 80. Since these three high performance home standards all result in essentially the same energy performance, the costs assumed for the measure are those of the least expensive of the three. EGH 80 is the lowest cost, since it allows the builder the most flexibitility for achieving the energy performance.	
Baseline:	An average new home (EGH rating of 76 assumed)	
Upgrade:	A high-performance new home (EGH rating of 80 assumed). This option no longer applies as EGH of 80 is now the minimum.	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083			$1.648			$1.648		$1.648
Electricity ($/kW)	$0.000			$0.000			$0.000		$0.000
Natural Gas ($/MJ)	$0.010			$0.139			$0.139		$0.139
Oil ($/L)	$0.000			$0.000			$0.000		$0.000
Water ($/1000L)	$0.000			$0.000			$0.000		$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New) ☑	Attached (Pre-1976)	Attached (Post-1976)	Attached (New) ☑	Mobile (Existing)	Mobile (New) ☑	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)			-			-		-	-	
	Natural Gas (MJ/yr.)			-			-		-	-	
	Oil (L/yr.)			-			-		-	-	
	Water (L/yr.)			-			-		-	-	
Upgrade Consumption	Electricity (kWh/yr.)			-			-		-	-	
	Natural Gas (MJ/yr.)			-			-		-	-	
	Oil (L/yr.)			-			-		-	-	
	Water (L/yr.)			-			-		-	-	
Interactive Effects (Inputs)	Heating Penalty ☐			0%			0%		0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐			0%			0%		0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)			-			-		-	-	
	Electricity, Cooling (kWh/yr.)			-			-		-	-	
	Electricity, Total (kWh/yr.)			-			-		-	-	
	Natural Gas (MJ/yr.)			-			-		-	-	
	Oil (L/yr.)			-			-		-	-	
Winter Peak Hours-Use Factor				-			-		-	-	
Resource Savings	Electricity (kWh/yr.)			-			-		-	-	
	Electricity (kW peak)			-			-		-	-	
	Natural Gas (MJ/yr.)			-			-		-	-	
	Oil (L/yr.)			-			-		-	-	
	Water (L/yr.)			-			-		-	-	
Cost Parameters	Upgrade, Material ($)			$6,000.00			$4,800.00		$0.00	$5,210.31	Based on cost estimates for Saskatchewan homes from Rob Dumont (Dumont and Associates) and Dave Fetsch (Sun Ridge Group). Assuming cost scales to 80% for attached homes. Need value for mobile homes.
	Upgrade, Installation ($)			$0.00			$0.00		$0.00	$0.00	
	Baseline, Material ($)			$0.00			$0.00		$0.00	$0.00	
	Baseline, Installation ($)			$0.00			$0.00		$0.00	$0.00	
	Total Measure Cost ($)			$6,000.00			$4,800.00		$0.00	$5,210.31	
	Basis (Full/Incremental)			Full			Full		Full	Full	
Incremental O&M ($/yr.)				$0			$0		$0	$0	
Lifetimes	Upgrade (yrs.)			30			30		30	30	Approximate lifetime, based on previous Marbek energy efficiency potential studies
	Baseline (yrs.)			30			30		30	30	
Cost Savings ($/yr.)				$0			$0		$0	$0	
Simple Payback (yrs.)				N/A			N/A		N/A	0.00	
NPV of O&M Costs ($)				$0			$0		$0	$0	
Total Benefits ($)	Electric Energy			$0			$0		$0	$0	
	Electric Demand			$0			$0		$0	$0	
	Natural Gas			$0			$0		$0	$0	
	Oil			$0			$0		$0	$0	
	Water			$0			$0		$0	$0	
Measure TRC ($)				-$6,000			-$4,800		$0	-$5,210	
Benefit/Cost Ratio				0.00			0.00		0.00	0.00	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed			1			1		1	
Cost Flag (i.e. way measure is typically applied)			Incremental			Incremental		Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No) Baseline	Upgrade	Measure Resource Savings (%) Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	Standard EGH rating assumes no space cooling
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No) Baseline	Upgrade	Measure Resource Savings (%) Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No) Baseline	Upgrade	Measure Resource Savings (%) Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	

Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	**Sub End Use/Equipment (If Applicable)**	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
		Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Ventilation and Circulation	0	0			-			-		-	-	
Space Cooling	0	0			-			-		-	-	
Clothes Washers	0	0			-			-		-	-	
Dishwashers	0	0			-			-		-	-	
Other Electric Loads	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Space Heating	0	0			-			-		-	-	
Domestic Hot Water (DHW)	0	0			-			-		-	-	
Fireplaces	0	0			-			-		-	-	
Cooking	0	0			-			-		-	-	
Clothes Dryers	0	0			-			-		-	-	
Pool and Spa Heaters	0	0			-			-		-	-	
Other	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Space Heating	0	0			-			-		-	-	
Domestic Hot Water (DHW)	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Water	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Net-Zero Ready Energy Homes

		References/Notes
Description:	Net-zero energy homes (NZEH) produce at least as much energy as they consume. This is accomplished by incorporating on-site power generation, such as solar PV panels or small wind turbines, to offset electrical loads. However, the energy consumption of a NZEH is significantly lower, due to the addition of a wide array of energy efficiency features. Measures that are typically considered include increased insulation, super high-performance windows, ENERGY STAR® appliances, solar thermal space and/or water heating, heat pumps, and passive solar designs. This measure is designed to produce a highly efficient house that is ready to be turned into a NZEH with the addition of on-site renewable energy generation.	
Baseline:	An average new home (Minimum EGH rating of 80 required)	
Upgrade:	A net-zero energy ready home (EGH rating of 86 assumed)	

Baseline Reference:	1. Annual consumption, end use
Heating Fuel Type:	All Fuels (Average Fuel Mix)
Main End Use:	Space Heating
Discount Rate:	7.38%
GHG Adder Incl.?	No
Resource Costs:	Baseload

= User Input
= Calculation

	Customer Cost	Avoided Costs (NPV)						
Electricity ($/kWh)	$0.083			$1.648			$1.648		$1.648
Electricity ($/kW)	$0.000			$0.000			$0.000		$0.000
Natural Gas ($/MJ)	$0.010			$0.139			$0.139		$0.139
Oil ($/L)	$0.000			$0.000			$0.000		$0.000
Water ($/1000L)	$0.000			$0.000			$0.000		$0.000

Sub-sector		Detached (Pre-1976) ☐	Detached (Post-1976) ☐	Detached (New) ☑	Attached (Pre-1976) ☐	Attached (Post-1976) ☐	Attached (New) ☑	Mobile (Existing) ☐	Mobile (New) ☑	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)			768			384		232	529	
	Natural Gas (MJ/yr.)			109,178			73,053		87,361	86,913	
	Oil (L/yr.)			-			-		-	-	
	Water (L/yr.)			-			-		-	-	
Upgrade Consumption	Electricity (kWh/yr.)			538			269		162	370	
	Natural Gas (MJ/yr.)			76,425			51,137		61,153	60,839	
	Oil (L/yr.)			-			-		-	-	
	Water (L/yr.)			-			-		-	-	
Interactive Effects (Inputs)	Heating Penalty ☐			0%			0%		0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐			0%			0%		0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)			-			-		-	-	
	Electricity, Cooling (kWh/yr.)			-			-		-	-	
	Electricity, Total (kWh/yr.)			-			-		-	-	
	Natural Gas (MJ/yr.)			-			-		-	-	
	Oil (L/yr.)			-			-		-	-	
Winter Peak Hours-Use Factor				-			-		-	-	
Resource Savings	Electricity (kWh/yr.)			230			115		70	159	
	Electricity (kW peak)			-			-		-	-	
	Natural Gas (MJ/yr.)			32,753			21,916		26,208	26,074	
	Oil (L/yr.)			-			-		-	-	
	Water (L/yr.)			-			-		-	-	
Cost Parameters	Upgrade, Material ($)			$14,000.00			$9,800.00		$9,800.00	$11,395.58	Working value of $14,000 based on NRCan's R-2000 renewal work (personal communication with Anil Parekh, Nov. 25, 2010). Assumed that cost scales by 75% for detached and mobile homes.
	Upgrade, Installation ($)			$0.00			$0.00		$0.00	$0.00	
	Baseline, Material ($)			$0.00			$0.00		$0.00	$0.00	
	Baseline, Installation ($)			$0.00			$0.00		$0.00	$0.00	
	Total Measure Cost ($)			$14,000.00			$9,800.00		$9,800.00	$11,395.58	
	Basis (Full/Incremental)			Full			Full		Full	Full	
Incremental O&M ($/yr.)				$0			$0		$0	$0	
Lifetimes	Upgrade (yrs.)			30			30		30	30	Maximum lifetime used in study.
	Baseline (yrs.)			30			30		30	30	
Cost Savings ($/yr.)				$340			$224		$263	$269	
Simple Payback (yrs.)				41.2			43.7		37.3	42.67	
NPV of O&M Costs ($)				$0			$0		$0	$0	
Total Benefits ($)	Electric Energy			$380			$190		$115	$261	
	Electric Demand			$0			$0		$0	$0	
	Natural Gas			$4,556			$3,048		$3,645	$3,627	
	Oil			$0			$0		$0	$0	
	Water			$0			$0		$0	$0	
Measure TRC ($)				-$9,065			-$6,562		-$6,040	-$7,508	
Benefit/Cost Ratio				0.35			0.33		0.38	0.34	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed			1			1		1	
Cost Flag (i.e. way measure is typically applied)			Incremental			Incremental		Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1			30.0%			30.0%		30.0%	30.0%	Going from EGH 80 to EGH 86 represents a savings of 30%. It is assumed that all major end uses are affected equally.
Space Cooling	-	0	0									-	Standard EGH rating assumes no space cooling
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1			30.0%			30.0%		30.0%	30.0%	Going from EGH 80 to EGH 86 represents a savings of 30%. It is assumed that all major end uses are affected equally.
Domestic Hot Water (DHW)	-	1	1			30.0%			30.0%		30.0%	30.0%	Going from EGH 80 to EGH 86 represents a savings of 30%. It is assumed that all major end uses are affected equally.
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	

Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1			30.0%			30.0%		30.0%	30.0%	
Space Cooling	0	0			-			-		-	-	
Clothes Washers	0	0			-			-		-	-	
Dishwashers	0	0			-			-		-	-	
Other Electric Loads	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1			30.0%			30.0%		30.0%	30.0%	
Domestic Hot Water (DHW)	1	1			30.0%			30.0%		30.0%	30.0%	
Fireplaces	0	0			-			-		-	-	
Cooking	0	0			-			-		-	-	
Clothes Dryers	0	0			-			-		-	-	
Pool and Spa Heaters	0	0			-			-		-	-	
Other	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0			-			-		-	-	
Domestic Hot Water (DHW)	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

High Efficiency Condensing Gas Furnaces

		References/Notes
Description:	Federal legislation now requires that all residential furnaces meet the minimum performance standard of 90% AFUE . However, higher efficiency condensing furnaces are available. These furnaces include more advanced heat exchanger designs that extract more heat from the flue gases before they are exhausted.	
Baseline:	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 90%	BC minimum
Upgrade:	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 96%	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	103,566	87,600	87,600	61,906	54,833	54,833	68,576	68,576	72,531	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	97,042	82,082	82,082	58,006	51,379	51,379	64,256	64,256	67,961	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	6,525	5,519	5,519	3,900	3,455	3,455	4,320	4,320	4,569	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$4,667.00	$4,667.00	$4,667.00	$4,667.00	$4,667.00	$4,667.00	$4,667.00	$4,667.00	$4,667.00	Cost of a 96% AFUE gas furnace, based on Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-41, April 16, 2009.
	Upgrade, Installation ($)	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	Approximate installation cost
	Baseline, Material ($)	$3,190.00	$3,190.00	$3,190.00	$3,190.00	$3,190.00	$3,190.00	$3,190.00	$3,190.00	$3,190.00	Cost of a 90% AFUE gas furnace, based on Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-41, April 16, 2009.
	Baseline, Installation ($)	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	Approximate installation cost
	Total Measure Cost ($)	$1,477.00	$1,477.00	$1,477.00	$1,477.00	$1,477.00	$1,477.00	$1,477.00	$1,477.00	$1,477.00	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	18	18	18	18	18	18	18	18	18	Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-41, April 16, 2009.
	Baseline (yrs.)	18	18	18	18	18	18	18	18	18	Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-41, April 16, 2009.
Cost Savings ($/yr.)		$64	$54	$54	$38	$34	$34	$42	$42	$45	
Simple Payback (yrs.)		23.1	27.3	27.3	38.6	43.6	43.6	34.9	34.9	34.91	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$682	$577	$577	$408	$361	$361	$452	$452	$478	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$795	-$900	-$900	-$1,069	-$1,116	-$1,116	-$1,025	-$1,025	-$999	
Benefit/Cost Ratio		0.46	0.39	0.39	0.28	0.24	0.24	0.31	0.31	0.32	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	96% AFUE versus 90% AFUE
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	

Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

Early Retirement of Existing Gas Furnaces

		References/Notes
Description:	Federal legislation now requires that all residential furnaces meet the minimum performance standard of 90% AFUE . However, consumers with less efficient furnaces that still work may wait years before replacing them. Early retirement of existing furnaces that are still functional is an option. Energy savings only last until the old furnace would have been replaced, because after that the energy consumption of the base case and upgrade is the same. The consumer has the added peace of mind of having a new furnace that is less likely to break down in winter.	
Baseline:	Keep existing 77% efficient furnace until failure, assumed to be in 9 years; then replace with the same furnace as the upgrade	Calculation of average existing efficiency from the REUS
Upgrade:	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 90%	BC minimum

Baseline Reference:	1. Annual consumption, end use
Heating Fuel Type:	All Fuels (Average Fuel Mix)
Main End Use:	Space Heating
Discount Rate:	7.38%
GHG Adder Incl.?	No
Resource Costs:	Baseload

= User Input
= Calculation

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$0.884	$0.884		$0.884	$0.884		$0.884	
Electricity ($/kW)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	
Natural Gas ($/MJ)	$0.010	$0.061	$0.061		$0.061	$0.061		$0.061	
Oil ($/L)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	
Water ($/1000L)	$0.000	$0.000	$0.000		$0.000	$0.000		$0.000	

Sub-sector		Detached ☑ (Pre-1976)	Detached ☑ (Post-1976)	Detached ☐ (New)	Attached ☑ (Pre-1976)	Attached ☑ (Post-1976)	Attached ☐ (New)	Mobile ☑ (Existing)	Mobile ☐ (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-		-	-		-		-	
	Natural Gas (MJ/yr.)	103,566	87,600		61,906	54,833		68,576		77,650	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-		-	-		-		-	
	Natural Gas (MJ/yr.)	88,607	74,947		52,964	46,913		58,671		66,434	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%		0%	0%		0%		0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%		0%	0%		0%		0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-		-	-		-		-	
	Electricity, Cooling (kWh/yr.)	-	-		-	-		-		-	
	Electricity, Total (kWh/yr.)	-	-		-	-		-		-	
	Natural Gas (MJ/yr.)	-	-		-	-		-		-	
	Oil (L/yr.)	-	-		-	-		-		-	
Winter Peak Hours-Use Factor		-	-		-	-		-		-	
Resource Savings	Electricity (kWh/yr.)	-	-		-	-		-		-	
	Electricity (kW peak)	-	-		-	-		-		-	
	Natural Gas (MJ/yr.)	14,960	12,653		8,942	7,920		9,905		11,216	
	Oil (L/yr.)	-	-		-	-		-		-	
	Water (L/yr.)	-	-		-	-		-		-	
Cost Parameters	Upgrade, Material ($)	$3,190.00	$3,190.00		$3,190.00	$3,190.00		$3,190.00		$3,190.00	Cost of a 90% AFUE gas furnace, based on Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-41, April 16, 2009.
	Upgrade, Installation ($)	$750.00	$750.00		$750.00	$750.00		$750.00		$750.00	Approximate installation cost
	Baseline, Material ($)	$1,680.66	$1,680.66		$1,680.66	$1,680.66		$1,680.66		$1,680.66	Cost of a 90% AFUE gas furnace, based on Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-41, April 16, 2009. Discounted by remaining life.
	Baseline, Installation ($)	$395.14	$395.14		$395.14	$395.14		$395.14		$395.14	Approximate installation cost
	Total Measure Cost ($)	$1,864.20	$1,864.20		$1,864.20	$1,864.20		$1,864.20		$1,864.20	
	Basis (Full/Incremental)	Incr.	Incr.		Incr.	Incr.		Incr.		Incr.	
Incremental O&M ($/yr.)		$0	$0		$0	$0		$0		$0	
Lifetimes	Upgrade (yrs.)	9	9		9	9		9		9	Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-41, April 16, 2009. See calculation at top right. Assumed age of present furnace is subtracted from Navigant's lifetime assumption
	Baseline (yrs.)	9	9		9	9		9		9	Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-41, April 16, 2009. See calculation at top right. Assumed age of present furnace is subtracted from Navigant's lifetime assumption
Cost Savings ($/yr.)		$147	$124		$88	$78		$97		$110	
Simple Payback (yrs.)		12.7	15.0		21.3	24.0		19.2		17.88	
NPV of O&M Costs ($)		$0	$0		$0	$0		$0		$0	
Total Benefits ($)	Electric Energy	$0	$0		$0	$0		$0		$0	
	Electric Demand	$0	$0		$0	$0		$0		$0	
	Natural Gas	$913	$773		$546	$484		$605		$685	
	Oil	$0	$0		$0	$0		$0		$0	
	Water	$0	$0		$0	$0		$0		$0	
Measure TRC ($)		-$951	-$1,092		-$1,318	-$1,381		-$1,259		-$1,179	
Benefit/Cost Ratio		0.49	0.41		0.29	0.26		0.32		0.37	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1		1	1		1		
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental		Incremental	Incremental		Incremental		
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	14.4%	14.4%		14.4%	14.4%		14.4%		14.4%	90% AFUE versus 77% AFUE
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	

Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-		-	-		-		-	
Space Cooling	0	0	-	-		-	-		-		-	
Clothes Washers	0	0	-	-		-	-		-		-	
Dishwashers	0	0	-	-		-	-		-		-	
Other Electric Loads	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	14.4%	14.4%		14.4%	14.4%		14.4%		14.4%	
Domestic Hot Water (DHW)	0	0	-	-		-	-		-		-	
Fireplaces	0	0	-	-		-	-		-		-	
Cooking	0	0	-	-		-	-		-		-	
Clothes Dryers	0	0	-	-		-	-		-		-	
Pool and Spa Heaters	0	0	-	-		-	-		-		-	
Other	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-		-	-		-		-	
Domestic Hot Water (DHW)	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-		-	-		-		-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

Condensing Gas Boilers

		References/Notes
Description:	High-efficiency condensing boilers feature advanced heat exchanger designs that extract more heat from the flue gases before they are exhausted. So much heat is extracted that the flue gases condense and must be discharged as a condensate rather than a gas. In retrofit applications where condensing boilers are replacing non-condensing units, it may be necessary to modify the radiating system. Otherwise, the units may not actually condense the flue gas and realize their full efficiency potential.	
Baseline:	A non-condensing mid-efficiency natural gas boiler (82% AFUE assumed)	Minimum proposed standard for gas boilers, to take effect on Sept. 1, 2010 - Link.
Upgrade:	A condensing natural gas boiler (92% AFUE assumed)	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	103,566	87,600	87,600	61,906	54,833	54,833	68,576	68,576	72,531	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	92,277	78,052	78,052	55,158	48,857	48,857	61,101	61,101	64,625	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	11,289	9,548	9,548	6,748	5,977	5,977	7,475	7,475	7,906	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$8,200.00	$8,200.00	$8,200.00	$8,200.00	$8,200.00	$8,200.00	$8,200.00	$8,200.00	$8,200.00	Needs to be updated
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Installation costs included above
	Baseline, Material ($)	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	Needs to be updated
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Installation costs included above
	Total Measure Cost ($)	$3,200.00	$3,200.00	$3,200.00	$3,200.00	$3,200.00	$3,200.00	$3,200.00	$3,200.00	$3,200.00	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	20	20	20	20	20	20	20	20	20	Needs to be updated
	Baseline (yrs.)	20	20	20	20	20	20	20	20	20	Needs to be updated
Cost Savings ($/yr.)		$111	$94	$94	$66	$59	$59	$73	$73	$77	
Simple Payback (yrs.)		28.9	34.2	34.2	48.4	54.6	54.6	43.7	43.7	43.72	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$1,261	$1,067	$1,067	$754	$668	$668	$835	$835	$883	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$1,939	-$2,133	-$2,133	-$2,446	-$2,532	-$2,532	-$2,365	-$2,365	-$2,317	
Benefit/Cost Ratio		0.39	0.33	0.33	0.24	0.21	0.21	0.26	0.26	0.28	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	10.9%	10.9%	10.9%	10.9%	10.9%	10.9%	10.9%	10.9%	10.9%	92% AFUE versus 82% AFUE
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	

Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	10.9%	10.9%	10.9%	10.9%	10.9%	10.9%	10.9%	10.9%	10.9%	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

High Efficiency Gas Fireplaces

		References/Notes
Description:	All vented gas fireplaces sold in Canada must now be tested for their energy efficiency using the Canadian Standards Association CSA-P.4.1-02 standard if they are shipped across provincial lines. The energy-efficiency rating of the fireplace is printed on the EnerGuide label. EnerGuide does not set a minimum efficiency level, so savings are possible by using the EnerGuide label to choose the more efficient unit.	
Baseline:	An average efficiency natural gas fireplace (60% assumed)	NRCan data, obtained via personal communication, 2008
Upgrade:	A high efficiency natural gas fireplace (80% assumed)	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.226	$1.226	$1.226	$1.226	$1.226	$1.226	$1.226	$1.226
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.092	$0.092	$0.092	$0.092	$0.092	$0.092	$0.092	$0.092
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	24,593	24,593	24,593	16,232	16,232	16,232	16,232	16,232	20,572	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	18,445	18,445	18,445	12,174	12,174	12,174	12,174	12,174	15,429	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	6,148	6,148	6,148	4,058	4,058	4,058	4,058	4,058	5,143	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$150.00	$150.00	$150.00	$150.00	$150.00	$150.00	$150.00	$150.00	$150.00	Previous analyses have suggested that the cost of gas fireplaces has more to do with "add-ons" (e.g., mantles, etched glass, etc.) than with efficiency. An incremental cost of $150 is assumed for higher-efficiency models, based on a discussion 22 Nov 2010 with Paul Miles of Miles Industries.
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$150.00	$150.00	$150.00	$150.00	$150.00	$150.00	$150.00	$150.00	$150.00	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Set to incremental
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	15	15	15	15	15	15	15	15	15	Lifetime based on previous energy efficiency potential studies conducted by Marbek
	Baseline (yrs.)	15	15	15	15	15	15	15	15	15	Lifetime based on previous energy efficiency potential studies conducted by Marbek
Cost Savings ($/yr.)		$60	$60	$60	$40	$40	$40	$40	$40	$50	
Simple Payback (yrs.)		2.5	2.5	2.5	3.8	3.8	3.8	3.8	3.8	3.11	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$567	$567	$567	$374	$374	$374	$374	$374	$475	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		$417	$417	$417	$224	$224	$224	$224	$224	$325	
Benefit/Cost Ratio		3.78	3.78	3.78	2.50	2.50	2.50	2.50	2.50	3.16	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	1	1	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	Improvement from average efficiency of 60% to 80%.
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	

Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	1	1	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

Programmable Thermostats (Central Heating and Cooling)

		References/Notes
Description:	Digital programmable thermostats provide improved temperature setting accuracy and allow occupants to preset temperatures for various time periods. A 4ºC temperature setback is often assumed during night and unoccupied periods. However, utility studies have indicated that a lower average setback value should be used to reflect the fact that the thermostat's setback capabilities do not completely reflect how they are used. For example, some home occupants reliably set back manual thermostats while others do not use the setback features on their electronic thermostats.	
Baseline:	Non-programmable thermostat installed on central forced-air natural gas furnace and electric space cooling system	
Upgrade:	Programmable thermostat installed on central forced-air natural gas furnace and electric space cooling system	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.015	$1.015	$1.015	$1.015	$1.015	$1.015	$1.015	$1.015
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.073	$0.073	$0.073	$0.073	$0.073	$0.073	$0.073	$0.073
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☑	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☑	Mobile (Existing) ☑	Mobile (New) ☑	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	878	1,078	1,035	565	565	543	417	401	808	
	Natural Gas (MJ/yr.)	103,566	87,600	87,600	61,906	54,833	54,833	68,576	68,576	72,531	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	865	1,063	1,021	557	557	535	410	394	797	
	Natural Gas (MJ/yr.)	96,834	81,906	81,906	57,882	51,269	51,269	64,119	64,119	67,816	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	13	14	14	8	8	8	7	7	11	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	6,732	5,694	5,694	4,024	3,564	3,564	4,457	4,457	4,715	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	Based on a retail scan of p-stats designed for central space heating and cooling (Home Depot, 2010)
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Assume that homeowners are able to install programmable thermostats on their own
	Baseline, Material ($)	$25.00	$25.00	$25.00	$25.00	$25.00	$25.00	$25.00	$25.00	$25.00	Based on a retail scan of manual thermostats designed for central space heating and cooling (Home Depot, 2010)
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Assume that homeowners are able to install thermostats on their own
	Total Measure Cost ($)	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	11	11	11	11	11	11	11	11	11	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 327, January 2010.
	Baseline (yrs.)	11	11	11	11	11	11	11	11	11	Assume similar lifetime for non-programmable thermostats
Cost Savings ($/yr.)		$67	$57	$57	$40	$36	$36	$44	$44	$47	
Simple Payback (yrs.)		0.7	0.9	0.9	1.2	1.4	1.4	1.1	1.1	1.12	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$13	$15	$14	$8	$8	$8	$7	$7	$11	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$489	$413	$413	$292	$259	$259	$324	$324	$342	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		$452	$378	$377	$250	$217	$216	$281	$280	$303	
Benefit/Cost Ratio		10.03	8.56	8.55	6.00	5.34	5.33	6.61	6.61	7.07	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	Assuming only night setback to 18°C (conservative estimate). Savings based on NRC, "The effects of thermostat set-back and set-up on seasonal energy consumption, surface temperatures and recovery times at the CCHT Twin House Facility", ASHRAE Transactions, v. 113, pt. 1, p. 5, 2007. Savings are conservative because testing was in R-2000 homes.
Space Cooling	-	1	1	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	Assuming day set-up to 25°C and low solar gains (conservative). Savings based on NRC, "The effects of thermostat set-back and set-up on seasonal energy consumption, surface temperatures and recovery times at the CCHT Twin House Facility", ASHRAE Transactions, v. 113, pt. 1, p. 8, 2007.
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	Assuming only night setback to 18°C (conservative estimate). Savings based on NRC, "The effects of thermostat set-back and set-up on seasonal energy consumption, surface temperatures and recovery times at the CCHT Twin House Facility", ASHRAE Transactions, v. 113, pt. 1, p. 5, 2007. Savings are conservative because testing was in R-2000 homes.
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment	Applies? (1=Yes; 0=No)	Measure Resource Savings (%)	References/Notes

Main End Use	Use/Equipment (If Applicable)	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	
Space Cooling	1	1	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Water

											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

Solar Pre-Heated Make-Up Air Systems (e.g., SolarWall®)

		References/Notes
Description:	Solar preheated ventilation systems preheat incoming ventilation air and reduce heat loss through the portion of the building shell covered by them. They consist of perforated steel or aluminum absorber sheets that are mounted vertically on a building's exterior surface and are ideally mounted on southerly facing walls, plus or minus 20 degrees. The dark coloured metal sheets that make up the system are mounted a small distance away from the building's surface, creating an air cavity. A negative pressure is created within the cavity by ventilation fans and air is drawn through small holes in the metal panels. On sunny winter days, these systems can raise incoming air temperatures by 25°C to 35°C. In summer months, ventilation air can be drawn directly from the outside through a bypass damper, while heated air is rejected through vents at the top of the air cavity. These systems are generally used in commercial and industrial applications but they have seen some limited residential use.	
Baseline:	Homes with ducting and heat recovery ventilators (HRVs)	
Upgrade:	A 10 m2 solar pre-heated make-up air system, located on the south side of a home	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.648	$1.648	$1.648	$1.648	$1.648	$1.648	$1.648	$1.648
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.139	$0.139	$0.139	$0.139	$0.139	$0.139	$0.139	$0.139
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	600	800	768	400	400	384	241	232	589	
	Natural Gas (MJ/yr.)	103,566	87,600	87,600	61,906	54,833	54,833	68,576	68,576	72,531	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	586	782	751	391	391	375	236	226	575	
	Natural Gas (MJ/yr.)	101,184	85,586	85,586	60,482	53,572	53,572	66,999	66,999	70,863	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	14	18	18	9	9	9	6	5	14	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	2,382	2,015	2,015	1,424	1,261	1,261	1,577	1,577	1,668	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$845.00	$845.00	$845.00	$845.00	$845.00	$845.00	$845.00	$845.00	$845.00	Based on private communication with Conserval, installed cost is about $130/m^2 - asumming 65% for material.
	Upgrade, Installation ($)	$455.00	$455.00	$455.00	$455.00	$455.00	$455.00	$455.00	$455.00	$455.00	Based on private communication with Conserval, installed cost is about $130/m^2 - asumming 35% for labour.
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$1,300.00	$1,300.00	$1,300.00	$1,300.00	$1,300.00	$1,300.00	$1,300.00	$1,300.00	$1,300.00	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	40	40	40	40	40	40	40	40	40	Personal communication, D McClenahan, NRCan, #### (year?)
	Baseline (yrs.)	-	-	-	-	-	-	-	-	-	
Cost Savings ($/yr.)		$24	$21	$21	$15	$13	$13	$16	$16	$17	
Simple Payback (yrs.)		53.1	61.1	61.3	88.3	99.1	99.3	81.7	81.8	78.99	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$23	$30	$29	$15	$15	$15	$9	$9	$22	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$331	$280	$280	$198	$175	$175	$219	$219	$232	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$946	-$989	-$991	-$1,087	-$1,109	-$1,110	-$1,071	-$1,072	-$1,046	
Benefit/Cost Ratio		0.27	0.24	0.24	0.16	0.15	0.15	0.18	0.18	0.20	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	Past Marbek work indicates approximately a 13% savings due to an HRV. An Enermodal paper indicates that a combined Solar Wall and HRV together would have a savings of 15%. This is a 2.3% savings.
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	See note above.
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heater	-	0	0									-	
Pool and Spa Heater	Pool Heaters	0	0									-	
Pool and Spa Heater	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	

Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

High Efficiency Heat Recovery Ventilators (HRVs)

		References/Notes
Description:	Heat recovery ventilators (HRVs) are heat exchangers that are integrated into the centralized ventilation and exhaust systems of many newer homes. In the winter, they allow for incoming fresh air to be heated by outgoing stale air. Conversely, in homes with central air conditioning systems, they allow incoming fresh air to be cooled by outgoing stale air in the summer. High efficiency HRVs incorporate more effective heat exchangers. Some models also include desiccant wheels so that latent heat (i.e. humidity) can be transferred between the two air streams.	
Baseline:	A standard-efficiency (sensible efficiency of approximately 70%) heat recovery ventilator (HRV), in a home with central heating and cooling	
Upgrade:	A high-efficiency heat recovery ventilator (HRV) (sensible efficiency of approximately 85%), in a home with central heating and cooling	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.226	$1.226	$1.226	$1.226	$1.226	$1.226	$1.226	$1.226
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/m^3)	$0.010	$0.092	$0.092	$0.092	$0.092	$0.092	$0.092	$0.092	$0.092
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☑	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☑	Mobile (Existing) ☑	Mobile (New) ☑	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	878	1,078	1,035	565	565	543	417	401	808	
	Natural Gas (m3/yr.)	103,566	87,600	87,600	61,906	54,833	54,833	68,576	68,576	72,531	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	855	1,050	1,008	550	550	529	406	390	787	
	Natural Gas (m3/yr.)	100,873	85,323	85,323	60,296	53,408	53,408	66,793	66,793	70,645	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	23	28	27	15	15	14	11	10	21	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Nat. Gas (m3/yr.)	2,693	2,278	2,278	1,610	1,426	1,426	1,783	1,783	1,886	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$1,600.00	$1,600.00	$1,600.00	$1,600.00	$1,600.00	$1,600.00	$1,600.00	$1,600.00	$1,600.00	Based on 2010 cost estimates for Saskatchewan homes from Rob Dumont (Dumont and Associates) and Dave Fetsch (Sun Ridge Group).
	Upgrade, Installation ($)	$800.00	$800.00	$800.00	$800.00	$800.00	$800.00	$800.00	$800.00	$800.00	Based on 2010 cost estimates for Saskatchewan homes from Rob Dumont (Dumont and Associates) and Dave Fetsch (Sun Ridge Group). Installation cost is very dependant on the home and accessibility within it.
	Baseline, Material ($)	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	Based on 2010 cost estimates for Saskatchewan homes from Rob Dumont (Dumont and Associates) and Dave Fetsch (Sun Ridge Group).
	Baseline, Installation ($)	$800.00	$800.00	$800.00	$800.00	$800.00	$800.00	$800.00	$800.00	$800.00	Based on 2010 cost estimates for Saskatchewan homes from Rob Dumont (Dumont and Associates) and Dave Fetsch (Sun Ridge Group). Installation cost is very dependant on the home and accessibility within it.
	Total Measure Cost ($)	$600.00	$600.00	$600.00	$600.00	$600.00	$600.00	$600.00	$600.00	$600.00	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	15	15	15	15	15	15	15	15	15	E Source Heating Technology Atlas. Also used in previous energy efficiency potential studies by Marbek. Most manufacturers provide limited lifetime warranties on HRV cores.
	Baseline (yrs.)	15	15	15	15	15	15	15	15	15	E Source Heating Technology Atlas. Also used in previous energy efficiency potential studies by Marbek. Most manufacturers provide limited lifetime warranties on HRV cores.
Cost Savings ($/yr.)		$28	$25	$25	$17	$15	$15	$18	$18	$20	
Simple Payback (yrs.)		21.2	24.4	24.4	35.3	39.5	39.6	32.7	32.7	31.50	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$28	$34	$33	$18	$18	$17	$13	$13	$26	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$248	$210	$210	$149	$132	$132	$165	$165	$174	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$324	-$355	-$357	-$433	-$450	-$451	-$422	-$423	-$400	
Benefit/Cost Ratio		0.46	0.41	0.41	0.28	0.25	0.25	0.30	0.30	0.33	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	1	1	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	Based on previous Marbek analyses, standard (~70% efficient) reduce space heating energy use by about 13% (i.e. for a similar ventilation rate). High efficiency models are about 20% more efficient.
Space Cooling	-	1	1	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	See comment for space heating. Similar savings are assumed for this end use.
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	See comment for space heating. Similar savings are assumed for this end use.
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment	Applies? (1=Yes; 0=No)	Measure Resource Savings (%)	References/Notes

Main End Use	Use/Equipment (If Applicable)	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	1	1	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	
Space Cooling	1	1	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Gas-Fired Air-Source Heat Pumps

Not used--not commercially available in residential sizes.

		References/Notes
Description:	Early gas-fired heat pumps, such as the York Triathlon, were unsuccessful due to their bulky size and poor quality design. A new generation of gas absorption heat pumps (GAHPs) is currently available through Robur, an Italian manufacturer. These systems can either be ground-source or air-source (i.e., the heat sink may be either an underground fluid loop or an above ground heat exchanger coil). Air-source systems are substantially less expensive since they don't require drilling to install underground fluid loops. However, they can also be much less efficient than ground-source versions since their efficiency is a function of outside air temperature. Commercial-sized GAHP systems have been available in Canada since mid-2007 but residential-sized systems are rare in North America. It is hoped that residential-sized units will become more available in Canada within the study period, but the current manufacturers do not have specific plans at this time. It is estimated that air-source systems can operate at temperatures as low as -29°C and have annual efficiencies of 105% in cold winter locations. In more moderate winter climates, an efficiency of up to 129% is advertised. Unlike electric heat pump systems, GAHPs do not require any auxiliary heating equipment. In addition, the lack of a mechanical compressor extends their lifetime and allows air-source systems to withstand more extreme temperatures.	
Baseline:	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 90%	
Upgrade:	A gas-fired air-source heat pump. This option is not valid because these units are not available in residential sizes.	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)								
Electricity ($/kWh)	$0.083	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	
Natural Gas ($/MJ)	$0.010	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	-	-	-	-	-	-	-	-	0	
	Baseline (yrs.)	-	-	-	-	-	-	-	-	-	
Cost Savings ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Simple Payback (yrs.)		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Benefit/Cost Ratio		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	

Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

Gas-Fired Ground-Source Heat Pumps

Not used--not yet commercially available in residential sizes.

		References/Notes
Description:	Early gas-fired heat pumps, such as the York Triathlon, were unsuccessful due to their bulky size and poor quality design. A new generation of gas absorption heat pumps (GAHPs) is currently available through Robur, an Italian manufacturer. These systems can either be ground-source or air-source (i.e., the heat sink may be either an underground fluid loop or an above ground heat exchanger coil). Air-source systems are substantially less expensive since they don't require drilling to install underground fluid loops. However, they can also be much less efficient than ground-source versions since their efficiency is a function of outside air temperature. Commercial-sized GAHP systems have been available in Canada since mid-2007 but residential-sized systems are not currently available outside of Europe. It is hoped that residential-sized units will become more available in Canada within the study period, but the current manufacturers do not have specific plans at this time. Ground-source GAHPs have efficiencies (COPs) ranging from 120% to 130% Unlike electric heat pump systems, GAHPs do not require any auxiliary heating equipment. In addition, the lack of a mechanical compressor extends their lifetime.	Need--Installed cost, maintenance costs/year, lifetime, savings (heating, cooling, HVAC)
Baseline:	A condensing gas furnace with an AFUE (Annual Fuel Utilization Efficiency) of 90%	
Upgrade:	A gas-fired ground-source heat pump. This option is not valid because these units are not available in residential sizes.	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/m^3)	$0.010	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	-	-	-	-	-	-	-	-	0	
	Baseline (yrs.)	-	-	-	-	-	-	-	-	-	
Cost Savings ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Simple Payback (yrs.)		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Benefit/Cost Ratio		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	

Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

Integrated Heating and DHW (Forced Air Heating)

		References/Notes
Description:	Integrated mechanical systems combine the most efficient technologies for residential space heating and domestic water heating into one package. For example, the Matrix system by NTI NY Thermal incorporates a condensing furnace, condensing boiler, condensing water heater and HRV all in one unit. Primary benefits of the integrated units include compact construction, lower cost of installation (only one set of gas, water and circulation connections are required), and lower installation and maintenance costs (once the technology is mature). Since the minimum performance standards for furnaces was brought up to 90% efficiency at the end of 2009, the base case system is a 90% efficient forced-air furnace and a standard efficiency natural gas tank-style water heater. With this baseline, the integrated system would offer little in the way of space heating savings, but it does still offer DHW savings because the integrated system would heat domestic water with its high-efficiency, condensing combustion.	
Baseline:	A 90% AFUE efficient forced-air condensing furnace, a standard efficiency natural gas tank-style water heater (EF of 0.62 or 0.64 assumed) and a standard efficiency HRV	
Upgrade:	An integrated heating and DHW system, with a condensing furnace (AFUE of 94), a condensing natural gas water heater (EF of 0.80 assumed), and an HRV with an efficiency similar to that in the base case (72%).	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	125,144	109,178	109,178	80,125	73,053	73,053	87,361	87,361	92,499	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	114,865	99,585	99,585	72,544	65,776	65,776	79,716	79,716	83,992	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	10,279	9,593	9,593	7,581	7,277	7,277	7,645	7,645	8,507	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$15,000.00	$15,000.00	$10,000.00	$15,000.00	$15,000.00	$10,000.00	$15,000.00	$10,000.00	$12,500.00	Clifford Paite of Matrix estimates installed cost of $10,000 to $20,000, with the lowest cost in new homes. (2010 estimate)
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Included in cost above
	Baseline, Material ($)	$5,900.00	$5,900.00	$5,900.00	$5,900.00	$5,900.00	$5,900.00	$5,900.00	$5,900.00	$5,900.00	Installed costs of base furnace plus water heater. (Update if base costs are updated.)
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Included in cost above
	Total Measure Cost ($)	$8,505.78	$8,505.78	$3,505.78	$8,505.78	$8,505.78	$3,505.78	$8,505.78	$3,505.78	$6,005.78	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	18	18	18	18	18	18	18	18	18	Lifetime of high efficiency furnace--based on Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-41, April 16, 2009.
	Baseline (yrs.)	15	15	15	15	15	15	15	15	15	Lifetime of base efficiency furnace--based on Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-41, April 16, 2009.
Cost Savings ($/yr.)		$101	$94	$94	$74	$71	$71	$75	$75	$83	
Simple Payback (yrs.)		84.4	90.5	37.3	114.5	119.3	49.2	113.5	46.8	72.22	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$1,075	$1,003	$1,003	$793	$761	$761	$799	$799	$889	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$7,431	-$7,503	-$2,503	-$7,713	-$7,745	-$2,745	-$7,707	-$2,707	-$5,116	
Benefit/Cost Ratio		0.13	0.12	0.29	0.09	0.09	0.22	0.09	0.23	0.18	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	No savings as HRVs in base and proposed case are similar.
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	Difference between AFUE 94 and AFUE 90
Domestic Hot Water (DHW)	-	1	1	27.0%	27.0%	27.0%	27.0%	27.0%	27.0%	25.0%	25.0%	27.0%	Difference between Efs of .85 and .64 or .62.
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	

Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	
Domestic Hot Water (DHW)	1	1	27.0%	27.0%	27.0%	27.0%	27.0%	27.0%	25.0%	25.0%	27.0%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

Integrated Heating and DHW (Hydronic Heating)

		References/Notes
Description:	Integrated mechanical systems combine the most efficient technologies for residential space heating and domestic water heating into one package. For example, the Matrix system by NTI NY Thermal incorporates a condensing furnace, condensing boiler, condensing water heater and HRV all in one unit. Primary benefits of the integrated units include compact construction, lower cost of installation (only one set of gas, water and circulation connections are required), and lower installation and maintenance costs (once the technology is mature). Water heating in the base case is assumed to be provided by a standard efficiency natural gas tank-style water heater (EF of 0.62 or 0.64), while space heating is provided by a non-condensing boiler, assumed to have an AFUE of 82% . The HRV in the base case is assumed to be of similar efficiency to the HRV in the integrated unit.	
Baseline:	A non-condensing boiler with an AFUE of 82% and a standard efficiency natural gas tank-style water heater (EF of 0.62 or 0.64). An HRV of similar efficiency to the integrated unit (72%) is assumed.	
Upgrade:	An integrated heating and DHW system, with a condensing boiler (AFUE 92.7), a condensing natural gas water heater (EF of .85) and an HRV with an efficiency similar to that in the base case (72%).	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/m^3)	$0.010	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	125,144	109,178	109,178	80,125	73,053	73,053	87,361	87,361	92,499	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	106,890	92,840	92,840	67,777	61,553	61,553	74,436	74,436	78,407	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Nat. Gas (m3/yr.)	18,254	16,338	16,338	12,348	11,499	11,499	12,925	12,925	14,091	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$15,000.00	$15,000.00	$10,000.00	$15,000.00	$15,000.00	$10,000.00	$15,000.00	$10,000.00	$12,500.00	Clifford Paite of Matrix estimates installed cost of $10,000 to $20,000, with the lowest cost in new homes. (2010 estimate)
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Included in cost above.
	Baseline, Material ($)	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	Cost of base case boiler and water heater. (Update if base case costs are updated)
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$8,000.00	$8,000.00	$3,000.00	$8,000.00	$8,000.00	$3,000.00	$8,000.00	$3,000.00	$5,500.00	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	20	20	20	20	20	20	20	20	20	lifetime of high-efficiency condensing furnace. (Updated if condensing boiler option updated.)
	Baseline (yrs.)	20	20	20	20	20	20	20	20	20	lifetime of standard efficiency condensing furnace. (Updated if condensing boiler option updated.)
Cost Savings ($/yr.)		$179	$160	$160	$121	$113	$113	$127	$127	$138	
Simple Payback (yrs.)		44.7	50.0	18.7	66.1	71.0	26.6	63.2	23.7	40.14	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$2,039	$1,825	$1,825	$1,380	$1,285	$1,285	$1,444	$1,444	$1,574	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$5,961	-$6,175	-$1,175	-$6,620	-$6,715	-$1,715	-$6,556	-$1,556	-$3,926	
Benefit/Cost Ratio		0.25	0.23	0.61	0.17	0.16	0.43	0.18	0.48	0.35	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	No savings as HRVs in base and proposed case are similar.
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	1	1	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	Difference between AFUE 92.7 and AFUE 82
Domestic Hot Water (DHW)	-	1	1	27.0%	27.0%	27.0%	27.0%	27.0%	27.0%	25.0%	25.0%	27.0%	Difference between Efs of .85 and .64 or .62.
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	

Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	1	1	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	
Domestic Hot Water (DHW)	1	1	27.0%	27.0%	27.0%	27.0%	27.0%	27.0%	25.0%	25.0%	27.0%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Condensing Gas Water Heaters

		References/Notes
Description:	Condensing water heaters feature advanced heat exchanger designs that extract more heat from the flue gases before they are exhausted. So much heat is extracted that the flue gases condense and must be discharged as a condensate rather than a gas. As a result, the efficiency of these types of water heaters is significantly higher than standard water heaters.	
Baseline:	A conventional storage natural gas hot water heater (EF of 0.62 or 0.64 assumed)	Current BC hot water heater regulations require an EF of 0.62 for 40 gallon (151 L) tanks and 0.64 for 30 gallon (114 L) tanks.
Upgrade:	A condensing natural gas water heater (EF of 0.80 assumed)	ENERGY STAR requirement for condensing hot water heaters is an EF of 0.80

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.128	$1.128	$1.128	$1.128	$1.128	$1.128	$1.128	$1.128
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.083	$0.083	$0.083	$0.083	$0.083	$0.083	$0.083	$0.083
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	21,578	21,578	21,578	18,219	18,219	18,219	18,785	18,785	19,968	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	16,723	16,723	16,723	14,120	14,120	14,120	15,028	15,028	15,480	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	4,855	4,855	4,855	4,099	4,099	4,099	3,757	3,757	4,488	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$1,500.00	$1,500.00	$1,500.00	$1,500.00	$1,500.00	$1,500.00	$1,500.00	$1,500.00	$1,500.00	Habart & Associates, "Market Transformation: Domestic Water Heaters," July 2010
	Upgrade, Installation ($)	$1,305.00	$1,305.00	$1,333.00	$1,305.00	$1,305.00	$1,333.00	$1,305.00	$1,333.00	$1,319.00	Habart & Associates, "Market Transformation: Domestic Water Heaters," July 2010
	Baseline, Material ($)	$675.00	$675.00	$675.00	$675.00	$675.00	$675.00	$675.00	$675.00	$675.00	Habart & Associates, "Market Transformation: Domestic Water Heaters," July 2010
	Baseline, Installation ($)	$563.00	$563.00	$1,085.00	$563.00	$563.00	$1,085.00	$563.00	$1,085.00	$824.00	Habart & Associates, "Market Transformation: Domestic Water Heaters," July 2010
	Total Measure Cost ($)	$1,567.00	$1,567.00	$1,073.00	$1,567.00	$1,567.00	$1,073.00	$1,567.00	$1,073.00	$1,320.00	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	13	13	13	13	13	13	13	13	13	Assume similar lifetime to conventional tanks. Habart report also makes this assumption.
	Baseline (yrs.)	13	13	13	13	13	13	13	13	13	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 495, January 2010.
Cost Savings ($/yr.)		$48	$48	$48	$40	$40	$40	$37	$37	$44	
Simple Payback (yrs.)		32.9	32.9	22.6	39.0	39.0	26.7	42.6	29.1	30.10	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$403	$403	$403	$340	$340	$340	$312	$312	$372	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$1,164	-$1,164	-$670	-$1,227	-$1,227	-$733	-$1,255	-$761	-$948	
Benefit/Cost Ratio		0.26	0.26	0.38	0.22	0.22	0.32	0.20	0.29	0.29	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	1	1	22.5%	22.5%	22.5%	22.5%	22.5%	22.5%	20.0%	20.0%	22.5%	EF of 0.80 versus an EF of 0.62 (40 gal) or 0.64 (30 gal)
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	

Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	**Sub End Use/Equipment (If Applicable)**	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
		Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	22.5%	22.5%	22.5%	22.5%	22.5%	22.5%	20.0%	20.0%	22.5%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

Point-of-Use (Tankless) Water Heaters (Gas)

		References/Notes
Description:	Tankless water heaters heat water on demand, eliminating hot water storage. The absence of hot water storage reduces standby heat losses. The efficiency of tankless water heaters is generally improved by the addition of features such as modulating controls, electric spark ignitions and direct venting. The applicability of tankless gas-fired DHW systems is somewhat limited by venting constraints; the burner is significantly larger than for a standard water heater, so a larger vent is required. Some houses cannot accommodate the larger flue because of requirements for clearance from other structures, windows, etc.	
Baseline:	A conventional storage natural gas hot water heater (EF of 0.60 assumed)	Based on a scan of models certified by the Air Conditioning, Heating, and Refrigeration Institute (AHRI), the average energy factor (EF) for conventional storage natural gas water heaters is ~0.60.
Upgrade:	A tankless natural gas hot water heater (EF of 0.82 assumed)	Based on a scan of models certified by the Air Conditioning, Heating, and Refrigeration Institute (AHRI), the overwhelming majority of tankless gas hot water heaters have an energy factor (EF) of 0.82

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)								
Electricity ($/kWh)	$0.083	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	
Natural Gas ($/MJ)	$0.010	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	21,578	21,578	21,578	18,219	18,219	18,219	18,785	18,785	19,968	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	14,026	14,026	14,026	11,842	11,842	11,842	12,210	12,210	12,979	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	7,552	7,552	7,552	6,377	6,377	6,377	6,575	6,575	6,989	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$1,500.00	$1,500.00	$1,500.00	$1,500.00	$1,500.00	$1,500.00	$1,500.00	$1,500.00	$1,500.00	Habart & Associates, "Market Transformation: Domestic Water Heaters," July 2010
	Upgrade, Installation ($)	$2,331.00	$2,331.00	$2,359.00	$2,331.00	$2,331.00	$2,359.00	$2,331.00	$2,359.00	$2,345.00	Habart & Associates, "Market Transformation: Domestic Water Heaters," July 2010
	Baseline, Material ($)	$675.00	$675.00	$675.00	$675.00	$675.00	$675.00	$675.00	$675.00	$675.00	Habart & Associates, "Market Transformation: Domestic Water Heaters," July 2010
	Baseline, Installation ($)	$563.00	$563.00	$1,085.00	$563.00	$563.00	$1,085.00	$563.00	$1,085.00	$824.00	Habart & Associates, "Market Transformation: Domestic Water Heaters," July 2010
	Total Measure Cost ($)	$2,274.04	$2,274.04	$1,645.56	$2,274.04	$2,274.04	$1,645.56	$2,274.04	$1,645.56	$1,959.80	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	20	20	20	20	20	20	20	20	20	Habart & Associates report: 25 yrs. Navigant Consulting Inc., Measures and Assumptions for Demand Side Management (DSM) Planning, p. C-87, April 16, 2009 indicated 18 yrs. Using 20 years as an intermediate value, after personal communication with J. Habart, Dec 2010.
	Baseline (yrs.)	13	13	13	13	13	13	13	13	13	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 495, January 2010.
Cost Savings ($/yr.)		$74	$74	$74	$62	$62	$62	$64	$64	$68	
Simple Payback (yrs.)		30.7	30.7	22.2	36.4	36.4	26.3	35.3	25.5	28.71	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$844	$844	$844	$712	$712	$712	$735	$735	$781	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$1,430	-$1,430	-$802	-$1,562	-$1,562	-$933	-$1,539	-$911	-$1,179	
Benefit/Cost Ratio		0.37	0.37	0.51	0.31	0.31	0.43	0.32	0.45	0.41	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	1	1	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	Actual use study shows average of 37% savings. We've assumed 35% because conventional EF is slightly higher and instantanoues EF is slightly lower than used in the study.
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	

Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Active Solar Water Heating Systems

		References/Notes
Description:	Solar DHW systems use the energy of the sun to heat water. The primary components of a solar water heating system are a solar collector, a heat transfer fluid and a well-insulated storage tank. Due to Canada's colder climate and the higher likelihood of freezing, active closed-loop systems are generally used. These systems use a pump to circulate a non-freezing heat transfer fluid through the collectors and then through a heat exchanger so that the thermal energy can be transferred to the water. Solar DHW are not generally sized to supply all of the annual requirement for water heating in the home, because if the system is sized for cloudy winter periods it will have enormous excess capacity during sunny summer periods, and will cost far too much to install. The system analyzed here meets approximately 2/3 of the annual requirements	
Baseline:	No solar water heating system installed	
Upgrade:	Solar DHW systems use the energy of the sun to heat water. The primary components of a solar water heating system are a solar collector, a heat transfer fluid and a well-insulated storage tank. Due to Canada's colder climate and the higher likelihood of	System sizes of 5.75 m^2 are assumed .

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.553	$1.553	$1.553	$1.553	$1.553	$1.553	$1.553	$1.553
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.127	$0.127	$0.127	$0.127	$0.127	$0.127	$0.127	$0.127
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	21,578	21,578	21,578	18,219	18,219	18,219	18,785	18,785	19,968	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	7,984	7,984	7,984	5,830	5,830	5,830	5,072	5,072	6,941	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	13,594	13,594	13,594	12,389	12,389	12,389	13,713	13,713	13,027	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	SolarBC incentive program average cost of 100 installed systems
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Costs above are installed.
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	$7,000.00	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	25	25	25	25	25	25	25	25	25	Retscreen default assumption.
	Baseline (yrs.)	-	-	-	-	-	-	-	-	-	
Cost Savings ($/yr.)		$133	$133	$133	$121	$121	$121	$134	$134	$128	
Simple Payback (yrs.)		52.5	52.5	52.5	57.7	57.7	57.7	52.1	52.1	54.95	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$1,727	$1,727	$1,727	$1,574	$1,574	$1,574	$1,742	$1,742	$1,655	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$5,273	-$5,273	-$5,273	-$5,426	-$5,426	-$5,426	-$5,258	-$5,258	-$5,345	
Benefit/Cost Ratio		0.25	0.25	0.25	0.22	0.22	0.22	0.25	0.25	0.24	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	1	1	63.0%	63.0%	63.0%	68.0%	68.0%	68.0%	73.0%	73.0%	65.5%	Based on RETScreen modeling results (Assuming average occupancies for detached, attached and mobile homes are 3.1, 2.4, 1.9 respectively, DHW use of 60 L/day/person, 55°C DHW temperature, southerly directional angle 30° away from optimal (i.e. azimuth)
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	

Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	63.0%	63.0%	63.0%	68.0%	68.0%	68.0%	73.0%	73.0%	65.5%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

DHW Tank Insulation

		References/Notes
Description:	Pre-cut tank jackets/blankets (DHW tank insulation) are readily available and can be installed on hot water storage tanks to reduce standby heat losses. Caution is required to install blankets on gas water heaters, to avoid blocking the flue, the air intake to the burner, or the drain at the bottom. The thermostat should also remain uncovered.	
Baseline:	No additional tank insulation installed on a conventional hot water storage tank	
Upgrade:	An insulating blanket installed on a hot water storage tank to reduce standby losses	

Baseline Reference:	1. Annual consumption, end use
Heating Fuel Type:	All Fuels (Average Fuel Mix)
Main End Use:	Space Heating
Discount Rate:	7.38%
GHG Adder Incl.?	No
Resource Costs:	Baseload

= User Input
= Calculation

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.128	$1.128	$1.128	$1.128	$1.128	$1.128	$1.128	$1.128
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.083	$0.083	$0.083	$0.083	$0.083	$0.083	$0.083	$0.083
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	1,618	1,618	1,618	1,366	1,366	1,366	1,409	1,409	1,498	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	1,214	1,214	1,214	1,025	1,025	1,025	1,057	1,057	1,123	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	405	405	405	342	342	342	352	352	374	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$35.00	$35.00	$35.00	$25.00	$25.00	$25.00	$25.00	$25.00	$30.19	Based on a 2010 retail scan of insulating blankets
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Assuming that homeowners are able to install the insulating blankets on their own.
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$35.00	$35.00	$35.00	$25.00	$25.00	$25.00	$25.00	$25.00	$30.19	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	13	13	13	13	13	13	13	13	13	Assuming a lifetime similar to that of a hot water heater (hot water heater lifetime based on OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 495, January 2010.)
	Baseline (yrs.)	-	-	-	-	-	-	-	-	-	
Cost Savings ($/yr.)		$4	$4	$4	$3	$3	$3	$3	$3	$4	
Simple Payback (yrs.)		8.8	8.8	8.8	7.5	7.5	7.5	7.2	7.2	8.17	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$34	$34	$34	$28	$28	$28	$29	$29	$31	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$1	-$1	-$1	$3	$3	$3	$4	$4	$1	
Benefit/Cost Ratio		0.96	0.96	0.96	1.13	1.13	1.13	1.17	1.17	1.04	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	1	1	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	US DOE website suggests that insulating blankets can reduce standby losses by 25-45%. Lower end assumed to be conservative and accounts for fact that newer storage tanks are better insulated
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	

Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	1.9%	1.9%	1.9%	1.9%	1.9%	1.9%	1.9%	1.9%	1.9%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

DHW Pipe Insulation

		References/Notes
Description:	Hot water pipe insulation reduces the distribution losses for DHW. In general, only the first one or two metres of pipe nearest the DHW tank are accessible enough to insulate. However, since the dominant loss is from the pipe transferring heat out of the tank and then losing it to the basement, the first meter of pipe is the most important and only worthwhile section of pipe to insulate. Insulating this section of piping affects both the delivery of hot water and the losses from the tank. Delivery temperature is slightly increased during a hot water draw, and the water in the piping does not lose its stored heat as quickly between draws.	In SaskPower
Baseline:	No insulation installed on the piping leading out of a hot water storage tank	
Upgrade:	Installing pipe insulation on the first meter of piping leading out of a hot water storage tank	

Baseline Reference:	1. Annual consumption, end use
Heating Fuel Type:	All Fuels (Average Fuel Mix)
Main End Use:	Space Heating
Discount Rate:	7.38%
GHG Adder Incl.?	No
Resource Costs:	Baseload

= User Input
= Calculation

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.226	$1.226	$1.226	$1.226	$1.226	$1.226	$1.226	$1.226
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.092	$0.092	$0.092	$0.092	$0.092	$0.092	$0.092	$0.092
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	1,618	1,618	1,618	1,366	1,366	1,366	1,409	1,409	1,498	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	1,473	1,473	1,473	1,243	1,243	1,243	1,282	1,282	1,363	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	146	146	146	123	123	123	127	127	135	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$0.70	$0.70	$0.70	$0.70	$0.70	$0.70	$0.70	$0.70	$0.70	Based on OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 492, January 2010.
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Assuming that homeowners are able to install the insulation on their own.
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$0.70	$0.70	$0.70	$0.70	$0.70	$0.70	$0.70	$0.70	$0.70	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	15	15	15	15	15	15	15	15	15	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 495, January 2010.
	Baseline (yrs.)	-	-	-	-	-	-	-	-	-	
Cost Savings ($/yr.)		$1	$1	$1	$1	$1	$1	$1	$1	$1	
Simple Payback (yrs.)		0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.53	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$13	$13	$13	$11	$11	$11	$12	$12	$12	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		$13	$13	$13	$11	$11	$11	$11	$11	$12	
Benefit/Cost Ratio		19.20	19.20	19.20	16.21	16.21	16.21	16.71	16.71	17.77	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	1	1	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	Original number of 15% was used: this was just over 1% of DHW overall and was based on Shipley's engineering calculations for a pipe acting as a fin on the tank. A paper by Andersen, Fan & Furbo called "Heat Losses from Pipes Connected to Hot Water Storage Tanks" estimates a heat trap reduces the losses in the first section of pipe by 40%.
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	

Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

DHW Heat Traps

Not used because many or most new hot water heaters have integral heat traps

		References/Notes
Description:	This measure involves the installation of external "S-type" pre-bent copper pipe heat traps on both of the outlets ofwater heaters. This measure is only being considered during the installation of new tanks since it can be prohibitively expensive to bring in a plumber otherwise.	
Baseline:	No heat trap installed on a new electric storage hot water heater	
Upgrade:	Installing an external "S-type" pre-bent copper pipe heat trap on an gas-fired storage hot water heater. This option no longer applies because most new hot water heaters include an integrated heat trap.	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083			$1.128			$1.128		$1.128
Electricity ($/kW)	$0.000			$0.000			$0.000		$0.000
Natural Gas ($/MJ)	$0.010			$0.083			$0.083		$0.083
Oil ($/L)	$0.000			$0.000			$0.000		$0.000
Water ($/1000L)	$0.000			$0.000			$0.000		$0.000

Sub-sector		Detached (Pre-1976) ☐	Detached (Post-1976) ☐	Detached (New) ☑	Attached (Pre-1976) ☐	Attached (Post-1976) ☐	Attached (New) ☑	Mobile (Existing) ☐	Mobile (New) ☑	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)			-			-		-	-	
	Natural Gas (MJ/yr.)			-			-		-	-	
	Oil (L/yr.)			-			-		-	-	
	Water (L/yr.)			-			-		-	-	
Upgrade Consumption	Electricity (kWh/yr.)			-			-		-	-	
	Natural Gas (MJ/yr.)			-			-		-	-	
	Oil (L/yr.)			-			-		-	-	
	Water (L/yr.)			-			-		-	-	
Interactive Effects (Inputs)	Heating Penalty ☐			0%			0%		0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐			0%			0%		0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)			-			-		-	-	
	Electricity, Cooling (kWh/yr.)			-			-		-	-	
	Electricity, Total (kWh/yr.)			-			-		-	-	
	Natural Gas (MJ/yr.)			-			-		-	-	
	Oil (L/yr.)			-			-		-	-	
Winter Peak Hours-Use Factor				-			-		-	-	
Resource Savings	Electricity (kWh/yr.)			-			-		-	-	
	Electricity (kW peak)			-			-		-	-	
	Natural Gas (MJ/yr.)			-			-		-	-	
	Oil (L/yr.)			-			-		-	-	
	Water (L/yr.)			-			-		-	-	
Cost Parameters	Upgrade, Material ($)			$0.00			$0.00		$0.00	$0.00	
	Upgrade, Installation ($)			$0.00			$0.00		$0.00	$0.00	Minimal labour costs since tank is already being installed
	Baseline, Material ($)			$0.00			$0.00		$0.00	$0.00	
	Baseline, Installation ($)			$0.00			$0.00		$0.00	$0.00	
	Total Measure Cost ($)			$0.00			$0.00		$0.00	$0.00	
	Basis (Full/Incremental)			Full			Full		Full	Full	
Incremental O&M ($/yr.)				$0			$0		$0	$0	
Lifetimes	Upgrade (yrs.)			13			13		13	13	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 495, January 2010.
	Baseline (yrs.)			-			-		-	-	
Cost Savings ($/yr.)				$0			$0		$0	$0	
Simple Payback (yrs.)				N/A			N/A		N/A	0.00	
NPV of O&M Costs ($)				$0			$0		$0	$0	
Total Benefits ($)	Electric Energy			$0			$0		$0	$0	
	Electric Demand			$0			$0		$0	$0	
	Natural Gas			$0			$0		$0	$0	
	Oil			$0			$0		$0	$0	
	Water			$0			$0		$0	$0	
Measure TRC ($)				$0			$0		$0	$0	
Benefit/Cost Ratio				0.00			0.00		0.00	0.00	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed			1			1		1	
Cost Flag (i.e. way measure is typically applied)			Incremental			Incremental		Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No) Baseline	Upgrade	Measure Resource Savings (%) Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No) Baseline	Upgrade	Measure Resource Savings (%) Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0			25.0%			25.0%		25.0%	25.0%	Based on Acker, L. Advanced Conservation Technology Inc. Improving the Efficiency of Hot Water Distribution Systems, ACEEE Forum, p. 12, 2008, installing a heat trap improves the energy factor of a hot water heater by about 0.02 (i.e. 2%) or about 25% of pipe losses.
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No) Baseline	Upgrade	Measure Resource Savings (%) Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	

Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0			-			-		-	-	
Space Cooling	0	0			-			-		-	-	
Clothes Washers	0	0			-			-		-	-	
Dishwashers	0	0			-			-		-	-	
Other Electric Loads	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0			-			-		-	-	
Domestic Hot Water (DHW)	0	0			-			-		-	-	
Fireplaces	0	0			-			-		-	-	
Cooking	0	0			-			-		-	-	
Clothes Dryers	0	0			-			-		-	-	
Pool and Spa Heaters	0	0			-			-		-	-	
Other	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0			-			-		-	-	
Domestic Hot Water (DHW)	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0			-			-		-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Ultra Low-Flow Showerheads

		References/Notes
Description:	Ultra low-flow showerheads have aerators and flow restrictors to reduce water use. At 4.75 LPM (1.25 GPM), their flow rates are substantially lower than traditional low-flow fixtures, whose flow rates range between 7.6 LPM and 9.5 LPM (2.0-2.5 GPM).	
Baseline:	A low-flow showerhead with a 2.0 GPM (7.6 LPM) flow rate (conservative estimate)	
Upgrade:	An ultra low-flow showerhead with a 1.25 GPM (4.75) flow rate	

Baseline Reference:	1. Annual consumption, end use
Heating Fuel Type:	All Fuels (Average Fuel Mix)
Main End Use:	Space Heating
Discount Rate:	7.38%
GHG Adder Incl.?	No
Resource Costs:	Baseload

= User Input
= Calculation

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	5,610	5,610	5,610	4,737	4,737	4,737	4,884	4,884	5,192	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	3,506	3,506	3,506	2,961	2,961	2,961	3,053	3,053	3,245	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	2,104	2,104	2,104	1,776	1,776	1,776	1,832	1,832	1,947	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$13.00	$13.00	$13.00	$13.00	$13.00	$13.00	$13.00	$13.00	$13.00	Incremental cost of $7 based on OPA, OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 193, January 2010.
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Assuming that homeowners are able to install the showerheads on their own
	Baseline, Material ($)	$6.00	$6.00	$6.00	$6.00	$6.00	$6.00	$6.00	$6.00	$6.00	Based on a retail scan of low-flow showerheads (2010)
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Assuming that homeowners are able to install the showerheads on their own
	Total Measure Cost ($)	$13.00	$13.00	$13.00	$13.00	$13.00	$13.00	$13.00	$13.00	$13.00	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	10	10	10	10	10	10	10	10	10	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 193, January 2010.
	Baseline (yrs.)	10	10	10	10	10	10	10	10	10	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 193, January 2010.
Cost Savings ($/yr.)		$21	$21	$21	$17	$17	$17	$18	$18	$19	
Simple Payback (yrs.)		0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.69	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$141	$141	$141	$119	$119	$119	$123	$123	$130	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		$128	$128	$128	$106	$106	$106	$110	$110	$117	
Benefit/Cost Ratio		10.84	10.84	10.84	9.15	9.15	9.15	9.44	9.44	10.03	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	1	1	37.5%	37.5%	37.5%	37.5%	37.5%	37.5%	37.5%	37.5%	37.5%	1.25 GPM (4.75 LPM) showerhead versus a 2.0 GPM (7.6 LPM) showerhead and assuming that the length of showers does not change
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	

Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	9.8%	9.8%	9.8%	9.8%	9.8%	9.8%	9.8%	9.8%	9.8%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

Faucet Aerators

		References/Notes
Description:	Aerators can easily be attached to most faucets to restrict the flow rate of water flowing from them. This can result in savings to both water consumption and DHW energy.	Not in SaskPower
Baseline:	No faucet aerator installed on the kitchen faucet	
Upgrade:	A 1.5 GPM (5.7 LPM) faucet aerator installed on the kitchen faucet	

Baseline Reference:	1. Annual consumption, end use	= User Input	
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation	
Main End Use:	Space Heating		
Discount Rate:	7.38%		
GHG Adder Incl.?	No		
Resource Costs:	Baseload		

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☑	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☑	Mobile (Existing) ☑	Mobile (New) ☑	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	4,100	4,100	4,100	3,462	3,462	3,462	3,569	3,569	3,794	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	2,829	2,829	2,829	2,389	2,389	2,389	2,463	2,463	2,618	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	1,271	1,271	1,271	1,073	1,073	1,073	1,106	1,106	1,176	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$15.00	$15.00	$15.00	$15.00	$15.00	$15.00	$15.00	$15.00	$15.00	Based on a 2010 retail scan of faucet aerators and OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 190, January 2010. The cost of faucet aerators is about $5. Assuming 3 aerators per home in order to realize full savings.
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$15.00	$15.00	$15.00	$15.00	$15.00	$15.00	$15.00	$15.00	$15.00	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	10	10	10	10	10	10	10	10	10	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 190, January 2010.
	Baseline (yrs.)	-	-	-	-	-	-	-	-	-	
Cost Savings ($/yr.)		$12	$12	$12	$11	$11	$11	$11	$11	$12	
Simple Payback (yrs.)		1.2	1.2	1.2	1.4	1.4	1.4	1.4	1.4	1.31	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$85	$85	$85	$72	$72	$72	$74	$74	$79	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		$70	$70	$70	$57	$57	$57	$59	$59	$64	
Benefit/Cost Ratio		5.67	5.67	5.67	4.79	4.79	4.79	4.94	4.94	5.25	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	1	1	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 190, January 2010.
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	

Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	5.9%	5.9%	5.9%	5.9%	5.9%	5.9%	5.9%	5.9%	5.9%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Wastewater Heat Recovery Systems

		References/Notes
Description:	Residential wastewater heat recovery systems transfer the waste heat from drains to preheat make-up water. These systems work well only for DHW uses in which the hot water use and the draining of wastewater are simultaneous. Thus, in homes, application to anything other than showers is difficult. Heat recovery systems incorporate shell-and-tube heat exchangers that typically have efficiencies in the range of 40% to 55%, depending on factors such as design, material, overall length, and fluid flow rate.	In SaskPower
Baseline:	No wastewater heat recovery system installed	
Upgrade:	A 60" wastewater heat recovery system	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.648	$1.648	$1.648	$1.648	$1.648	$1.648	$1.648	$1.648
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.139	$0.139	$0.139	$0.139	$0.139	$0.139	$0.139	$0.139
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	5,610	5,610	5,610	4,737	4,737	4,737	4,884	4,884	5,192	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	2,693	2,693	2,693	2,274	2,274	2,274	2,344	2,344	2,492	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	2,917	2,917	2,917	2,463	2,463	2,463	2,540	2,540	2,700	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$680.00	$680.00	$680.00	$611.00	$611.00	$611.00	$611.00	$611.00	$646.82	Based on the cost of a Powerpipe R3-60 (3" diameter, 60" length) model for detached and an R3-48 in attached and mobile homes. Costs from Home Depot (2010).
	Upgrade, Installation ($)	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	Assuming 2 hours of labour @ $60/hr
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$800.00	$800.00	$800.00	$731.00	$731.00	$731.00	$731.00	$731.00	$766.82	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	30	30	30	30	30	30	30	30	30	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 498, January 2010.
	Baseline (yrs.)	-	-	-	-	-	-	-	-	-	
Cost Savings ($/yr.)		$29	$29	$29	$24	$24	$24	$25	$25	$26	
Simple Payback (yrs.)		28.0	28.0	28.0	30.3	30.3	30.3	29.4	29.4	29.08	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$406	$406	$406	$343	$343	$343	$353	$353	$375	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$394	-$394	-$394	-$388	-$388	-$388	-$378	-$378	-$391	
Benefit/Cost Ratio		0.51	0.51	0.51	0.47	0.47	0.47	0.48	0.48	0.49	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	1	1	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	Avg efficiency is ~52% for 2.0 GPM flow rates and a 60" model, based on RenewABILITY Energy Inc., "Power-Pipe: Backgrounder for Homes" (Note: Estimate may be high since there would be heat losses between the showerhead and the top of the HEX)
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	

Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

DHW Recirculation Systems (e.g. Metlund D'MAND®)

		References/Notes
Description:	When turning on the hot water tap, it often takes a long time before hot water begins to flow. DHW recirculation systems can be used to pump hot water to a faucet at the demand of a user, getting hot water to the fixture four to five times quicker than traditional systems. Water that is in the hot water lines is pumped back to the water heater either through the cold water lines or through a dedicated line. This pumping continues until the temperature of the hot water at the point of use reaches a specified value. In retrofit situations, this pumping system is generally installed at the faucet that is furthest away from the water heater and the system is enabled by remote activation from the other points of use. Along with improved convenience and water savings (since water isn't flushed down the drain), energy savings are achieved since the water that is pumped back to the water heater is generally warmer than city water. In addition, since the pump gets water to the fixture more quickly, there is an overall reduction of hot water use.	
Baseline:	A home with no DHW recirculation system	
Upgrade:	A home with a DHW recirculation system installed on the point-of-use farthest away from the hot water tank	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	21,578	21,578	21,578	18,219	18,219	18,219	18,785	18,785	19,968	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	18,125	18,125	18,125	15,304	15,304	15,304	15,780	15,780	16,773	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	3,452	3,452	3,452	2,915	2,915	2,915	3,006	3,006	3,195	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$450.00	$450.00	$450.00	$350.00	$350.00	$350.00	$350.00	$350.00	$401.91	Material cost varies from $250 to $500, depending on pump size (based on an online retail scan of these systems (2010))
	Upgrade, Installation ($)	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	Assuming 2 hours of labour @ $60/hr
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$570.00	$570.00	$570.00	$470.00	$470.00	$470.00	$470.00	$470.00	$521.91	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	18	18	18	18	18	18	18	18	18	High lifetime assumed since the systems are fairly simple (i.e. lifetime of a pump is fairly high)
	Baseline (yrs.)	-	-	-	-	-	-	-	-	-	
Cost Savings ($/yr.)		$34	$34	$34	$29	$29	$29	$29	$29	$31	
Simple Payback (yrs.)		16.8	16.8	16.8	16.5	16.5	16.5	16.0	16.0	16.65	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$361	$361	$361	$305	$305	$305	$314	$314	$334	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$209	-$209	-$209	-$165	-$165	-$165	-$156	-$156	-$188	
Benefit/Cost Ratio		0.63	0.63	0.63	0.65	0.65	0.65	0.67	0.67	0.64	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	1	1	16.0%	16.0%	16.0%	16.0%	16.0%	16.0%	16.0%	16.0%	16.0%	Oak Ridge National Laboratory, "Water and Energy Savings using Demand Hot Water Recirculating Systems in Residential Homes: A Case Study of Five Homes in Palo Alto, California", Sept. 2002, suggests 16-32% savings on DHW. Lower end assumed since very little research is available on these devices and savings are uncertain.
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	

Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	**Sub End Use/Equipment (If Applicable)**	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
		Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	16.0%	16.0%	16.0%	16.0%	16.0%	16.0%	16.0%	16.0%	16.0%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

High-Efficiency (ENERGY STAR®) Dishwashers

		References/Notes
Description:	ENERGY STAR® dishwashers save energy by using improved technology for the primary wash cycle and by using less hot water to clean. Features include more effective washing action, energy-efficient motors, and sensors that determine the length of the wash cycle and the temperature of the water necessary to clean the dishes. In addition, some advanced dishwashers can sense and adjust for the amount of soil on dishes, using only as much water as necessary. These savings affect both the energy used for heating the water and the mechanical energy of the dishwasher.	
Baseline:	A standard-sized new dishwasher	Link to bulletin on performance standards (new standards took effect on Jan. 1, 2010).
Upgrade:	An ENERGY STAR® certified, standard-sized new dishwasher	ENERGY STAR® standard for dishwashers to improve to 307 kWh/yr by July 1, 2011 (assumed here)

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.015	$1.015	$1.015	$1.015	$1.015	$1.015	$1.015	$1.015
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.073	$0.073	$0.073	$0.073	$0.073	$0.073	$0.073	$0.073
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	75	75	75	58	58	58	60	60	67	
	Natural Gas (MJ/yr.)	2,589	2,589	2,589	2,186	2,186	2,186	2,254	2,254	2,396	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	65	65	65	50	50	50	52	52	58	
	Natural Gas (MJ/yr.)	2,240	2,240	2,240	1,891	1,891	1,891	1,950	1,950	2,073	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	10	10	10	8	8	8	8	8	9	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	350	350	350	295	295	295	304	304	323	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$395.00	$395.00	$395.00	$395.00	$395.00	$395.00	$395.00	$395.00	$395.00	Incr. cost of $45 indicated in OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 34, January 2010.
	Upgrade, Installation ($)	$60.00	$60.00	$60.00	$60.00	$60.00	$60.00	$60.00	$60.00	$60.00	Assuming 1 hour of labour @ $60/hr
	Baseline, Material ($)	$350.00	$350.00	$350.00	$350.00	$350.00	$350.00	$350.00	$350.00	$350.00	Based on a retail scan of dishwashers offered by Sears (lowest cost models by reliable manufacturers) (2010)
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Assuming 1 hour of labour @ $60/hr
	Total Measure Cost ($)	$105.00	$105.00	$105.00	$105.00	$105.00	$105.00	$105.00	$105.00	$105.00	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	11	11	11	11	11	11	11	11	11	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 34, January 2010.
	Baseline (yrs.)	11	11	11	11	11	11	11	11	11	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 34, January 2010.
Cost Savings ($/yr.)		$4	$4	$4	$4	$4	$4	$4	$4	$4	
Simple Payback (yrs.)		24.6	24.6	24.6	29.7	29.7	29.7	28.7	28.7	27.05	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$10	$10	$10	$8	$8	$8	$8	$8	$9	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$25	$25	$25	$21	$21	$21	$22	$22	$23	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$69	-$69	-$69	-$76	-$76	-$76	-$75	-$75	-$72	
Benefit/Cost Ratio		0.34	0.34	0.34	0.28	0.28	0.28	0.29	0.29	0.31	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	1	1	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%		
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	1	1	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	ENERGY STAR® standard for dishwashers to improve to 307 kWh/yr by July 1, 2011
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heater	-	0	0									-	
Pool and Spa Heater	Pool Heaters	0	0									-	
Pool and Spa Heater	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	

Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	1	1	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	1	1	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	13.5%	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

High-Efficiency (ENERGY STAR®) Clothes Washers

		References/Notes
Description:	In January 2011, the ENERGY STAR® standard for clothes washers will be increased once again. As a result, very few top loading washers will meet ENERGY STAR® requirements. Instead, the overwhelming majority of ENERGY STAR® models will be front loading (horizontal axis) models. Compared to standard models, front loading washing machines use less hot water, less mechanical energy, and result in dryer energy savings due to faster spin cycle speeds.	
Baseline:	A standard 3.2 cu. ft. (90.6 L) top loading clothes washer	Link to minimum energy performance standards, which took effect on Jan. 1, 2007. Note: Top loading washer assumed since very few front loading models do not meet ENERGY STAR requirements
Upgrade:	An ENERGY STAR® certified, 3.2 cu. ft. (90.6 L) front loading clothes washer	Link to ENERGY STAR® standards -- new standards to take effect on Jan. 1, 2011

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.179	$1.179	$1.179	$1.179	$1.179	$1.179	$1.179	$1.179
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/m^3)	$0.010	$0.088	$0.088	$0.088	$0.088	$0.088	$0.088	$0.088	$0.088
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	64	64	64	48	48	48	51	51	56	
	Natural Gas (MJ/yr.)	8,647	8,647	8,647	7,531	7,531	7,531	7,863	7,863	8,114	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	40	40	40	30	30	30	32	32	36	
	Natural Gas (MJ/yr.)	5,448	5,448	5,448	4,744	4,744	4,744	4,954	4,954	5,112	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	24	24	24	18	18	18	19	19	21	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	3,200	3,200	3,200	2,786	2,786	2,786	2,909	2,909	3,002	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	$750.00	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 25, January 2010.
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Material ($)	$450.00	$450.00	$450.00	$450.00	$450.00	$450.00	$450.00	$450.00	$450.00	Based on a scan of non-ENERGY STAR top-loading models available from various retailers (Note: Current ENERGY STAR models may not meet new standards) (2010). Top loading washer assumed since very few front loading models do not meet ENERGY STAR requirements.
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$300.00	$300.00	$300.00	$300.00	$300.00	$300.00	$300.00	$300.00	$300.00	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	14	14	14	14	14	14	14	14	14	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 24, January 2010.
	Baseline (yrs.)	14	14	14	14	14	14	14	14	14	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 24, January 2010.
Cost Savings ($/yr.)		$33	$33	$33	$29	$29	$29	$30	$30	$31	
Simple Payback (yrs.)		9.0	9.0	9.0	10.4	10.4	10.4	10.0	10.0	9.68	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$28	$28	$28	$21	$21	$21	$22	$22	$25	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$281	$281	$281	$244	$244	$244	$255	$255	$263	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		$9	$9	$9	-$35	-$35	-$35	-$23	-$23	-$12	
Benefit/Cost Ratio		1.03	1.03	1.03	0.88	0.88	0.88	0.92	0.92	0.96	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	1	1	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	Link to ENERGY STAR® standards -- new standards to take effect on Jan. 1, 2011 (these stds assumed)
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	1	1	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	Assuming water savings increase is approx. proportional to increase in mechanical energy savings with new standards (DHW savings included in MEF (Modified Energy Factor)).
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	1	1	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	Savings due to higher spin speeds (dryer savings are incorporated into MEF (Modified Energy Factor)). Assuming savings are proportional to the mechanical energy savings.
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	

Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	1	1	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	37.0%	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	1	1	6.7%	6.7%	6.7%	6.7%	6.7%	6.7%	6.7%	6.7%	6.7%	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	1	1	20.4%	20.4%	20.4%	20.4%	20.4%	20.4%	20.4%	20.4%	20.4%	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

High-Efficiency Gas Clothes Dryers

Not used--moisture sensors have become common.

		References/Notes
Description:	The major distinction with energy-efficient gas clothes dryer models is that they incorporate termination controls to sense dryness and turn off automatically. The most efficient models have moisture sensors in the drum for sensing dryness, while other lower-cost and slightly less efficient models infer dryness by sensing the temperature of the exhaust air. The majority of the retail models currently available employ some type of dryness sensing technology but it is unclear how often these controls are used by homeowners.	
Baseline:	A gas clothes dryer with a temperature sensor	
Upgrade:	A gas clothes dryer with a moisture sensor. This option is no longer valid because almost all new gas dryers have moisture sensors.	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350	$1.350
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105	$0.105
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$500.00	$500.00	$500.00	$500.00	$500.00	$500.00	$500.00	$500.00	$500.00	Based on a retail scan of low-cost gas dryers with moisture sensors (2009)
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Material ($)	$450.00	$450.00	$450.00	$450.00	$450.00	$450.00	$450.00	$450.00	$450.00	Based on a retail scan of low-cost gas dryers without moisture sensors (2009)
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	18	18	18	18	18	18	18	18	18	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 58, January 2010.
	Baseline (yrs.)	18	18	18	18	18	18	18	18	18	OPA, "2010 Prescriptive Measures and Assumptions: Release 1", p. 58, January 2010.
Cost Savings ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Simple Payback (yrs.)		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$50	-$50	-$50	-$50	-$50	-$50	-$50	-$50	-$50	
Benefit/Cost Ratio		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	Savings for moisture sensor relative to temperature sensor, according to Citizen Gas, "Buyer's Guide: Natural Gas Clothes Dryers"
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	

Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Insulating Pool Covers

		References/Notes
Description:	Between 30% and 50% of the heat loss from a swimming pool is due to evaporation. In an outdoor pool, this heat loss either adds to the cost of heating the pool or shortens the swimming season. Evaporation also increases the quantity of chemicals that must be added to the pool. A pool cover can reduce evaporation and other heat losses but can also reduce heat gains depending on the design. An insulating vinyl pool cover is assumed for this analysis. Although substantially more expensive than the bubble type covers, insulating vinyl pool covers are much more robust and, thus, have much longer lifetimes. They are also more effective at trapping heat.	In SaskPower
Baseline:	A pool with no insulating cover	
Upgrade:	Installing a pool cover to reduce the heat loss from a heated pool	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	23,096	23,096	23,096	23,096	23,096	23,096	23,096	23,096	23,096	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	15,397	15,397	15,397	15,397	15,397	15,397	15,397	15,397	15,397	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$1,200.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00	Based on quotes from suppliers for a 50 m^2 pool with a manual reel. Cost also used in several previous studies, particularly TG 2005, when this cost was endorsed by TG staff.
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Installation cost included above
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
	Total Measure Cost ($)	$1,200.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	10	10	10	10	10	10	10	10	10	Reasonable lifetime assumed
	Baseline (yrs.)	-	-	-	-	-	-	-	-	-	
Cost Savings ($/yr.)		$151	$151	$151	$151	$151	$151	$151	$151	$151	
Simple Payback (yrs.)		8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	7.95	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$1,031	$1,031	$1,031	$1,031	$1,031	$1,031	$1,031	$1,031	$1,031	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$169	-$169	-$169	-$169	-$169	-$169	-$169	-$169	-$169	
Benefit/Cost Ratio		0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	1	1	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	CanREN, "How Can I best Manage My Pool's Energy Use?", 2002., mid range of 30-50% savings estimate used
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	

Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	1	1	26.4%	26.4%	26.4%	26.4%	26.4%	26.4%	26.4%	26.4%	26.4%	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

Heat Pump Pool Heaters

Not used--this is a fuel-switching measure.

		References/Notes
Description:	Air source heat pumps can be used to replace electric or gas-fired pool heaters. The principal of operation for these types of heat pumps is very similar to refrigerators and air conditioning units, in that they are used to transfer heat from one place to another. This allows them to be significantly more efficient than electric or gas-fired pool heaters, since these types of heaters generate heat rather than transferring it.	
Baseline:	A standard efficiency gas-fired pool heater	
Upgrade:	A heat pump pool heater. This option is not valid in this study because it is a fuel-switching measure.	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952	$0.952
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/m^3)	$0.010	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067	$0.067
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☑	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☑	Mobile (Existing) ☑	Mobile (New) ☑	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Nat. Gas (m3/yr.)	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	$3,000.00	Approximate cost of an 80,000 BTU heat pump pool heater, based on a scan of models available from online retailers
	Upgrade, Installation ($)	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	$120.00	Assuming 2 hours of labour @ $60/hr
	Baseline, Material ($)	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	Based on Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-81, April 16, 2009.
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Included in cost above
	Total Measure Cost ($)	$524.65	$524.65	$524.65	$524.65	$524.65	$524.65	$524.65	$524.65	$524.65	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	Assuming no incremental O&M
Lifetimes	Upgrade (yrs.)	10	10	10	10	10	10	10	10	10	Lifetime based on a US DOE website on heat pump pool heaters
	Baseline (yrs.)	7	7	7	7	7	7	7	7	7	US DOE suggests lifetime of 5 years or longer.
Cost Savings ($/yr.)		$377	$377	$377	$377	$377	$377	$377	$377	$377	
Simple Payback (yrs.)		1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.39	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$2,578	$2,578	$2,578	$2,578	$2,578	$2,578	$2,578	$2,578	$2,578	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		$2,053	$2,053	$2,053	$2,053	$2,053	$2,053	$2,053	$2,053	$2,053	
Benefit/Cost Ratio		4.91	4.91	4.91	4.91	4.91	4.91	4.91	4.91	4.91	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	This is where electricity increase would go, in fuel switching analysis.

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	1	1	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	Heat pump pool heater replaces all gas use for pool heating
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	

Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	1	1	66.1%	66.1%	66.1%	66.1%	66.1%	66.1%	66.1%	66.1%	66.1%	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

High-Efficiency Gas-Fired Pool Heaters

		References/Notes
Description:	High-efficiency pool heaters incorporate advanced heat exchangers, forced draft combustion systems, pilot-less ignitions and innovations in hydraulics, which results in performance efficiencies that range between 90% and 95%, compared to efficiencies of 80% to 85% for standard models.	
Baseline:	A standard efficiency gas-fired pool heater (82.5% efficiency assumed)	
Upgrade:	A high efficiency gas-fired pool heater (92.5% efficiency assumed)	

Baseline Reference:	1. Annual consumption, end use
Heating Fuel Type:	All Fuels (Average Fuel Mix)
Main End Use:	Space Heating
Discount Rate:	7.38%
GHG Adder Incl.?	No
Resource Costs:	Baseload

= User Input
= Calculation

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$0.733	$0.733	$0.733	$0.733	$0.733	$0.733	$0.733	$0.733
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/m^3)	$0.010	$0.048	$0.048	$0.048	$0.048	$0.048	$0.048	$0.048	$0.048
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☑	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☑	Mobile (Existing) ☑	Mobile (New) ☑	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	34,259	34,259	34,259	34,259	34,259	34,259	34,259	34,259	34,259	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Nat. Gas (m3/yr.)	4,234	4,234	4,234	4,234	4,234	4,234	4,234	4,234	4,234	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$2,900.00	$2,900.00	$2,900.00	$2,900.00	$2,900.00	$2,900.00	$2,900.00	$2,900.00	$2,900.00	Personal communication with Jandy pool heater manufacturers, 2008<-- consider updating
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	installation costs included above
	Baseline, Material ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Cost of upgrade is incremental cost
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	installation costs included above
	Total Measure Cost ($)	$2,900.00	$2,900.00	$2,900.00	$2,900.00	$2,900.00	$2,900.00	$2,900.00	$2,900.00	$2,900.00	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Set to incremental since cost above is incremental
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	7	7	7	7	7	7	7	7	7	US DOE suggests lifetime of 5 years or longer for a conventional heater. No evidence that high efficiency lifetimes are different.
	Baseline (yrs.)	7	7	7	7	7	7	7	7	7	US DOE suggests lifetime of 5 years or longer.
Cost Savings ($/yr.)		$41	$41	$41	$41	$41	$41	$41	$41	$41	
Simple Payback (yrs.)		69.9	69.9	69.9	69.9	69.9	69.9	69.9	69.9	69.89	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$204	$204	$204	$204	$204	$204	$204	$204	$204	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$2,696	-$2,696	-$2,696	-$2,696	-$2,696	-$2,696	-$2,696	-$2,696	-$2,696	
Benefit/Cost Ratio		0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	1	1	11.0%	11.0%	11.0%	11.0%	11.0%	11.0%	11.0%	11.0%	11.0%	Difference between energy use of 82.5% and 92.5% heaters.
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	

Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	1	1	7.3%	7.3%	7.3%	7.3%	7.3%	7.3%	7.3%	7.3%	7.3%	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Back to Index

Solar Pool Heaters

		References/Notes
Description:	Unlike other types of solar hot water systems, solar pool heaters do not include storage tanks or heat exchangers, and, since they are only used in warmer weather, they generally employ unglazed solar collectors that are composed of a polymer. These collectors are mounted of the roofs of homes or in an unshaded part of the yard. The heat transfer fluid is usually pool water that is pumped directly into the array of collectors and flows within the polymer in a serpentine array in order to pick up heat. Although solar DHW systems do require a pump, its consumption is similar to that used in electric and gas-fired pool heaters. Solar pool heaters can completely offset the energy requirements of conventional pool heaters. And, since they are much simpler than solar DHW systems, they are also much more affordable.	
Baseline:	A standard efficiency gas-fired pool heater	
Upgrade:	A solar pool heater with an unglazed collector	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)							
Electricity ($/kWh)	$0.083	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Natural Gas ($/MJ)	$0.010	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000

Sub-sector		Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Natural Gas (MJ/yr.)	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	38,493	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$3,450.00	$3,450.00	$3,450.00	$3,450.00	$3,450.00	$3,450.00	$3,450.00	$3,450.00	$3,450.00	Based on Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-81, April 16, 2009.
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Installation costs included above
	Baseline, Material ($)	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	Based on Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-81, April 16, 2009.
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Installation costs included above
	Total Measure Cost ($)	$3,450.00	$3,450.00	$3,450.00	$3,450.00	$3,450.00	$3,450.00	$3,450.00	$3,450.00	$3,450.00	
	Basis (Full/Incremental)	Full	Full	Full	Full	Full	Full	Full	Full	Full	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	20	20	20	20	20	20	20	20	20	Based on Navigant Consulting Inc., "Measures and Assumptions for Demand Side Management (DSM) Planning", p. C-81, April 16, 2009.
	Baseline (yrs.)	7	7	7	7	7	7	7	7	7	US DOE suggests lifetime of 5 years or longer.
Cost Savings ($/yr.)		$377	$377	$377	$377	$377	$377	$377	$377	$377	
Simple Payback (yrs.)		9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.15	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$4,301	$4,301	$4,301	$4,301	$4,301	$4,301	$4,301	$4,301	$4,301	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		$851	$851	$851	$851	$851	$851	$851	$851	$851	
Benefit/Cost Ratio		1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	0									-	

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	1	1	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	

Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	**Sub End Use/Equipment (If Applicable)**	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
		Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	1	1	66.1%	66.1%	66.1%	66.1%	66.1%	66.1%	66.1%	66.1%	66.1%	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	**Applies? (1=Yes; 0=No)**		**Measure Resource Savings (%)**									**References/Notes**
	Baseline	**Upgrade**	**Detached (Pre-1976)**	**Detached (Post-1976)**	**Detached (New)**	**Attached (Pre-1976)**	**Attached (Post-1976)**	**Attached (New)**	**Mobile (Existing)**	**Mobile (New)**	**Weighted Avg.**	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

TERASEN GAS: RESIDENTIAL SECTOR, LOWER MAINLAND - NATURAL GAS EFFICIENCY

Back to Index

Micro-Combined Heat and Power (CHP)

		References/Notes
Description:	Several types of micro-combustion heat and power (micro CHP) systems are either available or under development. These units all generate electrical power and capture the resulting "waste" heat for space and/or water heating. Reciprocating engine units such as the Honda Freewatt use a well-developed technology and can be scaled to a residential size. Power generate efficiencies range from 20-40% and up to 90% of the waste heat can be captured. Various sizing and control strategies can be used: for example, the amount of heat can be maximized or the amount of electricity can be maximized. This example assumes a unit such as the Honda Freewatt hydronic system, which has a 1.2 kW maximum electrical output and a 3.5 kW thermal output. Heat load following control is assumed to avoid fuel-switching, however power load following control is usually more economically attractive for applications involving seasonally varying loads. A back-up boiler is included in the Honda Freewatt package. Net-metering is assumed.	
Baseline:	Condensing gas-fired boiler (92% AFUE)	
Upgrade:	Installing a microturbine system in an average home, offsetting both the electric consumption from the grid and the amount of space and water heating that must be provided by a boiler. Note that this technology is not currently available in Canada.	

Baseline Reference:	1. Annual consumption, end use	= User Input
Heating Fuel Type:	All Fuels (Average Fuel Mix)	= Calculation
Main End Use:	Space Heating	
Discount Rate:	7.38%	
GHG Adder Incl.?	No	
Resource Costs:	Baseload	

	Customer Cost	Avoided Costs (NPV)								
Electricity ($/kWh)	$0.083	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	$1.418	
Electricity ($/kW)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	
Natural Gas ($/m^3)	$0.010	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	$0.112	
Oil ($/L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	
Water ($/1000L)	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	

Sub-sector		Detached (Pre-1976) ☑	Detached (Post-1976) ☑	Detached (New) ☑	Attached (Pre-1976) ☑	Attached (Post-1976) ☑	Attached (New) ☑	Mobile (Existing) ☑	Mobile (New) ☑	Weighted Avg.	References/Notes
Baseline Consumption	Electricity (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Upgrade Consumption	Electricity (kWh/yr.)	-2,000	-2,000	-2,000	-2,000	-2,000	-2,000	-2,000	-2,000	-2,000	
	Natural Gas (m3/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Interactive Effects (Inputs)	Heating Penalty ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
	Cooling Benefits ☐	0%	0%	0%	0%	0%	0%	0%	0%	0%	Ignoring interactive effects in Terasen Gas study
Interactive Effects (Results)	Electricity, Heating (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Cooling (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Electricity, Total (kWh/yr.)	-	-	-	-	-	-	-	-	-	
	Natural Gas (m3/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
Winter Peak Hours-Use Factor		-	-	-	-	-	-	-	-	-	
Resource Savings	Electricity (kWh/yr.)	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	
	Electricity (kW peak)	-	-	-	-	-	-	-	-	-	
	Nat. Gas (m3/yr.)	-	-	-	-	-	-	-	-	-	
	Oil (L/yr.)	-	-	-	-	-	-	-	-	-	
	Water (L/yr.)	-	-	-	-	-	-	-	-	-	
Cost Parameters	Upgrade, Material ($)	$13,000.00	$13,000.00	$13,000.00	$13,000.00	$13,000.00	$13,000.00	$13,000.00	$13,000.00	$13,000.00	Cost is anecdotal, gleaned from websites. Waiting for confirmation from Honda. This technology is not available in Canada and is not expected to be soon.
	Upgrade, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Above cost includes installation
	Baseline, Material ($)	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	$5,000.00	Cost is base case cost of 82 AFUE boiler. Update if base case for condensing boiler is updated.
	Baseline, Installation ($)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	Above cost includes installation
	Total Measure Cost ($)	$8,000.00	$8,000.00	$8,000.00	$8,000.00	$8,000.00	$8,000.00	$8,000.00	$8,000.00	$8,000.00	
	Basis (Full/Incremental)	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	Incr.	
Incremental O&M ($/yr.)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Lifetimes	Upgrade (yrs.)	20	20	20	20	20	20	20	20	20	Lifetime not well established--lifetime of base case boiler assumed.
	Baseline (yrs.)	20	20	20	20	20	20	20	20	20	
Cost Savings ($/yr.)		$166	$166	$166	$166	$166	$166	$166	$166	$166	
Simple Payback (yrs.)		48.3	48.3	48.3	48.3	48.3	48.3	48.3	48.3	48.31	
NPV of O&M Costs ($)		$0	$0	$0	$0	$0	$0	$0	$0	$0	
Total Benefits ($)	Electric Energy	$2,837	$2,837	$2,837	$2,837	$2,837	$2,837	$2,837	$2,837	$2,837	
	Electric Demand	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Natural Gas	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Oil	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	Water	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Measure TRC ($)		-$5,163	-$5,163	-$5,163	-$5,163	-$5,163	-$5,163	-$5,163	-$5,163	-$5,163	
Benefit/Cost Ratio		0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	

OTHER INPUTS

	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	References/Notes
Number of Units Installed	1	1	1	1	1	1	1	1	
Cost Flag (i.e. way measure is typically applied)	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	Incremental	
Sector Names (Model)									
Other (Blank)									
Other (Blank)									

RESOURCE SAVINGS ASSUMPTIONS (% RELATIVE TO BASELINE, NOT INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	-	0	0									-	
Space Cooling	-	0	0									-	
Clothes Washers	-	0	0									-	
Dishwashers	-	0	0									-	
Other Electric Loads	-	0	-1									-	RETSreen run indicates that mCHP delivers about 7200 MJ per year with heat following control

Natural Gas

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	RETScreen run indicates heat load following strategy uses about the same amount of gas a 92 AFUE boiler would use.
Domestic Hot Water (DHW)	-	0	0										RETScreen run indicates heat load following strategy uses about the same amount of gas a 92 AFUE boiler would use.
Domestic Hot Water (DHW)	Clothes Washers	0	0									-	
Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwashers	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	
Fireplaces	-	0	0									-	
Cooking	-	0	0									-	
Cooking	Cooktops	0	0									-	
Cooking	Ovens	0	0									-	
Clothes Dryers	-	0	0									-	
Pool and Spa Heaters	-	0	0									-	
Pool and Spa Heaters	Pool Heaters	0	0									-	
Pool and Spa Heaters	Spa Heaters	0	0									-	
Other	-	0	0									-	

Oil

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	-	0	0									-	
Domestic Hot Water (DHW)	-	0	0									-	
Domestic Hot Water (DHW)	Clothes Washer	0	0									-	

Domestic Hot Water (DHW)	Showers	0	0									-	
Domestic Hot Water (DHW)	Faucets	0	0									-	
Domestic Hot Water (DHW)	Baths	0	0									-	
Domestic Hot Water (DHW)	Dishwasher	0	0									-	
Domestic Hot Water (DHW)	Leaks	0	0									-	
Domestic Hot Water (DHW)	Tank (Standby) Losses	0	0									-	
Domestic Hot Water (DHW)	Pipe Losses	0	0									-	

Water

Main End Use	Sub End Use/Equipment (If Applicable)	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
		Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	Clothes Washer	0	0									-	
Water	Showers	0	0									-	
Water	Faucets	0	0									-	
Water	Baths	0	0									-	
Water	Dishwasher	0	0									-	
Water	Leaks	0	0									-	
Water	Tank (Standby) Losses	0	0									-	
Water	Pipe Losses	0	0									-	

RESOURCE SAVINGS WRAP-UP (% RELATIVE TO BASELINE, MAIN END-USES ONLY & INCLUDING HEATING PENALTIES/COOLING BENEFITS)

Electricity

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Ventilation and Circulation	0	0	-	-	-	-	-	-	-	-	-	
Space Cooling	0	0	-	-	-	-	-	-	-	-	-	
Clothes Washers	0	0	-	-	-	-	-	-	-	-	-	
Dishwashers	0	0	-	-	-	-	-	-	-	-	-	
Other Electric Loads	0	-1	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Natural Gas

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
Fireplaces	0	0	-	-	-	-	-	-	-	-	-	
Cooking	0	0	-	-	-	-	-	-	-	-	-	
Clothes Dryers	0	0	-	-	-	-	-	-	-	-	-	
Pool and Spa Heaters	0	0	-	-	-	-	-	-	-	-	-	
Other	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Oil

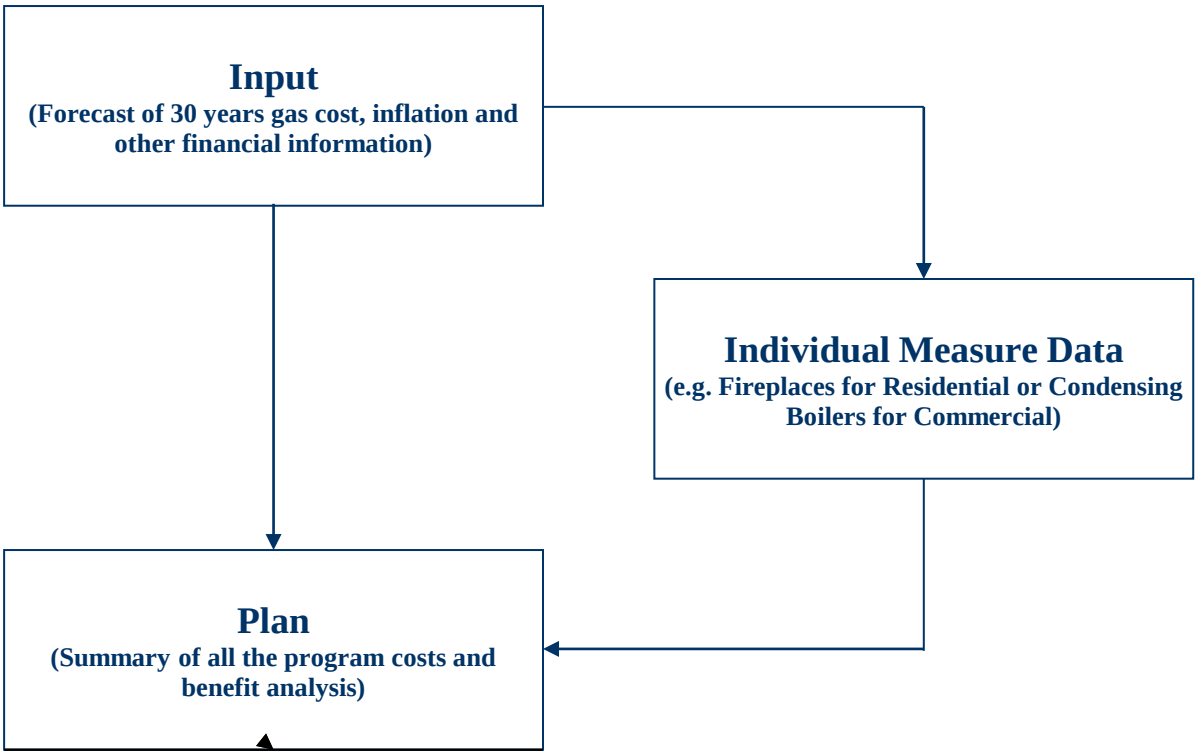
Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Space Heating	0	0	-	-	-	-	-	-	-	-	-	
Domestic Hot Water (DHW)	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Water

Main End Use	Applies? (1=Yes; 0=No)		Measure Resource Savings (%)									References/Notes
	Baseline	Upgrade	Detached (Pre-1976)	Detached (Post-1976)	Detached (New)	Attached (Pre-1976)	Attached (Post-1976)	Attached (New)	Mobile (Existing)	Mobile (New)	Weighted Avg.	
Water	0	0	-	-	-	-	-	-	-	-	-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											-	

Table of Contents

Sheet Name	Description
Plan	A summary of all the programs costs, savings, and benefit analysis
Input	30 years Gas Cost forecast, Inflation, and other financial inputs for the models
BASEBOARD Fuel Switching	Measure data and benefit analysis for High-Efficiency Furnace (New Construction)
HEAT PUMP Fuel Switching	Measure data and benefit analysis for High-Efficiency Furnace (New Construction)
Supply and DSM Projects	Diagram: Utility, shareholder, ratepayer, participant, society benefits and costs for supply projects and DSM
FS Project	Diagram: Utility, shareholder, ratepayer, participant, society benefits and costs for supply projects, DSM, and Fuel Switching


Input
(Forecast of 30 years gas cost, inflation and other financial information)
Individual Measure Data
(e.g. Fireplaces for Residential or Condensing Boilers for Commercial)
Plan
(Summary of all the program costs and benefit analysis)

Fortis BC

	PROGRAM															ALTERNATE		NET PRESENT VALUE									BENEFIT/COST							PARAMETERS										
	COSTS ($000)											SAVINGS (GJ)			LIFE	Impact		Levelized Cost	Utility Benefits (Costs)		Participant Benefits (Costs)			Program Net Savings				Participant							UTILITY				PARTICIPANT						
	Utility			Partners																																									
	Incentives	Administration	Total	Incentives	Administration	Total	Participant	Total	% Utility	% Partner	% Participant	Gross	Net-to-Gross	Net	Years	Energy	Capacity	($/GJ)	Program	Alternate	Program	Carbon Tax	Alternate	Natural Gas	Alternate Energy	Alternate Capacity	Natural Gas	Total Costs	Total Benefits	Benefit/Cost	Natural Gas	Total Resource	TRC Net Benefits	Natural Gas Utility Discount Rate	Natural Gas Supply	Alternate Discount Rate	Alternate Supply	Discount Rate	Natural Gas NPV	Carbon Tax NPV	Alternate Energy NPV	Alternate Capacity NPV	Natural Gas Tariff	Energy Tariff	Capacity Tariff
																MWh	kW		($'000s)	($'000s)	($'000s)	($'000s)	($'000s)	(GJ)	(MWh)	(kW)	Utility	($'000s)	($'000s)		Rate Impact		($'000s)		$/GJ		$/kWh		$/GJ	$/GJ	$/kWh	$/kW/a	$/GJ	$/kWh	$/kW/a
Label	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT
Source Sheet or Calculation	Program	Program	B+C	Program	Program	E+F	Program	D+G+H	D/I	G/I	H/I	Program	Program	MxN	Program	Program	Program	D/Y	OxAJ	Q x N x AL	M x N x AN	M x N x AO	N x (QxAP + RxAQ)	PV(AI,P,-O)	PV(AK,P,-Q*N)	PV(AK,P,-R)	T/D	H>0, (V+W)>0	H<0, (V+W)>0, X	AD/AC	T/(V+D)	(T+U)/I	(T+U)-I	Input	Program	Input	Input	Input	PV(AM,P,-InputD25)	Input	PV(AM,P,-InputD28)	PV(AM,P,-InputD29)	Input	Input	Input
2011																																													
Schools																																													
Geothermal - Average	0	30	30	0	0	0	310	340	9%	0%	91%	3,330	100%	3,330	20	(260)	-	1	434	(326)	349	53	(225)	34,872	(2,719)	-	14.5	310	176	0.6	1.1	0.3	(232)	7.15%	130.39	7%	1.26	7.2%	104.71	15.79	0.87	0.00	9.999	0.083	-

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI
1	**UTILITY**		**Fortis BC**																																
2																																			
3																																			
4			**Year**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**
5			Units																																
6		**NATURAL GAS**																																	
7		Incremental Cost of Gas (nominal)	$ Per GJ	$8.23	$8.70	$9.06	$9.39	$9.73	$9.96	$10.14	$10.29	$10.44	$10.59	$10.78	$11.01	$11.25	$11.49	$11.74	$11.99	$12.25	$12.51	$12.76	$13.04	$13.32	$13.60	$13.90	$14.20	$14.50	$14.81	$15.13	$15.46	$15.80	$16.14	$16.49	$16.79
8	1		*Year*	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*	*31*
9		carbon tax	$ per GJ	*0.75*	*1.00*	*1.25*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*
10		Distribution adder	$ per GJ	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	
11		Total incremental cost of gas including carbon		*9.13*	*9.86*	*10.46*	*11.05*	*11.39*	*11.62*	*11.80*	*11.95*	*12.10*	*12.24*	*12.44*	*12.67*	*12.91*	*13.15*	*13.39*	*13.65*	*13.90*	*14.17*	*14.42*	*14.69*	*14.97*	*15.26*	*15.55*	*15.85*	*16.16*	*16.47*	*16.79*	*17.12*	*17.45*	*17.79*	*18.14*	*18.29*
12	2	GDP Deflator		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
13	3	Incremental Cost of Gas (Real)		$9.13	$9.86	$10.46	$11.05	$11.39	$11.62	$11.80	$11.95	$12.10	$12.24	$12.44	$12.67	$12.91	$13.15	$13.39	$13.65	$13.90	$14.17	$14.42	$14.69	$14.97	$15.26	$15.55	$15.85	$16.16	$16.47	$16.79	$17.12	$17.45	$17.79	$18.14	$18.29
14	4	Net Present Value -2010			$17.11	$25.62	$34.00	$42.06	$49.74	$57.01	$63.89	$70.38	$76.52	$82.34	$87.87	$93.13	$98.13	$102.89	$107.41	$111.70	$115.79	$119.67	$123.37	$126.88	$130.22	$133.39	$136.41	$139.29	$142.02	$144.63	$147.10	$149.46	$151.70	$153.83	$155.84
15	5	Net Present Value -2011				$18.32	$27.29	$35.93	$44.16	$51.95	$59.32	$66.28	$72.86	$79.09	$85.02	$90.66	$96.01	$101.11	$105.95	$110.56	$114.94	$119.10	$123.05	$126.81	$130.39	$133.80	$137.03	$140.11	$143.04	$145.83	$148.48	$151.01	$153.41	$155.70	$157.85
16	6	Net Present Value -2012					$19.39	$28.64	$37.46	$45.81	$53.70	$61.16	$68.21	$74.89	$81.24	$87.28	$93.02	$98.48	$103.67	$108.60	$113.30	$117.75	$121.99	$126.02	$129.86	$133.50	$136.97	$140.27	$143.41	$146.40	$149.24	$151.95	$154.52	$156.97	$159.27
17																																			
18																																			
19		**ELECTRICITY**																																	
20		Incremental Cost of Elec	$ Per kWh	$0.12																															
21		Incremental Cost of E Capacity	$ Per kW/a	$170.00																															
22																																			
23																																			
24																																			
25	**RETAIL**																																		
26				Rate	Customers		789,928	Total Customers in BC		80,000	Total Residential and Commercial Customers on VI																								
27		Residential Retail			000's																														
28		**TGI**	$ Per MJ	$0.0100	640		712,304	Total Residential Customers in BC																											
29		**TGVI**	$ Per MJ	$0.0143	72																														
30		**Electricity**	$ Per MJ	$0.0230																															
31		**Electricity**	$ per kWh	$0.0827	1,511		1,511,435	Total BCH Residential Customers in BC				89%																							
32		**Electricity**	$ per kW per year																																
33		Commercial Retail																																	
34		**TGI**	$ Per MJ	$0.0094	78		77,624	Total Commercial Customers in BC																											
35		**TGVI**	$ Per MJ	$0.0169	8																														
36		**Electricity**	$ Per MJ	$0.0214																															
37		**Electricity**	$ per kWh	$0.0769	190		189,764	Total Light Industrial and Commercial Customers in BC																											
38		**Electricity**	$ per kW per year	$52.0000	15																														
39																																			
40	**TAX**																																		
41			**Year**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**
42	1		*Year*		*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*
43	2	Carbon	$ Per tonne		$20.00	$25.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00
44	3	Carbon	$ Per GJ		$0.9976	$1.2470	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964
45	4	GDP Deflator			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
46	5	Carbon (Real)			$1.00	$1.25	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50
47	6	Net Present Value -2010				$2.02	$3.23	$4.37	$5.43	$6.42	$7.34	$8.20	$9.00	$9.75	$10.45	$11.11	$11.72	$12.29	$12.82	$13.31	$13.78	$14.21	$14.61	$14.99	$15.34	$15.67	$15.97	$16.26	$16.52	$16.77	$17.00	$17.22	$17.42	$17.61	$17.79
48	7	Net Present Value -2011					$2.47	$3.68	$4.82	$5.88	$6.87	$7.79	$8.65	$9.45	$10.20	$10.90	$11.56	$12.17	$12.74	$13.27	$13.76	$14.23	$14.66	$15.06	$15.44	$15.79	$16.12	$16.42	$16.71	$16.97	$17.22	$17.45	$17.67	$17.87	$18.06
49	8	Net Present Value -2012						$2.70	$3.92	$5.05	$6.11	$7.10	$8.02	$8.88	$9.69	$10.44	$11.14	$11.79	$12.40	$12.97	$13.50	$14.00	$14.46	$14.89	$15.29	$15.67	$16.02	$16.35	$16.65	$16.94	$17.21	$17.45	$17.69	$17.90	$18.10
50																																			
51		**Discount Rate (real)[1]**																																	
52		**TERASEN GAS**																																	
53		**Rate of Inflation**	1.90%																																
54		**TGI**	7.15%																																
55		**TGVI**	7.15%																																
56		**BC HYDRO**																																	
57		**Rate of Inflation**	2.00%																																
58		**BC Hydro**	7.15%																																
59		**Customer**	7.15%																																
60		*Footnote 1: Source LR 070531*																																	
61																																			
62																																			

Fortis BC

Schools

NEW

only enter in boxes marked in blue

Measure Data for Geothermal - Average

PER MEASURE			Utility Incentive to the participant	partner incentive
Incremental Cost	$ 309,667			
Total Incentive	$ -			
Participant	**$ 309,667**			

Annual Impact Per Measure

Energy Savings per installation	**3330.1**	GJ		Average Annnual Energy Savings per Measure
Free Rider Rate / Net-to-Gross	**0%**	1.00		Net-to-Gross
Alternate Energy Impact	**-935**	GJ	-259,611	kWh
Alternate Capacity Impact		kW/a		
Measure Lifetime	**20**	Years	Estimated lifespan of measure	

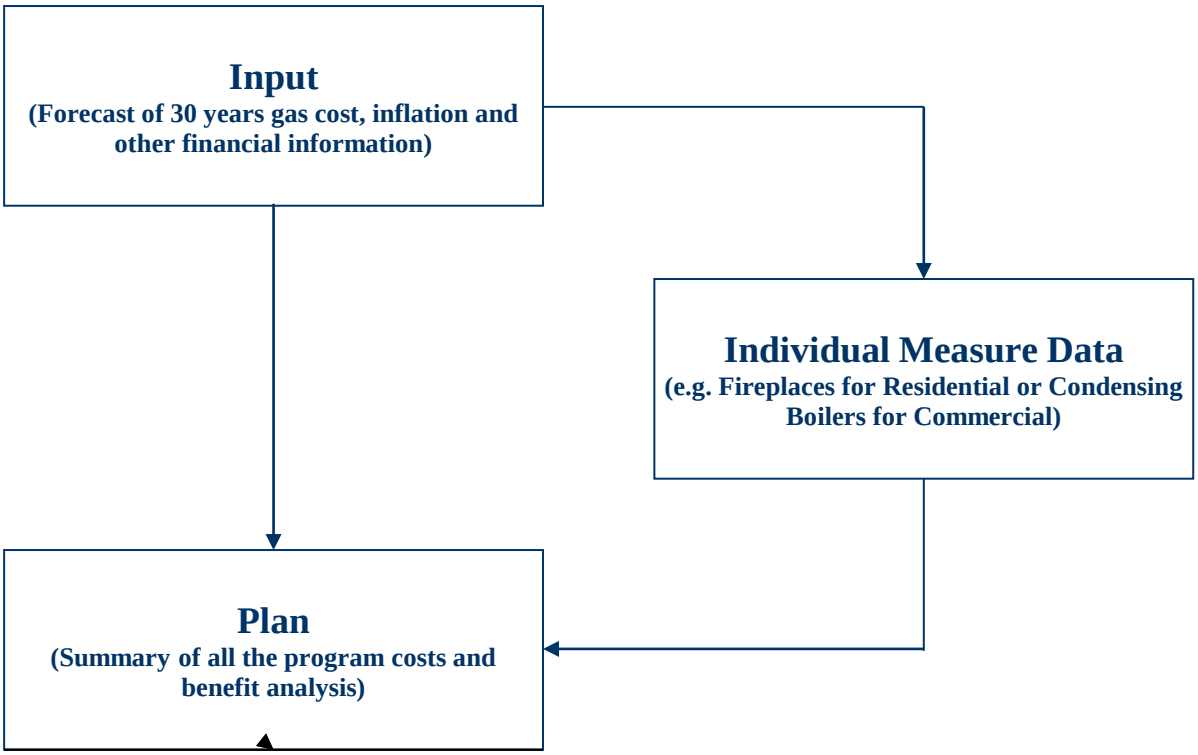
ANNUAL ACTIVITY	2010 NPV	Total	2010	2011	2012	Explanatory Notes
Number of FS Furnaces	1	1	**0**	**1**		Estimated Participatation
Impact						
Gross Energy Savings (GJ)	3,108	3,330	0	3,330	0	Extension of Unit Savings x No. of Upgrades
Net Energy Savings (GJ)	3,108	3,330	0	3,330	0	Gross Energy Savings less Free Riders
Alternate Energy Impact (Increase) (kWh)	(242,288)	(259,611)	0	(259,611)	0	Other Utility Billed energy impact
Alternate Capacity Impact (Increase) (kW/a)	$0.00	-				Other Utility Billed capacity impact

Benefit Cost Summary

	2010 NPV	*$ Total*	2010	2011	2012	
Avoided Revenue Requirements						
PV $ per GJ			$126.88	$130.39	$133.50	
Energy Purchases	$ 434,219	$ 434,219	$ -	$ 434,219	$ -	
Utility Program Costs						
DSM Incentives		$ -	$ -	$ -	$ -	
Administration		$ 30,000	**$ -**	**$ 30,000**		
Subtotal	$ 27,998	$ 30,000	$ -	$ 30,000	$ -	
Partner Program Costs						
DSM Incentives		$ -	$ -	$ -	$ -	
Administration		$ -	**$ -**	**$ -**	**$ -**	
Subtotal	$ -	$ -	$ -	$ -	$ -	
Participants' Net Costs						
Incremental Cost		$ 309,667	$ -	$ 309,667	$ -	
Subtotal	$ 289,003	$ 309,667	$ -	$ 309,667	$ -	
Alternate Savings - Net						
Energy (Purchases)		$ (326,226)	$ -	$ (326,226)	$ -	$1.257 PV $ per kWh
Capacity (Purchases)		$ -	$ -	$ -	$ -	PV$ per kW/a
Subtotal	$ (326,226)	$ (326,226)	$ -	$ (326,226)	$ -	
Total Resource Net Benefit (Cost)	$ (209,008)		$ -	$ (231,674)	$ -	Avoided Revenue Requirement less Utility less Partners less Participant Costs plus Alternate Savings
Utility Levelized Cost per GJ (Lifetime)	**$ 9.7**		**$ -**	**$ 9.7**	**$ -**	Informational (for comparison with supply options)

Table of Contents

Sheet Name	Description
Plan	A summary of all the programs costs, savings, and benefit analysis
Input	30 years Gas Cost forecast, Inflation, and other financial inputs for the models
BASEBOARD Fuel Switching	Measure data and benefit analysis for High-Efficiency Furnace (New Construction)
HEAT PUMP Fuel Switching	Measure data and benefit analysis for High-Efficiency Furnace (New Construction)
Supply and DSM Projects	Diagram: Utility, shareholder, ratepayer, participant, society benefits and costs for supply projects and DSM
FS Project	Diagram: Utility, shareholder, ratepayer, participant, society benefits and costs for supply projects, DSM, and Fuel Switching


Input
(Forecast of 30 years gas cost, inflation and other financial information)
Individual Measure Data
(e.g. Fireplaces for Residential or Condensing Boilers for Commercial)
Plan
(Summary of all the program costs and benefit analysis)

Fortis BC

	PROGRAM															ALTERNATE		NET PRESENT VALUE									BENEFIT/COST							PARAMETERS										
	COSTS ($000)											SAVINGS (GJ)			LIFE	Impact		Levelized Cost	Utility Benefits (Costs)		Participant Benefits (Costs)			Program Net Savings				Participant							UTILITY				PARTICIPANT						
	Utility			Partners																																									
	Incentives	Administration	Total	Incentives	Administration	Total	Participant	Total	% Utility	% Partner	% Participant	Gross	Net-to-Gross	Net	Years	Energy	Capacity	($/GJ)	Program	Alternate	Program	Carbon Tax	Alternate	Natural Gas	Alternate Energy	Alternate Capacity	Natural Gas	Total Costs	Total Benefits	Benefit/Cost	Natural Gas	Total Resource	TRC Net Benefits	Natural Gas Utility Discount Rate	Natural Gas Supply	Alternate Discount Rate	Alternate Supply	Discount Rate	Natural Gas NPV	Carbon Tax NPV	Alternate Energy NPV	Alternate Capacity NPV	Natural Gas Tariff	Energy Tariff	Capacity Tariff
																MWh	kW		($'000s)	($'000s)	($'000s)	($'000s)	($'000s)	(GJ)	(MWh)	(kW)	Utility	($'000s)	($'000s)		Rate Impact		($'000s)		$/GJ		$/kWh		$/GJ	$/GJ	$/kWh	$/kW/a	$/GJ	$/kWh	$/kW/a
Label	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT
Source Sheet or Calculation	Program	Program	B+C	Program	Program	E+F	Program	D+G+H	D/I	G/I	H/I	Program	Program	MxN	Program	Program	Program	D/Y	OxAJ	Q x N x AL	M x N x AN	M x N x AO	N x (QxAP + RxAQ)	PV(AI,P,-O)	PV(AK,P,-Q*N)	PV(AK,P,-R)	T/D	H>0, (V+W)>0	H<0, (V+W)>0, X	AD/AC	T/(V+D)	(T+U)/I	(T+U)-I	Input	Program	Input	Input	Input	PV(AM,P,-InputD25)	Input	PV(AM,P,-InputD28)	PV(AM,P,-InputD29)	Input	Input	Input
2011																																													
Schools																																													
Geothermal - Elementary	0	30	30	0	0	0	167	197	15%	0%	85%	1,402	100%	1,402	20	(153)	-	2	183	(193)	147	22	(133)	14,681	(1,606)	-	6.1	167	36	0.2	1.0	(0.1)	(206)	7.15%	130.39	7%	1.26	7.2%	104.71	15.79	0.87	0.00	9.999	0.083	-

	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI
1		**Fortis BC**																																
2																																		
3																																		
4		**Year**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**
5		Units																																
6	**NATURAL GAS**																																	
7	Incremental Cost of Gas (nominal)	$ Per GJ	$8.23	$8.70	$9.06	$9.39	$9.73	$9.96	$10.14	$10.29	$10.44	$10.59	$10.78	$11.01	$11.25	$11.49	$11.74	$11.99	$12.25	$12.51	$12.76	$13.04	$13.32	$13.60	$13.90	$14.20	$14.50	$14.81	$15.13	$15.46	$15.80	$16.14	$16.49	$16.79
8		*Year*	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*	*31*
9	carbon tax	$ per GJ	*0.75*	*1.00*	*1.25*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*
10	Distribution adder	$ per GJ	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	
11	Total incremental cost of gas including carbon		*9.13*	*9.86*	*10.46*	*11.05*	*11.39*	*11.62*	*11.80*	*11.95*	*12.10*	*12.24*	*12.44*	*12.67*	*12.91*	*13.15*	*13.39*	*13.65*	*13.90*	*14.17*	*14.42*	*14.69*	*14.97*	*15.26*	*15.55*	*15.85*	*16.16*	*16.47*	*16.79*	*17.12*	*17.45*	*17.79*	*18.14*	*18.29*
12	GDP Deflator		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
13	Incremental Cost of Gas (Real)		$9.13	$9.86	$10.46	$11.05	$11.39	$11.62	$11.80	$11.95	$12.10	$12.24	$12.44	$12.67	$12.91	$13.15	$13.39	$13.65	$13.90	$14.17	$14.42	$14.69	$14.97	$15.26	$15.55	$15.85	$16.16	$16.47	$16.79	$17.12	$17.45	$17.79	$18.14	$18.29
14	Net Present Value -2010			$17.11	$25.62	$34.00	$42.06	$49.74	$57.01	$63.89	$70.38	$76.52	$82.34	$87.87	$93.13	$98.13	$102.89	$107.41	$111.70	$115.79	$119.67	$123.37	$126.88	$130.22	$133.39	$136.41	$139.29	$142.02	$144.63	$147.10	$149.46	$151.70	$153.83	$155.84
15	Net Present Value -2011				$18.32	$27.29	$35.93	$44.16	$51.95	$59.32	$66.28	$72.86	$79.09	$85.02	$90.66	$96.01	$101.11	$105.95	$110.56	$114.94	$119.10	$123.05	$126.81	$130.39	$133.80	$137.03	$140.11	$143.04	$145.83	$148.48	$151.01	$153.41	$155.70	$157.85
16	Net Present Value -2012					$19.39	$28.64	$37.46	$45.81	$53.70	$61.16	$68.21	$74.89	$81.24	$87.28	$93.02	$98.48	$103.67	$108.60	$113.30	$117.75	$121.99	$126.02	$129.86	$133.50	$136.97	$140.27	$143.41	$146.40	$149.24	$151.95	$154.52	$156.97	$159.27
17																																		
18																																		
19	**ELECTRICITY**																																	
20	Incremental Cost of Elec	$ Per kWh	$0.12																															
21	Incremental Cost of E Capacity	$ Per kW/a	$170.00																															
22																																		
23																																		
24																																		
25																																		
26			Rate	Customers		789,928	Total Customers in BC		80,000	Total Residential and Commercial Customers on VI																								
27	Residential Retail			000's																														
28	**TGI**	$ Per MJ	$0.0100	640		712,304	Total Residential Customers in BC																											
29	**TGVI**	$ Per MJ	$0.0143	72																														
30	**Electricity**	$ Per MJ	$0.0230																															
31	**Electricity**	$ per kWh	$0.0827	1,511		1,511,435	Total BCH Residential Customers in BC				89%																							
32	**Electricity**	$ per kW per year																																
33	Commercial Retail																																	
34	**TGI**	$ Per MJ	$0.0094	78		77,624	Total Commercial Customers in BC																											
35	**TGVI**	$ Per MJ	$0.0169	8																														
36	**Electricity**	$ Per MJ	$0.0214																															
37	**Electricity**	$ per kWh	$0.0769	190		189,764	Total Light Industrial and Commercial Customers in BC																											
38	**Electricity**	$ per kW per year	$52.0000	15																														
39																																		
40																																		
41		**Year**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**
42		*Year*		*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*
43	Carbon	$ Per tonne		$20.00	$25.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00
44	Carbon	$ Per GJ		$0.9976	$1.2470	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964
45	GDP Deflator			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
46	Carbon (Real)			$1.00	$1.25	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50
47	Net Present Value -2010				$2.02	$3.23	$4.37	$5.43	$6.42	$7.34	$8.20	$9.00	$9.75	$10.45	$11.11	$11.72	$12.29	$12.82	$13.31	$13.78	$14.21	$14.61	$14.99	$15.34	$15.67	$15.97	$16.26	$16.52	$16.77	$17.00	$17.22	$17.42	$17.61	$17.79
48	Net Present Value -2011					$2.47	$3.68	$4.82	$5.88	$6.87	$7.79	$8.65	$9.45	$10.20	$10.90	$11.56	$12.17	$12.74	$13.27	$13.76	$14.23	$14.66	$15.06	$15.44	$15.79	$16.12	$16.42	$16.71	$16.97	$17.22	$17.45	$17.67	$17.87	$18.06
49	Net Present Value -2012						$2.70	$3.92	$5.05	$6.11	$7.10	$8.02	$8.88	$9.69	$10.44	$11.14	$11.79	$12.40	$12.97	$13.50	$14.00	$14.46	$14.89	$15.29	$15.67	$16.02	$16.35	$16.65	$16.94	$17.21	$17.45	$17.69	$17.90	$18.10
50																																		
51	**Discount Rate (real)[1]**																																	
52	**TERASEN GAS**																																	
53	**Rate of Inflation**	1.90%																																
54	**TGI**	7.15%																																
55	**TGVI**	7.15%																																
56	**BC HYDRO**																																	
57	**Rate of Inflation**	2.00%																																
58	**BC Hydro**	7.15%																																
59	**Customer**	7.15%																																
60	*Footnote 1: Source LR 070531*																																	
61																																		
62																																		
63																																		

Fortis BC

Schools

NEW

only enter in boxes marked in blue

Measure Data for Geothermal - Elementary

PER MEASURE			Utility Incentive to the participant	partner incentive
Incremental Cost	$	166,631		
Total Incentive	$	-		
Participant	**$**	**166,631**		

Annual Impact Per Measure

Energy Savings per installation	**1402.0**	GJ		Average Annnual Energy Savings per Measure
Free Rider Rate / Net-to-Gross	**0%**	1.00		Net-to-Gross
Alternate Energy Impact	**-552**	GJ	-153,333	kWh
Alternate Capacity Impact		kW/a		
Measure Lifetime	**20**	Years	Estimated lifespan of measure	

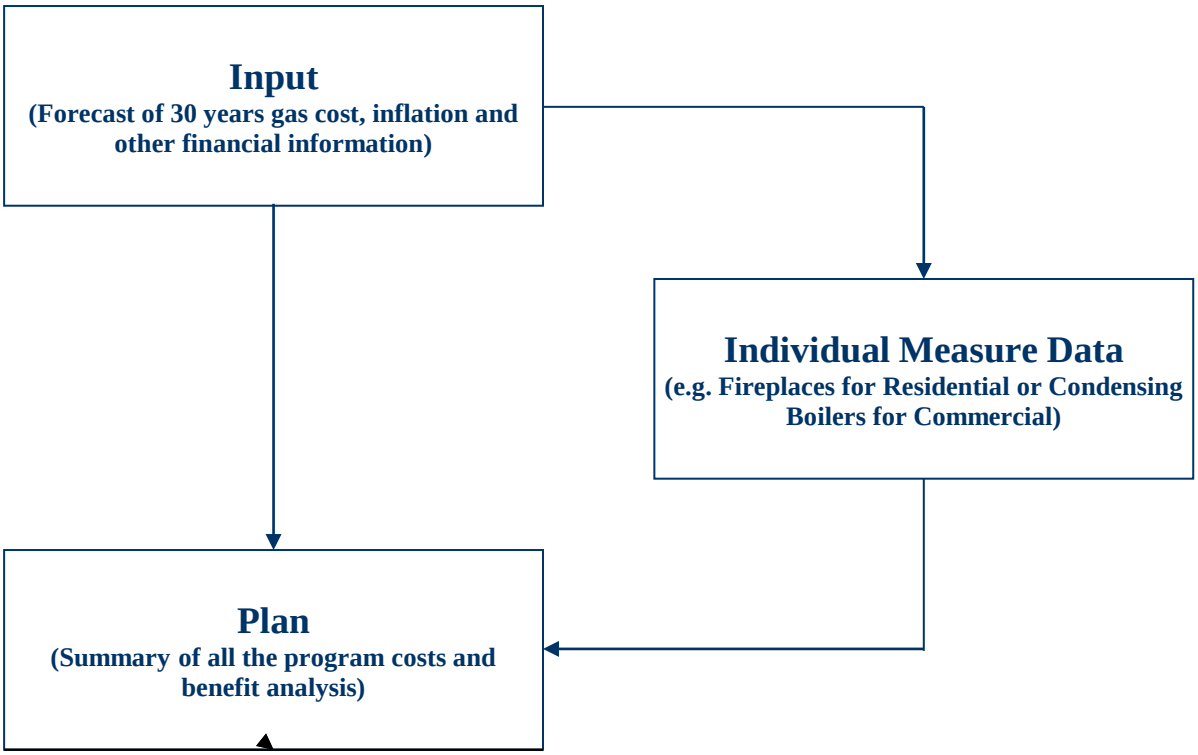
ANNUAL ACTIVITY	2010 NPV	Total	2010	2011	2012	Explanatory Notes
Number of FS Furnaces	1	1	**0**	**1**		Estimated Participatation
Impact						
Gross Energy Savings (GJ)	1,308	1,402	0	1,402	0	Extension of Unit Savings x No. of Upgrades
Net Energy Savings (GJ)	1,308	1,402	0	1,402	0	Gross Energy Savings less Free Riders
Alternate Energy Impact (Increase) (kWh)	(143,102)	(153,333)	0	(153,333)	0	Other Utility Billed energy impact
Alternate Capacity Impact (Increase) (kW/a)	$0.00	-				Other Utility Billed capacity impact

Benefit Cost Summary

	2010 NPV	*$ Total*	2010	2011	2012	
Avoided Revenue Requirements						
PV $ per GJ			$126.88	$130.39	$133.50	
Energy Purchases	$ 182,810	$ 182,810	$ -	$ 182,810	$ -	
Utility Program Costs						
DSM Incentives		$ -	$ -	$ -	$ -	
Administration		$ 30,000	**$ -**	**$ 30,000**		
Subtotal	$ 27,998	$ 30,000	$ -	$ 30,000	$ -	
Partner Program Costs						
DSM Incentives		$ -	$ -	$ -	$ -	
Administration		$ -	**$ -**	**$ -**	**$ -**	
Subtotal	$ -	$ -	$ -	$ -	$ -	
Participants' Net Costs						
Incremental Cost		$ 166,631	$ -	$ 166,631	$ -	
Subtotal	$ 155,512	$ 166,631	$ -	$ 166,631	$ -	
Alternate Savings - Net						
Energy (Purchases)		$ (192,678)	$ -	$ (192,678)	$ -	$1.257 PV $ per kWh
Capacity (Purchases)		$ -	$ -	$ -	$ -	PV$ per kW/a
Subtotal	$ (192,678)	$ (192,678)	$ -	$ (192,678)	$ -	
Total Resource Net Benefit (Cost)	$ (193,378)		$ -	$ (206,499)	$ -	Avoided Revenue Requirement less Utility less Partners less Participant Co
Utility Levelized Cost per GJ (Lifetime)	**$ 13.4**		**$ -**	**$ 13.4**	**$ -**	Informational (for comparison with supply options)

Table of Contents

Sheet Name	Description
Plan	A summary of all the programs costs, savings, and benefit analysis
Input	30 years Gas Cost forecast, Inflation, and other financial inputs for the models
BASEBOARD Fuel Switching	Measure data and benefit analysis for High-Efficiency Furnace (New Construction)
HEAT PUMP Fuel Switching	Measure data and benefit analysis for High-Efficiency Furnace (New Construction)
Supply and DSM Projects	Diagram: Utility, shareholder, ratepayer, participant, society benefits and costs for supply projects and DSM
FS Project	Diagram: Utility, shareholder, ratepayer, participant, society benefits and costs for supply projects, DSM, and Fuel Switching


Input
(Forecast of 30 years gas cost, inflation and other financial information)
Individual Measure Data
(e.g. Fireplaces for Residential or Condensing Boilers for Commercial)
Plan
(Summary of all the program costs and benefit analysis)

Fortis BC

	PROGRAM															ALTERNATE		NET PRESENT VALUE									BENEFIT/COST							PARAMETERS											
	COSTS ($000)											SAVINGS (GJ)			LIFE	Impact		Levelized Cost	Utility Benefits (Costs)		Participant Benefits (Costs)			Program Net Savings				Participant							UTILITY				PARTICIPANT							
	Utility			Partners																																											
	Incentives	Administration	Total	Incentives	Administration	Total	Participant	Total	% Utility	% Partner	% Participant	Gross	Net-to-Gross	Net	Years	Energy	Capacity	($/GJ)	Program	Alternate	Program	Carbon Tax	Alternate	Natural Gas	Alternate Energy	Alternate Capacity	Natural Gas	Total Costs	Total Benefits	Benefit/Cost	Natural Gas	Total Resource	TRC Net Benefits	Natural Gas Utility Discount Rate	Natural Gas Supply	Alternate Discount Rate	Alternate Supply	Discount Rate	Natural Gas NPV	Carbon Tax NPV	Alternate Energy NPV	Alternate Capacity NPV	Natural Gas Tariff	Energy Tariff	Capacity Tariff
																MWh	kW		($'000s)	($'000s)	($'000s)	($'000s)	($'000s)	(GJ)	(MWh)	(kW)	Utility	($'000s)	($'000s)		Rate Impact		($'000s)		$/GJ		$/kWh		$/GJ	$/GJ	$/kWh	$/kW/a	$/GJ	$/kWh	$/kW/a
Label	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT
Source Sheet or Calculation	Program	Program	B+C	Program	Program	E+F	Program	D+G+H	D/I	G/I	H/I	Program	Program	MxN	Program	Program	Program	D/Y	OxAJ	Q x N x AL	M x N x AN	M x N x AO	N x (QxAP + RxAQ)	PV(AI,P,-O)	PV(AK,P,-Q*N)	PV(AK,P,-R)	T/D	H>0, (V+W)>0	H<0, (V+W)>0, X	AD/AC	T/(V+D)	(T+U)/I	(T+U)-I	Input	Program	Input	Input	Input	PV(AM,P,-InputD25)	Input	PV(AM,P,-InputD28)	PV(AM,P,-InputD29)	Input	Input	Input
2011																																															
Schools																																															
Geothermal - Secondary	0	30	30	0	0	0	524	554	5%	0%	95%	6,223	100%	6,223	20	(419)	-	0	811	(527)	652	98	(363)	65,165	(4,389)	-	27.0	524	387	0.7	1.2	0.5	(270)	7.15%	130.39	7%	1.26	7.2%	104.71	15.79	0.87	0.00	9.999	0.083	-

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI
1	**UTILITY**		**Fortis BC**																																
2																																			
3																																			
4			**Year**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**
5			Units																																
6		**NATURAL GAS**																																	
7		Incremental Cost of Gas (nominal)	$ Per GJ	$8.23	$8.70	$9.06	$9.39	$9.73	$9.96	$10.14	$10.29	$10.44	$10.59	$10.78	$11.01	$11.25	$11.49	$11.74	$11.99	$12.25	$12.51	$12.76	$13.04	$13.32	$13.60	$13.90	$14.20	$14.50	$14.81	$15.13	$15.46	$15.80	$16.14	$16.49	$16.79
8	1		*Year*	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*	*31*
9		carbon tax	$ per GJ	*0.75*	*1.00*	*1.25*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*
10		Distribution adder	$ per GJ	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	
11		Total incremental cost of gas including carbon		*9.13*	*9.86*	*10.46*	*11.05*	*11.39*	*11.62*	*11.80*	*11.95*	*12.10*	*12.24*	*12.44*	*12.67*	*12.91*	*13.15*	*13.39*	*13.65*	*13.90*	*14.17*	*14.42*	*14.69*	*14.97*	*15.26*	*15.55*	*15.85*	*16.16*	*16.47*	*16.79*	*17.12*	*17.45*	*17.79*	*18.14*	*18.29*
12	2	GDP Deflator		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
13	3	Incremental Cost of Gas (Real)		$9.13	$9.86	$10.46	$11.05	$11.39	$11.62	$11.80	$11.95	$12.10	$12.24	$12.44	$12.67	$12.91	$13.15	$13.39	$13.65	$13.90	$14.17	$14.42	$14.69	$14.97	$15.26	$15.55	$15.85	$16.16	$16.47	$16.79	$17.12	$17.45	$17.79	$18.14	$18.29
14	4	Net Present Value -2010			$17.11	$25.62	$34.00	$42.06	$49.74	$57.01	$63.89	$70.38	$76.52	$82.34	$87.87	$93.13	$98.13	$102.89	$107.41	$111.70	$115.79	$119.67	$123.37	$126.88	$130.22	$133.39	$136.41	$139.29	$142.02	$144.63	$147.10	$149.46	$151.70	$153.83	$155.84
15	5	Net Present Value -2011				$18.32	$27.29	$35.93	$44.16	$51.95	$59.32	$66.28	$72.86	$79.09	$85.02	$90.66	$96.01	$101.11	$105.95	$110.56	$114.94	$119.10	$123.05	$126.81	$130.39	$133.80	$137.03	$140.11	$143.04	$145.83	$148.48	$151.01	$153.41	$155.70	$157.85
16	6	Net Present Value -2012					$19.39	$28.64	$37.46	$45.81	$53.70	$61.16	$68.21	$74.89	$81.24	$87.28	$93.02	$98.48	$103.67	$108.60	$113.30	$117.75	$121.99	$126.02	$129.86	$133.50	$136.97	$140.27	$143.41	$146.40	$149.24	$151.95	$154.52	$156.97	$159.27
17																																			
18																																			
19		**ELECTRICITY**																																	
20		Incremental Cost of Elec	$ Per kWh	$0.12																															
21		Incremental Cost of E Capacity	$ Per kW/a	$170.00																															
22																																			
23																																			
24																																			
25	**RETAIL**																																		
26				Rate	Customers		789,928	Total Customers in BC		80,000	Total Residential and Commercial Customers on VI																								
27		Residential Retail			000's																														
28		**TGI**	$ Per MJ	$0.0100	640		712,304	Total Residential Customers in BC																											
29		**TGVI**	$ Per MJ	$0.0143	72																														
30		**Electricity**	$ Per MJ	$0.0230																															
31		**Electricity**	$ per kWh	$0.0827	1,511		1,511,435	Total BCH Residential Customers in BC			89%																								
32		**Electricity**	$ per kW per year																																
33		Commercial Retail																																	
34		**TGI**	$ Per MJ	$0.0094	78		77,624	Total Commercial Customers in BC																											
35		**TGVI**	$ Per MJ	$0.0169	8																														
36		**Electricity**	$ Per MJ	$0.0214																															
37		**Electricity**	$ per kWh	$0.0769	190		189,764	Total Light Industrial and Commercial Customers in BC																											
38		**Electricity**	$ per kW per year	$52.0000	15																														
39																																			
40	**TAX**																																		
41			**Year**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**
42	1		*Year*		*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*
43	2	Carbon	$ Per tonne		$20.00	$25.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00
44	3	Carbon	$ Per GJ		$0.9976	$1.2470	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964
45	4	GDP Deflator			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
46	5	Carbon (Real)			$1.00	$1.25	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50
47	6	Net Present Value -2010				$2.02	$3.23	$4.37	$5.43	$6.42	$7.34	$8.20	$9.00	$9.75	$10.45	$11.11	$11.72	$12.29	$12.82	$13.31	$13.78	$14.21	$14.61	$14.99	$15.34	$15.67	$15.97	$16.26	$16.52	$16.77	$17.00	$17.22	$17.42	$17.61	$17.79
48	7	Net Present Value -2011					$2.47	$3.68	$4.82	$5.88	$6.87	$7.79	$8.65	$9.45	$10.20	$10.90	$11.56	$12.17	$12.74	$13.27	$13.76	$14.23	$14.66	$15.06	$15.44	$15.79	$16.12	$16.42	$16.71	$16.97	$17.22	$17.45	$17.67	$17.87	$18.06
49	8	Net Present Value -2012						$2.70	$3.92	$5.05	$6.11	$7.10	$8.02	$8.88	$9.69	$10.44	$11.14	$11.79	$12.40	$12.97	$13.50	$14.00	$14.46	$14.89	$15.29	$15.67	$16.02	$16.35	$16.65	$16.94	$17.21	$17.45	$17.69	$17.90	$18.10
50																																			
51		**Discount Rate (real)[1]**																																	
52		**TERASEN GAS**																																	
53		**Rate of Inflation**	1.90%																																
54		**TGI**	7.15%																																
55		**TGVI**	7.15%																																
56		**BC HYDRO**																																	
57		**Rate of Inflation**	2.00%																																
58		**BC Hydro**	7.15%																																
59		**Customer**	7.15%																																
60		*Footnote 1: Source LR 070531*																																	
61																																			
62																																			

Fortis BC

Schools

NEW

only enter in boxes marked in blue

Measure Data for Geothermal - Secondary

PER MEASURE			Utility Incentive to the participant	partner incentive
Incremental Cost	$ 524,221			
Total Incentive	$ -			
Participant	**$ 524,221**			

Annual Impact Per Measure

Energy Savings per installation	**6223.0**	GJ		Average Annnual Energy Savings per Measure
Free Rider Rate / Net-to-Gross	**0%**	1.00		Net-to-Gross
Alternate Energy Impact	**-1509**	GJ	-419,167	kWh
Alternate Capacity Impact		kW/a		
Measure Lifetime	**20**	Years	Estimated lifespan of measure	

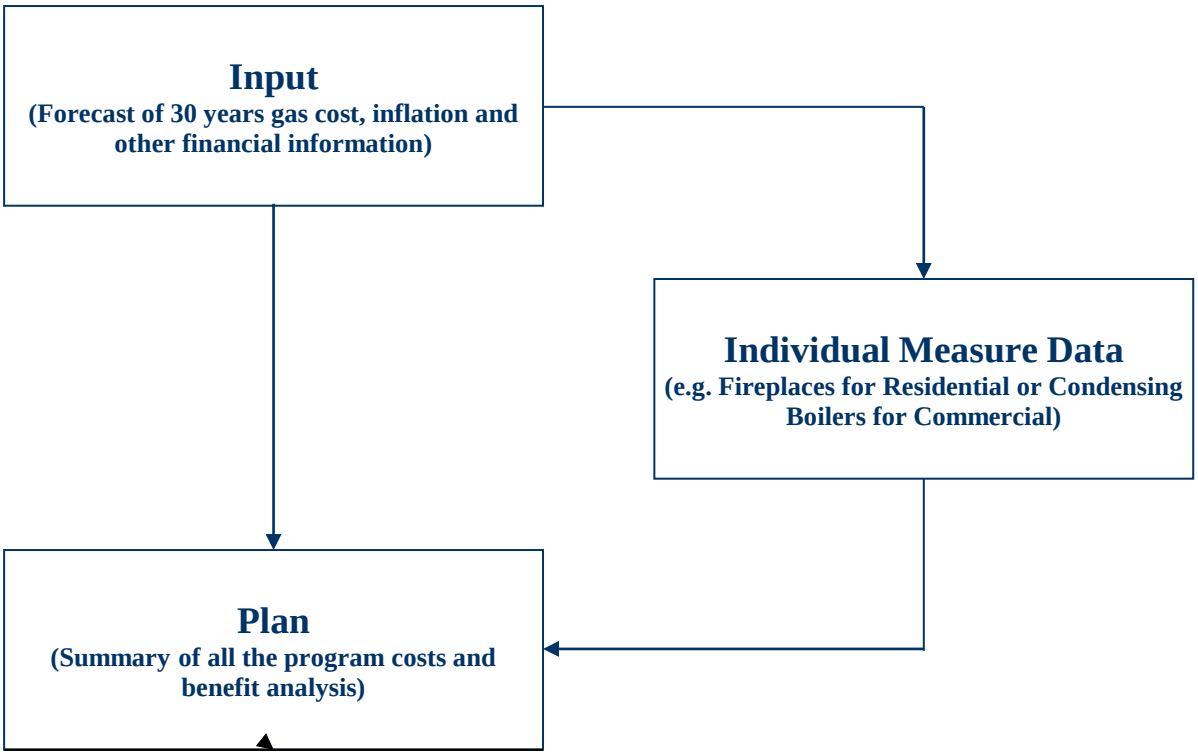
ANNUAL ACTIVITY	2010 NPV	Total	2010	2011	2012	Explanatory Notes
Number of FS Furnaces	1	1	**0**	**1**		Estimated Participatation
Impact						
Gross Energy Savings (GJ)	5,808	6,223	0	6,223	0	Extension of Unit Savings x No. of Upgrades
Net Energy Savings (GJ)	5,808	6,223	0	6,223	0	Gross Energy Savings less Free Riders
Alternate Energy Impact (Increase) (kWh)	(391,196)	(419,167)	0	(419,167)	0	Other Utility Billed energy impact
Alternate Capacity Impact (Increase) (kW/a)	$0.00	-				Other Utility Billed capacity impact

Benefit Cost Summary

	2010 NPV	*$ Total*	2010	2011	2012	
Avoided Revenue Requirements						
PV $ per GJ			$126.88	$130.39	$133.50	
Energy Purchases	$ 811,431	$ 811,431	$ -	$ 811,431	$ -	
Utility Program Costs						
DSM Incentives		$ -	$ -	$ -	$ -	
Administration		$ 30,000	**$ -**	**$ 30,000**		
Subtotal	$ 27,998	$ 30,000	$ -	$ 30,000	$ -	
Partner Program Costs						
DSM Incentives		$ -	$ -	$ -	$ -	
Administration		$ -	**$ -**	**$ -**	**$ -**	
Subtotal	$ -	$ -	$ -	$ -	$ -	
Participants' Net Costs						
Incremental Cost		$ 524,221	$ -	$ 524,221	$ -	
Subtotal	$ 489,240	$ 524,221	$ -	$ 524,221	$ -	
Alternate Savings - Net						
Energy (Purchases)		$ (526,723)	$ -	$ (526,723)	$ -	$1.257 PV $ per kWh
Capacity (Purchases)		$ -	$ -	$ -	$ -	PV$ per kW/a
Subtotal	$ (526,723)	$ (526,723)	$ -	$ (526,723)	$ -	
Total Resource Net Benefit (Cost)	$ (232,530)		$ -	$ (269,513)	$ -	Avoided Revenue Requirement less Utility less Partners less Participant Costs plus Alternate Savings
Utility Levelized Cost per GJ (Lifetime)	**$ 8.5**		**$ -**	**$ 8.5**	**$ -**	Informational (for comparison with supply options)

Table of Contents

Sheet Name	Description
Plan	A summary of all the programs costs, savings, and benefit analysis
Input	30 years Gas Cost forecast, Inflation, and other financial inputs for the models
BASEBOARD Fuel Switching	Measure data and benefit analysis for High-Efficiency Furnace (New Construction)
HEAT PUMP Fuel Switching	Measure data and benefit analysis for High-Efficiency Furnace (New Construction)
Supply and DSM Projects	Diagram: Utility, shareholder, ratepayer, participant, society benefits and costs for supply projects and DSM
FS Project	Diagram: Utility, shareholder, ratepayer, participant, society benefits and costs for supply projects, DSM, and Fuel Switching


Input
(Forecast of 30 years gas cost, inflation and other financial information)
Individual Measure Data
(e.g. Fireplaces for Residential or Condensing Boilers for Commercial)
Plan
(Summary of all the program costs and benefit analysis)

Fortis BC

	PROGRAM															ALTERNATE		NET PRESENT VALUE									BENEFIT/COST							PARAMETERS											
	COSTS ($000)											SAVINGS (GJ)			LIFE	Impact		Levelized Cost	Utility Benefits (Costs)		Participant Benefits (Costs)			Program Net Savings				Participant							UTILITY				PARTICIPANT							
	Utility			Partners																																										
	Incentives	Administration	Total	Incentives	Administration	Total	Participant	Total	% Utility	% Partner	% Participant	Gross	Net-to-Gross	Net	Years	Energy	Capacity	($/GJ)	Program	Alternate	Program	Carbon Tax	Alternate	Natural Gas	Alternate Energy	Alternate Capacity	Natural Gas	Total Costs	Total Benefits	Benefit/Cost	Natural Gas	Total Resource	TRC Net Benefits	Natural Gas Utility Discount Rate	Natural Gas Supply	Alternate Discount Rate	Alternate Supply	Discount Rate	Natural Gas NPV	Carbon Tax NPV	Alternate Energy NPV	Alternate Capacity NPV	Natural Gas Tariff	Energy Tariff	Capacity Tariff
																MWh	kW		($'000s)	($'000s)	($'000s)	($'000s)	($'000s)	(GJ)	(MWh)	(kW)	Utility	($'000s)	($'000s)		Rate Impact		($'000s)		$/GJ		$/kWh		$/GJ	$/GJ	$/kWh	$/kW/a	$/GJ	$/kWh	$/kW/a
Label	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT
Source Sheet or Calculation	Program	Program	B+C	Program	Program	E+F	Program	D+G+H	D/I	G/I	H/I	Program	Program	MxN	Program	Program	Program	D/Y	OxAJ	Q x N x AL	M x N x AN	M x N x AO	N x (QxAP + RxAQ)	PV(AI,P,-O)	PV(AK,P,-Q*N)	PV(AK,P,-R)	T/D	H>0, (V+W)>0	H<0, (V+W)>0, X	AD/AC	T/(V+D)	(T+U)/I	(T+U)-I	Input	Program	Input	Input	Input	PV(AM,P,-InputD25)	Input	PV(AM,P,-InputD28)	PV(AM,P,-InputD29)	Input	Input	Input
2011																																														
RESIDENTIAL:																																														
Solar Residential Hot Water Pilot Program	0	1	1	0	0	0	8	8	8%	0%	92%	12	100%	12	25	0	-	5	2	N/A	2	0	N/A	138	-	-	2.8	8	2	0.2	0.8	0.2	(6)	7.15%	145.83	6%	1.53	6.0%	127.82	17.22	1.06	0.00	9.999	0.083	-

	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ
1		**Fortis BC**																																	
2																																			
3																																			
4		**Year**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**	
5		Units																																	
6	**NATURAL GAS**																																		
7	Incremental Cost of Gas (nominal)	$ Per GJ	$8.23	$8.70	$9.06	$9.39	$9.73	$9.96	$10.14	$10.29	$10.44	$10.59	$10.78	$11.01	$11.25	$11.49	$11.74	$11.99	$12.25	$12.51	$12.76	$13.04	$13.32	$13.60	$13.90	$14.20	$14.50	$14.81	$15.13	$15.46	$15.80	$16.14	$16.49	$16.79	
8		*Year*	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*	*31*	
9	carbon tax	$ per GJ	*0.75*	*1.00*	*1.25*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	
10	Distribution adder	$ per GJ	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*		
11	Total incremental cost of gas including carbon		*9.13*	*9.86*	*10.46*	*11.05*	*11.39*	*11.62*	*11.80*	*11.95*	*12.10*	*12.24*	*12.44*	*12.67*	*12.91*	*13.15*	*13.39*	*13.65*	*13.90*	*14.17*	*14.42*	*14.69*	*14.97*	*15.26*	*15.55*	*15.85*	*16.16*	*16.47*	*16.79*	*17.12*	*17.45*	*17.79*	*18.14*	*18.29*	
12	GDP Deflator		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
13	Incremental Cost of Gas (Real)		$9.13	$9.86	$10.46	$11.05	$11.39	$11.62	$11.80	$11.95	$12.10	$12.24	$12.44	$12.67	$12.91	$13.15	$13.39	$13.65	$13.90	$14.17	$14.42	$14.69	$14.97	$15.26	$15.55	$15.85	$16.16	$16.47	$16.79	$17.12	$17.45	$17.79	$18.14	$18.29	
14	Net Present Value -2010			$17.11	$25.62	$34.00	$42.06	$49.74	$57.01	$63.89	$70.38	$76.52	$82.34	$87.87	$93.13	$98.13	$102.89	$107.41	$111.70	$115.79	$119.67	$123.37	$126.88	$130.22	$133.39	$136.41	$139.29	$142.02	$144.63	$147.10	$149.46	$151.70	$153.83	$155.84	
15	Net Present Value -2011				$18.32	$27.29	$35.93	$44.16	$51.95	$59.32	$66.28	$72.86	$79.09	$85.02	$90.66	$96.01	$101.11	$105.95	$110.56	$114.94	$119.10	$123.05	$126.81	$130.39	$133.80	$137.03	$140.11	$143.04	$145.83	$148.48	$151.01	$153.41	$155.70	$157.85	
16	Net Present Value -2012					$19.39	$28.64	$37.46	$45.81	$53.70	$61.16	$68.21	$74.89	$81.24	$87.28	$93.02	$98.48	$103.67	$108.60	$113.30	$117.75	$121.99	$126.02	$129.86	$133.50	$136.97	$140.27	$143.41	$146.40	$149.24	$151.95	$154.52	$156.97	$159.27	
17																																			
18																																			
19	**ELECTRICITY**																																		
20	Incremental Cost of Elec	$ Per kWh	$0.12																																
21	Incremental Cost of E Capacity	$ Per kW/a	$170.00																																
22																																			
23																																			
24																																			
25																																			
26			Rate	Customers		789,928	Total Customers in BC		80,000	Total Residential and Commercial Customers on VI																									
27	Residential Retail			*000's*																															
28	**TGI**	$ Per MJ	$0.0100	640		712,304	Total Residential Customers in BC																												
29	**TGVI**	$ Per MJ	$0.0143	72																															
30	**Electricity**	$ Per MJ	$0.0230																																
31	**Electricity**	$ per kWh	$0.0827	1,511		1,511,435	Total BCH Residential Customers in BC				89%																								
32	**Electricity**	$ per kW per year																																	
33	Commercial Retail																																		
34	**TGI**	$ Per MJ	$0.0094	78		77,624	Total Commercial Customers in BC																												
35	**TGVI**	$ Per MJ	$0.0169	8																															
36	**Electricity**	$ Per MJ	$0.0214																																
37	**Electricity**	$ per kWh	$0.0769	190		189,764	Total Light Industrial and Commercial Customers in BC																												
38	**Electricity**	$ per kW per year	$52.0000	15																															
39																																			
40																																			
41		**Year**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	
42		*Year*		*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*	
43	Carbon	$ Per tonne		$20.00	$25.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	
44	Carbon	$ Per GJ		$0.9976	$1.2470	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	
45	GDP Deflator			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
46	Carbon (Real)			$1.00	$1.25	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	
47	Net Present Value -2010				$2.02	$3.23	$4.37	$5.43	$6.42	$7.34	$8.20	$9.00	$9.75	$10.45	$11.11	$11.72	$12.29	$12.82	$13.31	$13.78	$14.21	$14.61	$14.99	$15.34	$15.67	$15.97	$16.26	$16.52	$16.77	$17.00	$17.22	$17.42	$17.61	$17.79	
48	Net Present Value -2011					$2.47	$3.68	$4.82	$5.88	$6.87	$7.79	$8.65	$9.45	$10.20	$10.90	$11.56	$12.17	$12.74	$13.27	$13.76	$14.23	$14.66	$15.06	$15.44	$15.79	$16.12	$16.42	$16.71	$16.97	$17.22	$17.45	$17.67	$17.87	$18.06	
49	Net Present Value -2012						$2.70	$3.92	$5.05	$6.11	$7.10	$8.02	$8.88	$9.69	$10.44	$11.14	$11.79	$12.40	$12.97	$13.50	$14.00	$14.46	$14.89	$15.29	$15.67	$16.02	$16.35	$16.65	$16.94	$17.21	$17.45	$17.69	$17.90	$18.10	
50																																			
51	**Discount Rate (real)[1]**																																		
52	**TERASEN GAS**																																		
53	**Rate of Inflation**	1.90%																																	
54	**TGI**	7.15%																																	
55	**TGVI**	6.89%																																	
56	**BC HYDRO**																																		
57	**Rate of Inflation**	2.00%																																	
58	**BC Hydro**	6.00%																																	
59	**Customer**	6.00%																																	
60	*Footnote 1: Source LR 070531*																																		
61																																			
62																																			
63																																			
64																																			

Fortis BC
RESIDENTIAL
NEW

only enter in boxes marked in blue

Measure Data for Solar Residential Hot Water Pilot Program

PER MEASURE

			Utility Incentive to the participant	partner incentive
Incremental Cost	$	7,500		
Total Incentive	$	-		
Participant	**$**	**7,500**		

Annual Impact Per Measure

Energy Savings per installation	**12.0**	GJ		Average Annnual Energy Savings per Measure
Free Rider Rate / Net-to-Gross	**0%**	1.00		Net-to-Gross
Alternate Energy Impact		GJ	0	kWh
Alternate Capacity Impact		kW/a		
Measure Lifetime	**25**	Years	Estimated lifespan of measure	

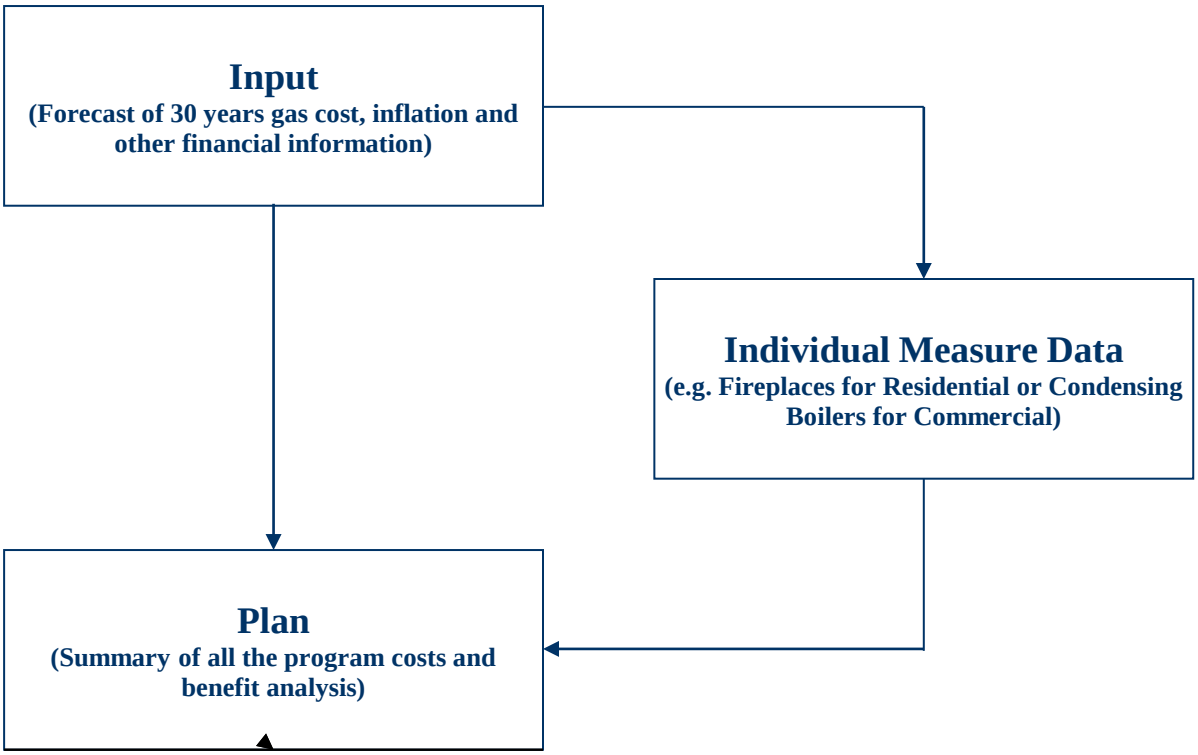
ANNUAL ACTIVITY	2010 NPV	Total	2010	2011	2012	Explanatory Notes
Number of FS Furnaces	1	1	**0**	**1**		Estimated Participatation
Impact						
Gross Energy Savings (GJ)	11	12	0	12	0	Extension of Unit Savings x No. of Upgrades
Net Energy Savings (GJ)	11	12	0	12	0	Gross Energy Savings less Free Riders
Alternate Energy Impact (Increase) (kWh)	0	0	0	0	0	Other Utility Billed energy impact
Alternate Capacity Impact (Increase) (kW/a)	$0.00	-				Other Utility Billed capacity impact

Benefit Cost Summary

	2010 NPV	*$ Total*	2010	2011	2012	
Avoided Revenue Requirements						
PV $ per GJ			$142.02	$145.83	$149.24	
Energy Purchases	$ 1,750	$ 1,750	$ -	$ 1,750	$ -	
Utility Program Costs						
DSM Incentives		$ -	$ -	$ -	$ -	
Administration		$ 625	**$ -**	**$ 625**		
Subtotal	$ 583	$ 625	$ -	$ 625	$ -	
Partner Program Costs						
DSM Incentives		$ -	$ -	$ -	$ -	
Administration		$ -	**$ -**	**$ -**	**$ -**	
Subtotal	$ -	$ -	$ -	$ -	$ -	
Participants' Net Costs						
Incremental Cost		$ 7,500	$ -	$ 7,500	$ -	
Subtotal	$ 7,000	$ 7,500	$ -	$ 7,500	$ -	
Alternate Savings - Net						
Energy (Purchases)		$ -	$ -	$ -	$ -	$1.534 PV $ per kWh
Capacity (Purchases)		$ -	$ -	$ -	$ -	PV$ per kW/a
Subtotal	$ -	$ -	$ -	$ -	$ -	
Total Resource Net Benefit (Cost)	$ (5,833)		$ -	$ (6,375)	$ -	Avoided Revenue Requirement less Utility less Partners less Participant Costs plus Alternate Savings
Utility Levelized Cost per GJ (Lifetime)	**$ 58.9**		**$ -**	**$ 58.9**	**$ -**	Informational (for comparison with supply options)

Table of Contents

Sheet Name	Description
Plan	A summary of all the programs costs, savings, and benefit analysis
Input	30 years Gas Cost forecast, Inflation, and other financial inputs for the models
BASEBOARD Fuel Switching	Measure data and benefit analysis for High-Efficiency Furnace (New Construction)
HEAT PUMP Fuel Switching	Measure data and benefit analysis for High-Efficiency Furnace (New Construction)
Supply and DSM Projects	Diagram: Utility, shareholder, ratepayer, participant, society benefits and costs for supply projects and DSM
FS Project	Diagram: Utility, shareholder, ratepayer, participant, society benefits and costs for supply projects, DSM, and Fuel Switching


Input
(Forecast of 30 years gas cost, inflation and other financial information)
Individual Measure Data
(e.g. Fireplaces for Residential or Condensing Boilers for Commercial)
Plan
(Summary of all the program costs and benefit analysis)

Fortis BC

	PROGRAM															ALTERNATE		NET PRESENT VALUE									BENEFIT/COST							PARAMETERS										
	COSTS ($000)											SAVINGS (GJ)			LIFE	Impact		Levelized Cost	Utility Benefits (Costs)		Participant Benefits (Costs)			Program Net Savings				Participant							UTILITY				PARTICIPANT						
	Utility			Partners																																									
	Incentives	Administration	Total	Incentives	Administration	Total	Participant	Total	% Utility	% Partner	% Participant	Gross	Net-to-Gross	Net	Years	Energy	Capacity	($/GJ)	Program	Alternate	Program	Carbon Tax	Alternate	Natural Gas	Alternate Energy	Alternate Capacity	Natural Gas	Total Costs	Total Benefits	Benefit/Cost	Natural Gas	Total Resource	TRC Net Benefits	Natural Gas Utility Discount Rate	Natural Gas Supply	Alternate Discount Rate	Alternate Supply	Discount Rate	Natural Gas NPV	Carbon Tax NPV	Alternate Energy NPV	Alternate Capacity NPV	Natural Gas Tariff	Energy Tariff	Capacity Tariff
																MWh	kW		($'000s)	($'000s)	($'000s)	($'000s)	($'000s)	(GJ)	(MWh)	(kW)	Utility	($'000s)	($'000s)		Rate Impact		($'000s)		$/GJ		$/kWh		$/GJ	$/GJ	$/kWh	$/kW/a	$/GJ	$/kWh	$/kW/a
Label	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT
Source Sheet or Calculation	Program	Program	B+C	Program	Program	E+F	Program	D+G+H	D/I	G/I	H/I	Program	Program	MxN	Program	Program	Program	D/Y	OxAJ	Q x N x AL	M x N x AN	M x N x AO	N x (QxAP + RxAQ)	PV(AI,P,-O)	PV(AK,P,-Q*N)	PV(AK,P,-R)	T/D	H>0, (V+W)>0	H<0, (V+W)>0, X	AD/AC	T/(V+D)	(T+U)/I	(T+U)-I	Input	Program	Input	Input	Input	PV(AM,P,-InputD25)	Input	PV(AM,P,-InputD28)	PV(AM,P,-InputD29)	Input	Input	Input
2011																																													
RESIDENTIAL:																																													
Scrap It	0	0	0	0	0	0	4	4	4%	0%	96%	9	100%	9	18	1	-	2	1	1	1	0	1	86	11	-	6.5	4	2	0.5	1.0	0.6	(2)	7.15%	123.05	6%	1.30	6.0%	108.27	15.06	0.90	0.00	9.999	0.083	-

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI
1	**UTILITY**		**Fortis BC**																																
2																																			
3																																			
4			**Year**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**
5			Units																																
6		**NATURAL GAS**																																	
7		Incremental Cost of Gas (nominal)	$ Per GJ	$8.23	$8.70	$9.06	$9.39	$9.73	$9.96	$10.14	$10.29	$10.44	$10.59	$10.78	$11.01	$11.25	$11.49	$11.74	$11.99	$12.25	$12.51	$12.76	$13.04	$13.32	$13.60	$13.90	$14.20	$14.50	$14.81	$15.13	$15.46	$15.80	$16.14	$16.49	$16.79
8	1		*Year*	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*	*31*
9		carbon tax	$ per GJ	*0.75*	*1.00*	*1.25*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*
10		Distribution adder	$ per GJ	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	
11		Total incremental cost of gas including carbon		*9.13*	*9.86*	*10.46*	*11.05*	*11.39*	*11.62*	*11.80*	*11.95*	*12.10*	*12.24*	*12.44*	*12.67*	*12.91*	*13.15*	*13.39*	*13.65*	*13.90*	*14.17*	*14.42*	*14.69*	*14.97*	*15.26*	*15.55*	*15.85*	*16.16*	*16.47*	*16.79*	*17.12*	*17.45*	*17.79*	*18.14*	*18.29*
12	2	GDP Deflator		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
13	3	Incremental Cost of Gas (Real)		$9.13	$9.86	$10.46	$11.05	$11.39	$11.62	$11.80	$11.95	$12.10	$12.24	$12.44	$12.67	$12.91	$13.15	$13.39	$13.65	$13.90	$14.17	$14.42	$14.69	$14.97	$15.26	$15.55	$15.85	$16.16	$16.47	$16.79	$17.12	$17.45	$17.79	$18.14	$18.29
14	4	Net Present Value -2010			$17.11	$25.62	$34.00	$42.06	$49.74	$57.01	$63.89	$70.38	$76.52	$82.34	$87.87	$93.13	$98.13	$102.89	$107.41	$111.70	$115.79	$119.67	$123.37	$126.88	$130.22	$133.39	$136.41	$139.29	$142.02	$144.63	$147.10	$149.46	$151.70	$153.83	$155.84
15	5	Net Present Value -2011				$18.32	$27.29	$35.93	$44.16	$51.95	$59.32	$66.28	$72.86	$79.09	$85.02	$90.66	$96.01	$101.11	$105.95	$110.56	$114.94	$119.10	$123.05	$126.81	$130.39	$133.80	$137.03	$140.11	$143.04	$145.83	$148.48	$151.01	$153.41	$155.70	$157.85
16	6	Net Present Value -2012					$19.39	$28.64	$37.46	$45.81	$53.70	$61.16	$68.21	$74.89	$81.24	$87.28	$93.02	$98.48	$103.67	$108.60	$113.30	$117.75	$121.99	$126.02	$129.86	$133.50	$136.97	$140.27	$143.41	$146.40	$149.24	$151.95	$154.52	$156.97	$159.27
17																																			
18																																			
19		**ELECTRICITY**																																	
20		Incremental Cost of Elec	$ Per kWh	$0.12																															
21		Incremental Cost of E Capacity	$ Per kW/a	$170.00																															
22																																			
23																																			
24																																			
25	**RETAIL**																																		
26				Rate	Customers		789,928	Total Customers in BC		80,000	Total Residential and Commercial Customers on VI																								
27		Residential Retail			000's																														
28		**TGI**	$ Per MJ	$0.0100	640		712,304	Total Residential Customers in BC																											
29		**TGVI**	$ Per MJ	$0.0143	72																														
30		**Electricity**	$ Per MJ	$0.0230																															
31		**Electricity**	$ per kWh	$0.0827	1,511		1,511,435	Total BCH Residential Customers in BC				89%																							
32		**Electricity**	$ per kW per year																																
33		Commercial Retail																																	
34		**TGI**	$ Per MJ	$0.0094	78		77,624	Total Commercial Customers in BC																											
35		**TGVI**	$ Per MJ	$0.0169	8																														
36		**Electricity**	$ Per MJ	$0.0214																															
37		**Electricity**	$ per kWh	$0.0769	190		189,764	Total Light Industrial and Commercial Customers in BC																											
38		**Electricity**	$ per kW per year	$52.0000	15																														
39																																			
40	**TAX**																																		
41			**Year**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**
42	1		*Year*		*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*
43	2	Carbon	$ Per tonne		$20.00	$25.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00
44	3	Carbon	$ Per GJ		$0.9976	$1.2470	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964
45	4	GDP Deflator			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
46	5	Carbon (Real)			$1.00	$1.25	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50
47	6	Net Present Value -2010				$2.02	$3.23	$4.37	$5.43	$6.42	$7.34	$8.20	$9.00	$9.75	$10.45	$11.11	$11.72	$12.29	$12.82	$13.31	$13.78	$14.21	$14.61	$14.99	$15.34	$15.67	$15.97	$16.26	$16.52	$16.77	$17.00	$17.22	$17.42	$17.61	$17.79
48	7	Net Present Value -2011					$2.47	$3.68	$4.82	$5.88	$6.87	$7.79	$8.65	$9.45	$10.20	$10.90	$11.56	$12.17	$12.74	$13.27	$13.76	$14.23	$14.66	$15.06	$15.44	$15.79	$16.12	$16.42	$16.71	$16.97	$17.22	$17.45	$17.67	$17.87	$18.06
49	8	Net Present Value -2012						$2.70	$3.92	$5.05	$6.11	$7.10	$8.02	$8.88	$9.69	$10.44	$11.14	$11.79	$12.40	$12.97	$13.50	$14.00	$14.46	$14.89	$15.29	$15.67	$16.02	$16.35	$16.65	$16.94	$17.21	$17.45	$17.69	$17.90	$18.10
50																																			
51		**Discount Rate (real)[1]**																																	
52		**TERASEN GAS**																																	
53		**Rate of Inflation**	1.90%																																
54		**TGI**	7.15%																																
55		**TGVI**	6.89%																																
56		**BC HYDRO**																																	
57		**Rate of Inflation**	2.00%																																
58		**BC Hydro**	6.00%																																
59		**Customer**	6.00%																																
60		*Footnote 1: Source LR 070531*																																	
61																																			
62																																			
63																																			
64																																			

Fortis BC
RESIDENTIAL
NEW

only enter in boxes marked in blue

Measure Data for Scrap It

PER MEASURE			Utility Incentive to the participant	partner incentive
Incremental Cost	$	3,708		
Total Incentive	$	-		
Participant	**$**	**3,708**		

Annual Impact Per Measure

Energy Savings per installation	**8.6**	GJ		Average Annnual Energy Savings per Measure
Free Rider Rate / Net-to-Gross	**0%**	1.00		Net-to-Gross
Alternate Energy Impact	**4**	GJ	976	kWh
Alternate Capacity Impact		kW/a		
Measure Lifetime	**18**	Years	Estimated lifespan of measure	

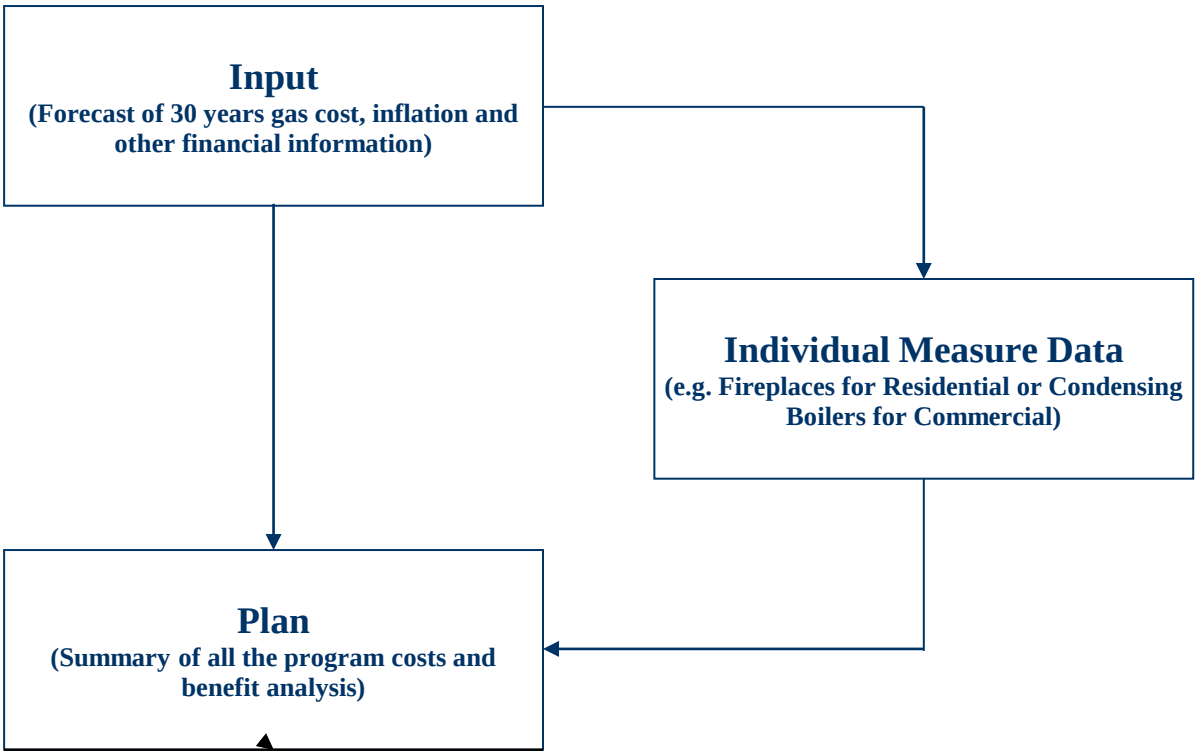
ANNUAL ACTIVITY	2010 NPV	Total	2010	2011	2012	Explanatory Notes
Number of FS Furnaces	1	1	**0**	**1**		Estimated Participatation
Impact						
Gross Energy Savings (GJ)	8	9	0	9	0	Extension of Unit Savings x No. of Upgrades
Net Energy Savings (GJ)	8	9	0	9	0	Gross Energy Savings less Free Riders
Alternate Energy Impact (Increase) (kWh)	921	976	0	976	0	Other Utility Billed energy impact
Alternate Capacity Impact (Increase) (kW/a)	$0.00	-				Other Utility Billed capacity impact

Benefit Cost Summary

	2010 NPV	*$ Total*	2010	2011	2012	
Avoided Revenue Requirements						
PV $ per GJ			$119.67	$123.05	$126.02	
Energy Purchases	$ 1,061	$ 1,061	$ -	$ 1,061	$ -	
Utility Program Costs						
DSM Incentives		$ -	$ -	$ -	$ -	
Administration		$ 162	**$ -**	**$ 162**		
Subtotal	$ 151	$ 162	$ -	$ 162	$ -	
Partner Program Costs						
DSM Incentives		$ -	$ -	$ -	$ -	
Administration		$ -	**$ -**	**$ -**	**$ -**	
Subtotal	$ -	$ -	$ -	$ -	$ -	
Participants' Net Costs						
Incremental Cost		$ 3,708	$ -	$ 3,708	$ -	
Subtotal	$ 3,460	$ 3,708	$ -	$ 3,708	$ -	
Alternate Savings - Net						
Energy (Purchases)		$ 1,268	$ -	$ 1,268	$ -	$1.299 PV $ per kWh
Capacity (Purchases)		$ -	$ -	$ -	$ -	PV$ per kW/a
Subtotal	$ 1,268	$ 1,268	$ -	$ 1,268	$ -	
Total Resource Net Benefit (Cost)	$ (1,282)		$ -	$ (1,540)	$ -	Avoided Revenue Requirement less Utility less Partners less Participant Costs plus Alternate Savings
Utility Levelized Cost per GJ (Lifetime)	**$ 45.1**		**$ -**	**$ 45.1**	**$ -**	Informational (for comparison with supply options)

Table of Contents

Sheet Name	Description
Plan	A summary of all the programs costs, savings, and benefit analysis
Input	30 years Gas Cost forecast, Inflation, and other financial inputs for the models
BASEBOARD Fuel Switching	Measure data and benefit analysis for High-Efficiency Furnace (New Construction)
HEAT PUMP Fuel Switching	Measure data and benefit analysis for High-Efficiency Furnace (New Construction)
Supply and DSM Projects	Diagram: Utility, shareholder, ratepayer, participant, society benefits and costs for supply projects and DSM
FS Project	Diagram: Utility, shareholder, ratepayer, participant, society benefits and costs for supply projects, DSM, and Fuel Switching


Input
(Forecast of 30 years gas cost, inflation and other financial information)
Individual Measure Data
(e.g. Fireplaces for Residential or Condensing Boilers for Commercial)
Plan
(Summary of all the program costs and benefit analysis)

Fortis BC

	PROGRAM															ALTERNATE		NET PRESENT VALUE									BENEFIT/COST							PARAMETERS										
	COSTS ($000)											SAVINGS (GJ)			LIFE	Impact		Levelized Cost	Utility Benefits (Costs)		Participant Benefits (Costs)			Program Net Savings				Participant							UTILITY				PARTICIPANT						
	Utility			Partners																																									
	Incentives	Administration	Total	Incentives	Administration	Total	Participant	Total	% Utility	% Partner	% Participant	Gross	Net-to-Gross	Net	Years	Energy	Capacity	($/GJ)	Program	Alternate	Program	Carbon Tax	Alternate	Natural Gas	Alternate Energy	Alternate Capacity	Natural Gas	Total Costs	Total Benefits	Benefit/Cost	Natural Gas	Total Resource	TRC Net Benefits	Natural Gas Utility Discount Rate	Natural Gas Supply	Alternate Discount Rate	Alternate Supply	Discount Rate	Natural Gas NPV	Carbon Tax NPV	Alternate Energy NPV	Alternate Capacity NPV	Natural Gas Tariff	Energy Tariff	Capacity Tariff
																MWh	kW		($'000s)	($'000s)	($'000s)	($'000s)	($'000s)	(GJ)	(MWh)	(kW)	Utility	($'000s)	($'000s)		Rate Impact		($'000s)	$/GJ		$/kWh		$/GJ	$/GJ	$/kWh	$/kW/a	$/GJ	$/kWh	$/kW/a
Label	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT
Source Sheet or Calculation	Program	Program	B+C	Program	Program	E+F	Program	D+G+H	D/I	G/I	H/I	Program	Program	MxN	Program	Program	Program	D/Y	OxAJ	Q x N x AL	M x N x AN	M x N x AO	N x (QxAP + RxAQ)	PV(AI,P,-O)	PV(AK,P,-Q*N)	PV(AK,P,-R)	T/D	H>0, (V+W)>0	H<0, (V+W)>0, X	AD/AC	T/(V+D)	(T+U)/I	(T+U)-I	Input	Program	Input	Input	Input	PV(AM,P,-InputD25)	Input	PV(AM,P,-InputD28)	PV(AM,P,-InputD29)	Input	Input	Input
2011																																													
Schools																																													
Solar Air	0	5	5	0	0	0	39	45	12%	0%	88%	48	100%	48	25	0	-	10	7	N/A	6	1	N/A	549	-	-	1.3	39	7	0.2	0.6	0.2	(38)	7.15%	145.83	6%	1.53	6.0%	127.82	17.22	1.06	0.00	9.999	0.083	-

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI
1	**UTILITY**		**Fortis BC**																																
2																																			
3																																			
4			**Year**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**
5			Units																																
6		**NATURAL GAS**																																	
7		Incremental Cost of Gas (nominal)	$ Per GJ	$8.23	$8.70	$9.06	$9.39	$9.73	$9.96	$10.14	$10.29	$10.44	$10.59	$10.78	$11.01	$11.25	$11.49	$11.74	$11.99	$12.25	$12.51	$12.76	$13.04	$13.32	$13.60	$13.90	$14.20	$14.50	$14.81	$15.13	$15.46	$15.80	$16.14	$16.49	$16.79
8	1		*Year*	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*	*31*
9		carbon tax	$ per GJ	*0.75*	*1.00*	*1.25*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*
10		Distribution adder	$ per GJ	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	
11		Total incremental cost of gas including carbon		*9.13*	*9.86*	*10.46*	*11.05*	*11.39*	*11.62*	*11.80*	*11.95*	*12.10*	*12.24*	*12.44*	*12.67*	*12.91*	*13.15*	*13.39*	*13.65*	*13.90*	*14.17*	*14.42*	*14.69*	*14.97*	*15.26*	*15.55*	*15.85*	*16.16*	*16.47*	*16.79*	*17.12*	*17.45*	*17.79*	*18.14*	*18.29*
12	2	GDP Deflator		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
13	3	Incremental Cost of Gas (Real)		$9.13	$9.86	$10.46	$11.05	$11.39	$11.62	$11.80	$11.95	$12.10	$12.24	$12.44	$12.67	$12.91	$13.15	$13.39	$13.65	$13.90	$14.17	$14.42	$14.69	$14.97	$15.26	$15.55	$15.85	$16.16	$16.47	$16.79	$17.12	$17.45	$17.79	$18.14	$18.29
14	4	Net Present Value -2010			$17.11	$25.62	$34.00	$42.06	$49.74	$57.01	$63.89	$70.38	$76.52	$82.34	$87.87	$93.13	$98.13	$102.89	$107.41	$111.70	$115.79	$119.67	$123.37	$126.88	$130.22	$133.39	$136.41	$139.29	$142.02	$144.63	$147.10	$149.46	$151.70	$153.83	$155.84
15	5	Net Present Value -2011				$18.32	$27.29	$35.93	$44.16	$51.95	$59.32	$66.28	$72.86	$79.09	$85.02	$90.66	$96.01	$101.11	$105.95	$110.56	$114.94	$119.10	$123.05	$126.81	$130.39	$133.80	$137.03	$140.11	$143.04	$145.83	$148.48	$151.01	$153.41	$155.70	$157.85
16	6	Net Present Value -2012					$19.39	$28.64	$37.46	$45.81	$53.70	$61.16	$68.21	$74.89	$81.24	$87.28	$93.02	$98.48	$103.67	$108.60	$113.30	$117.75	$121.99	$126.02	$129.86	$133.50	$136.97	$140.27	$143.41	$146.40	$149.24	$151.95	$154.52	$156.97	$159.27
17																																			
18																																			
19		**ELECTRICITY**																																	
20		Incremental Cost of Elec	$ Per kWh	$0.12																															
21		Incremental Cost of E Capacity	$ Per kW/a	$170.00																															
22																																			
23																																			
24																																			
25	**RETAIL**																																		
26				Rate	Customers		789,928	Total Customers in BC		80,000	Total Residential and Commercial Customers on VI																								
27		Residential Retail			000's																														
28		**TGI**	$ Per MJ	$0.0100	640		712,304	Total Residential Customers in BC																											
29		**TGVI**	$ Per MJ	$0.0143	72																														
30		**Electricity**	$ Per MJ	$0.0230																															
31		**Electricity**	$ per kWh	$0.0827	1,511		1,511,435	Total BCH Residential Customers in BC				89%																							
32		**Electricity**	$ per kW per year																																
33		Commercial Retail																																	
34		**TGI**	$ Per MJ	$0.0094	78		77,624	Total Commercial Customers in BC																											
35		**TGVI**	$ Per MJ	$0.0169	8																														
36		**Electricity**	$ Per MJ	$0.0214																															
37		**Electricity**	$ per kWh	$0.0769	190		189,764	Total Light Industrial and Commercial Customers in BC																											
38		**Electricity**	$ per kW per year	$52.0000	15																														
39																																			
40	**TAX**																																		
41			**Year**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**
42	1		*Year*		*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*
43	2	Carbon	$ Per tonne		$20.00	$25.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00
44	3	Carbon	$ Per GJ		$0.9976	$1.2470	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964
45	4	GDP Deflator			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
46	5	Carbon (Real)			$1.00	$1.25	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50
47	6	Net Present Value -2010				$2.02	$3.23	$4.37	$5.43	$6.42	$7.34	$8.20	$9.00	$9.75	$10.45	$11.11	$11.72	$12.29	$12.82	$13.31	$13.78	$14.21	$14.61	$14.99	$15.34	$15.67	$15.97	$16.26	$16.52	$16.77	$17.00	$17.22	$17.42	$17.61	$17.79
48	7	Net Present Value -2011					$2.47	$3.68	$4.82	$5.88	$6.87	$7.79	$8.65	$9.45	$10.20	$10.90	$11.56	$12.17	$12.74	$13.27	$13.76	$14.23	$14.66	$15.06	$15.44	$15.79	$16.12	$16.42	$16.71	$16.97	$17.22	$17.45	$17.67	$17.87	$18.06
49	8	Net Present Value -2012						$2.70	$3.92	$5.05	$6.11	$7.10	$8.02	$8.88	$9.69	$10.44	$11.14	$11.79	$12.40	$12.97	$13.50	$14.00	$14.46	$14.89	$15.29	$15.67	$16.02	$16.35	$16.65	$16.94	$17.21	$17.45	$17.69	$17.90	$18.10
50																																			
51		**Discount Rate (real)[1]**																																	
52		**TERASEN GAS**																																	
53		**Rate of Inflation**	1.90%																																
54		**TGI**	7.15%																																
55		**TGVI**	6.89%																																
56		**BC HYDRO**																																	
57		**Rate of Inflation**	2.00%																																
58		**BC Hydro**	6.00%																																
59		**Customer**	6.00%																																
60		*Footnote 1: Source LR 070531*																																	
61																																			
62																																			
63																																			
64																																			
65																																			
66																																			
67																																			
68																																			

Fortis BC

C&I

NEW

only enter in boxes marked in blue

Measure Data for Solar Air

PER MEASURE			Utility Incentive to the participant	partner incentive
Incremental Cost	$	39,400		
Total Incentive	$	-		
Participant	**$**	**39,400**		

Annual Impact Per Measure

Energy Savings per installation	**47.8**	GJ		Average Annnual Energy Savings per Measure
Free Rider Rate / Net-to-Gross	**0%**	1.00		Net-to-Gross
Alternate Energy Impact		GJ	0	kWh
Alternate Capacity Impact		kW/a		
Measure Lifetime	**25**	Years	Estimated lifespan of measure	

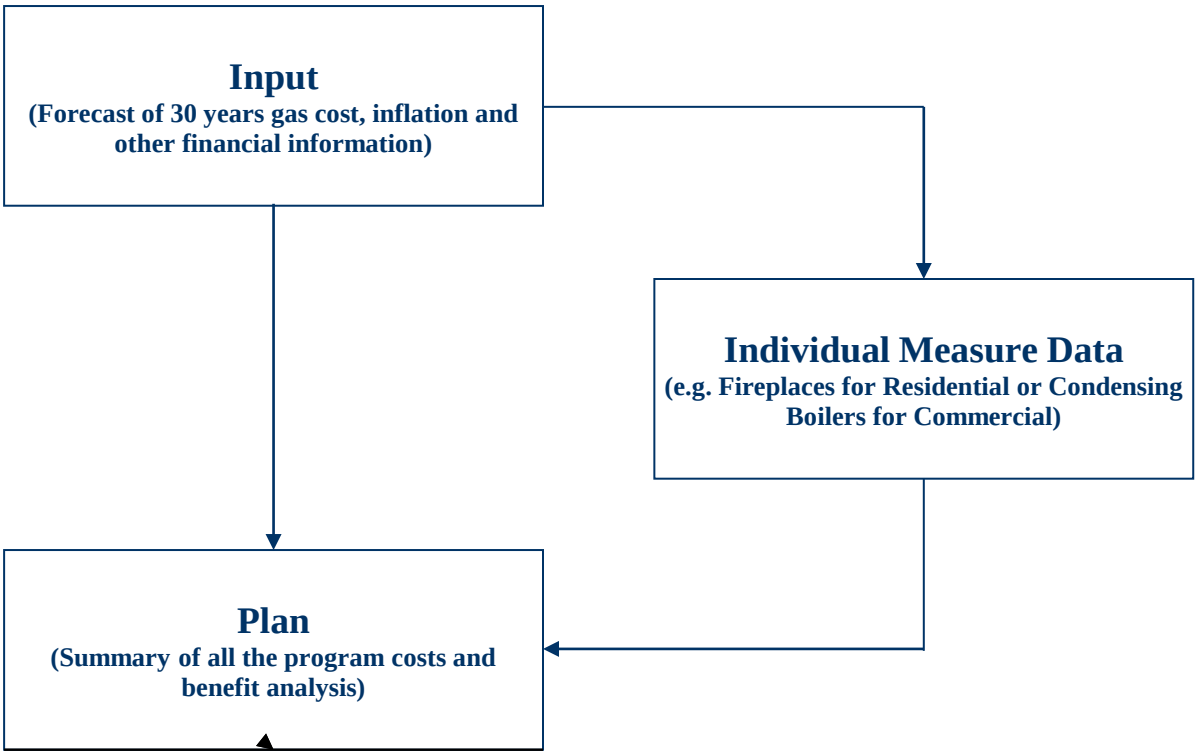
ANNUAL ACTIVITY	2010 NPV	Total	2010	2011	2012	Explanatory Notes
Number of FS Furnaces	1	1	**0**	**1**		Estimated Participatation
Impact						
Gross Energy Savings (GJ)	45	48	0	48	0	Extension of Unit Savings x No. of Upgrades
Net Energy Savings (GJ)	45	48	0	48	0	Gross Energy Savings less Free Riders
Alternate Energy Impact (Increase) (kWh)	0	0	0	0	0	Other Utility Billed energy impact
Alternate Capacity Impact (Increase) (kW/a)	$0.00	-				Other Utility Billed capacity impact

Benefit Cost Summary

	2010 NPV	*$ Total*	2010	2011	2012	
Avoided Revenue Requirements						
PV $ per GJ			$142.02	$145.83	$149.24	
Energy Purchases	$ 6,966	$ 6,966	$ -	$ 6,966	$ -	
Utility Program Costs						
DSM Incentives		$ -	$ -	$ -	$ -	
Administration		$ 5,250	**$ -**	**$ 5,250**		
Subtotal	$ 4,900	$ 5,250	$ -	$ 5,250	$ -	
Partner Program Costs						
DSM Incentives		$ -	$ -	$ -	$ -	
Administration		$ -	**$ -**	**$ -**	**$ -**	
Subtotal	$ -	$ -	$ -	$ -	$ -	
Participants' Net Costs						
Incremental Cost		$ 39,400	$ -	$ 39,400	$ -	
Subtotal	$ 36,771	$ 39,400	$ -	$ 39,400	$ -	
Alternate Savings - Net						
Energy (Purchases)		$ -	$ -	$ -	$ -	$1.534 PV $ per kWh
Capacity (Purchases)		$ -	$ -	$ -	$ -	PV$ per kW/a
Subtotal	$ -	$ -	$ -	$ -	$ -	
Total Resource Net Benefit (Cost)	$ (34,704)		$ -	$ (37,684)	$ -	Avoided Revenue Requirement less Utility less Partners less Participant Co
Utility Levelized Cost per GJ (Lifetime)	**$ 81.3**		**$ -**	**$ 81.3**	**$ -**	Informational (for comparison with supply options)

Table of Contents

Sheet Name	Description
Plan	A summary of all the programs costs, savings, and benefit analysis
Input	30 years Gas Cost forecast, Inflation, and other financial inputs for the models
BASEBOARD Fuel Switching	Measure data and benefit analysis for High-Efficiency Furnace (New Construction)
HEAT PUMP Fuel Switching	Measure data and benefit analysis for High-Efficiency Furnace (New Construction)
Supply and DSM Projects	Diagram: Utility, shareholder, ratepayer, participant, society benefits and costs for supply projects and DSM
FS Project	Diagram: Utility, shareholder, ratepayer, participant, society benefits and costs for supply projects, DSM, and Fuel Switching


Input
(Forecast of 30 years gas cost, inflation and other financial information)
Individual Measure Data
(e.g. Fireplaces for Residential or Condensing Boilers for Commercial)
Plan
(Summary of all the program costs and benefit analysis)

Fortis BC

	PROGRAM															ALTERNATE		NET PRESENT VALUE									BENEFIT/COST							PARAMETERS										
	COSTS ($000)											SAVINGS (GJ)			LIFE	Impact		Levelized Cost	Utility Benefits (Costs)		Participant Benefits (Costs)			Program Net Savings				Participant							UTILITY				PARTICIPANT						
	Utility			Partners																																									
	Incentives	Administration	Total	Incentives	Administration	Total	Participant	Total	% Utility	% Partner	% Participant	Gross	Net-to-Gross	Net	Years	Energy	Capacity	($/GJ)	Program	Alternate	Program	Carbon Tax	Alternate	Natural Gas	Alternate Energy	Alternate Capacity	Natural Gas	Total Costs	Total Benefits	Benefit/Cost	Natural Gas	Total Resource	TRC Net Benefits	Natural Gas Utility Discount Rate	Natural Gas Supply	Alternate Discount Rate	Alternate Supply	Discount Rate	Natural Gas NPV	Carbon Tax NPV	Alternate Energy NPV	Alternate Capacity NPV	Natural Gas Tariff	Energy Tariff	Capacity Tariff
																MWh	kW		($'000s)	($'000s)	($'000s)	($'000s)	($'000s)	(GJ)	(MWh)	(kW)	Utility	($'000s)	($'000s)		Rate Impact		($'000s)		$/GJ		$/kWh		$/GJ	$/GJ	$/kWh	$/kW/a	$/GJ	$/kWh	$/kW/a
Label	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT
Source Sheet or Calculation	Program	Program	B+C	Program	Program	E+F	Program	D+G+H	D/I	G/I	H/I	Program	Program	MxN	Program	Program	Program	D/Y	OxAJ	Q x N x AL	M x N x AN	M x N x AO	N x (QxAP + RxAQ)	PV(AI,P,-O)	PV(AK,P,-Q*N)	PV(AK,P,-R)	T/D	H>0, (V+W)<0	H<0, (V+W)>0, X	AD/AC	T/(V+D)	(T+U)/I	(T+U)-I	Input	Program	Input	Input	Input	PV(AM,P,-InputD25)	Input	PV(AM,P,-InputD28)	PV(AM,P,-InputD29)	Input	Input	Input
2011																																													
Schools																																													
Solar Com	0	4	4	0	0	0	55	59	6%	0%	94%	76	100%	76	25	0	-	4	11	N/A	10	1	N/A	879	-	-	3.0	55	11	0.2	0.8	0.2	(47)	7.15%	145.83	6%	1.53	6.0%	127.82	17.22	1.06	0.00	9.999	0.083	-

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI
1	**UTILITY**		**Fortis BC**																																
2																																			
3																																			
4			**Year**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**
5			Units																																
6		**NATURAL GAS**																																	
7		Incremental Cost of Gas (nominal)	$ Per GJ	$8.23	$8.70	$9.06	$9.39	$9.73	$9.96	$10.14	$10.29	$10.44	$10.59	$10.78	$11.01	$11.25	$11.49	$11.74	$11.99	$12.25	$12.51	$12.76	$13.04	$13.32	$13.60	$13.90	$14.20	$14.50	$14.81	$15.13	$15.46	$15.80	$16.14	$16.49	$16.79
8	1		*Year*	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*	*31*
9		carbon tax	$ per GJ	*0.75*	*1.00*	*1.25*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*	*1.50*
10		Distribution adder	$ per GJ	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	*0.16*	
11		Total incremental cost of gas including carbon		*9.13*	*9.86*	*10.46*	*11.05*	*11.39*	*11.62*	*11.80*	*11.95*	*12.10*	*12.24*	*12.44*	*12.67*	*12.91*	*13.15*	*13.39*	*13.65*	*13.90*	*14.17*	*14.42*	*14.69*	*14.97*	*15.26*	*15.55*	*15.85*	*16.16*	*16.47*	*16.79*	*17.12*	*17.45*	*17.79*	*18.14*	*18.29*
12	2	GDP Deflator		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
13	3	Incremental Cost of Gas (Real)		$9.13	$9.86	$10.46	$11.05	$11.39	$11.62	$11.80	$11.95	$12.10	$12.24	$12.44	$12.67	$12.91	$13.15	$13.39	$13.65	$13.90	$14.17	$14.42	$14.69	$14.97	$15.26	$15.55	$15.85	$16.16	$16.47	$16.79	$17.12	$17.45	$17.79	$18.14	$18.29
14	4	Net Present Value -2010			$17.11	$25.62	$34.00	$42.06	$49.74	$57.01	$63.89	$70.38	$76.52	$82.34	$87.87	$93.13	$98.13	$102.89	$107.41	$111.70	$115.79	$119.67	$123.37	$126.88	$130.22	$133.39	$136.41	$139.29	$142.02	$144.63	$147.10	$149.46	$151.70	$153.83	$155.84
15	5	Net Present Value -2011				$18.32	$27.29	$35.93	$44.16	$51.95	$59.32	$66.28	$72.86	$79.09	$85.02	$90.66	$96.01	$101.11	$105.95	$110.56	$114.94	$119.10	$123.05	$126.81	$130.39	$133.80	$137.03	$140.11	$143.04	$145.83	$148.48	$151.01	$153.41	$155.70	$157.85
16	6	Net Present Value -2012					$19.39	$28.64	$37.46	$45.81	$53.70	$61.16	$68.21	$74.89	$81.24	$87.28	$93.02	$98.48	$103.67	$108.60	$113.30	$117.75	$121.99	$126.02	$129.86	$133.50	$136.97	$140.27	$143.41	$146.40	$149.24	$151.95	$154.52	$156.97	$159.27
17																																			
18																																			
19		**ELECTRICITY**																																	
20		Incremental Cost of Elec	$ Per kWh	$0.12																															
21		Incremental Cost of E Capacity	$ Per kW/a	$170.00																															
22																																			
23																																			
24																																			
25	**RETAIL**																																		
26				Rate	Customers		789,928	Total Customers in BC		80,000	Total Residential and Commercial Customers on VI																								
27		Residential Retail			000's																														
28		**TGI**	$ Per MJ	$0.0100	640		712,304	Total Residential Customers in BC																											
29		**TGVI**	$ Per MJ	$0.0143	72																														
30		**Electricity**	$ Per MJ	$0.0230																															
31		**Electricity**	$ per kWh	$0.0827	1,511		1,511,435	Total BCH Residential Customers in BC				89%																							
32		**Electricity**	$ per kW per year																																
33		Commercial Retail																																	
34		**TGI**	$ Per MJ	$0.0094	78		77,624	Total Commercial Customers in BC																											
35		**TGVI**	$ Per MJ	$0.0169	8																														
36		**Electricity**	$ Per MJ	$0.0214																															
37		**Electricity**	$ per kWh	$0.0769	190		189,764	Total Light Industrial and Commercial Customers in BC																											
38		**Electricity**	$ per kW per year	$52.0000	15																														
39																																			
40	**TAX**																																		
41			**Year**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**
42	1		*Year*		*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*
43	2	Carbon	$ Per tonne		$20.00	$25.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00	$30.00
44	3	Carbon	$ Per GJ		$0.9976	$1.2470	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964	$1.4964
45	4	GDP Deflator			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
46	5	Carbon (Real)			$1.00	$1.25	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50	$1.50
47	6	Net Present Value -2010				$2.02	$3.23	$4.37	$5.43	$6.42	$7.34	$8.20	$9.00	$9.75	$10.45	$11.11	$11.72	$12.29	$12.82	$13.31	$13.78	$14.21	$14.61	$14.99	$15.34	$15.67	$15.97	$16.26	$16.52	$16.77	$17.00	$17.22	$17.42	$17.61	$17.79
48	7	Net Present Value -2011					$2.47	$3.68	$4.82	$5.88	$6.87	$7.79	$8.65	$9.45	$10.20	$10.90	$11.56	$12.17	$12.74	$13.27	$13.76	$14.23	$14.66	$15.06	$15.44	$15.79	$16.12	$16.42	$16.71	$16.97	$17.22	$17.45	$17.67	$17.87	$18.06
49	8	Net Present Value -2012						$2.70	$3.92	$5.05	$6.11	$7.10	$8.02	$8.88	$9.69	$10.44	$11.14	$11.79	$12.40	$12.97	$13.50	$14.00	$14.46	$14.89	$15.29	$15.67	$16.02	$16.35	$16.65	$16.94	$17.21	$17.45	$17.69	$17.90	$18.10
50																																			
51		**Discount Rate (real)[1]**																																	
52		**TERASEN GAS**																																	
53		**Rate of Inflation**	1.90%																																
54		**TGI**	7.15%																																
55		**TGVI**	6.89%																																
56		**BC HYDRO**																																	
57		**Rate of Inflation**	2.00%																																
58		**BC Hydro**	6.00%																																
59		**Customer**	6.00%																																
60		*Footnote 1: Source LR 070531*																																	
61																																			
62																																			
63																																			
64																																			
65																																			
66																																			

Fortis BC

Commercial

NEW

only enter in boxes marked in blue

Measure Data for Solar Com

PER MEASURE			Utility Incentive to the participant	partner incentive
Incremental Cost	$	54,772		
Total Incentive	$	-		
Participant	**$**	**54,772**		

Annual Impact Per Measure

Energy Savings per installation	**76.4**	GJ		Average Annnual Energy Savings per Measure
Free Rider Rate / Net-to-Gross	**0%**	1.00		Net-to-Gross
Alternate Energy Impact		GJ	0	kWh
Alternate Capacity Impact		kW/a		
Measure Lifetime	**25**	Years	Estimated lifespan of measure	

ANNUAL ACTIVITY	2010 NPV	Total	2010	2011	2012	Explanatory Notes
Number of FS Furnaces	1	1	**0**	**1**		Estimated Participatation
Impact						
Gross Energy Savings (GJ)	71	76	0	76	0	Extension of Unit Savings x No. of Upgrades
Net Energy Savings (GJ)	71	76	0	76	0	Gross Energy Savings less Free Riders
Alternate Energy Impact (Increase) (kWh)	0	0	0	0	0	Other Utility Billed energy impact
Alternate Capacity Impact (Increase) (kW/a)	$0.00	-				Other Utility Billed capacity impact

Benefit Cost Summary

	2010 NPV	*$ Total*	2010	2011	2012	
Avoided Revenue Requirements						
PV $ per GJ			$142.02	$145.83	$149.24	
Energy Purchases	$ 11,145	$ 11,145	$ -	$ 11,145	$ -	
Utility Program Costs						
DSM Incentives		$ -	$ -	$ -	$ -	
Administration		$ 3,750	**$ -**	**$ 3,750**		
Subtotal	$ 3,500	$ 3,750	$ -	$ 3,750	$ -	
Partner Program Costs						
DSM Incentives		$ -	$ -	$ -	$ -	
Administration		$ -	**$ -**	**$ -**	**$ -**	
Subtotal	$ -	$ -	$ -	$ -	$ -	
Participants' Net Costs						
Incremental Cost		$ 54,772	$ -	$ 54,772	$ -	
Subtotal	$ 51,117	$ 54,772	$ -	$ 54,772	$ -	
Alternate Savings - Net						
Energy (Purchases)		$ -	$ -	$ -	$ -	$1.534 PV $ per kWh
Capacity (Purchases)		$ -	$ -	$ -	$ -	PV$ per kW/a
Subtotal	$ -	$ -	$ -	$ -	$ -	
Total Resource Net Benefit (Cost)	$ (43,472)		$ -	$ (47,377)	$ -	Avoided Revenue Requirement less Utility less Partners less Participant Costs plus Alternate Savings
Utility Levelized Cost per GJ (Lifetime)	**$ 66.6**		**$ -**	**$ 66.6**	**$ -**	Informational (for comparison with supply options)

High Level Summary Table - similar to Table 2.2 in FEI-FEVI 2010 EEC Report*

	1*	2	3	4	5	6	7	8			
	For each of years 2008-2010								For each of years 2011 to latest year included in RRA		
	Expenditures			Energy Savings					Planned Expenditure	Planned Savings	TRC
	Planned	Actual	Variance	Annual Energy Savings			NPV Energy Savings	TRC			
	Incentives / Non-Incentives	Incentives / Non-Incentives	Incentives / Non-Incentives	Forecast	Actual	Variance					
1 Residential											
2 FEI											
3 FEVI											
4 Commercial											
FEI											
FEVI											
5 Industrial											
6 Supporting Initiatives											
7 Codes and Standards											
8 Etc.											

*To Table 2.2 - add: All suporting Initiatives, historical results, breakout FEI and FEVI for all Program Areas

For Each Program Area (i.e. Residential, Commercial, etc.) - similar to Table 3.1 in FEI-FEVI 2010 EEC Report

	1*	2	3	4	5	6	7	8	9	10	11	12	13
	For each of years 2008-2010										For each of years 2011 to latest year included in RRA		
	Expenditures			Energy Savings				TRC	Participants	Free Ridership	Planned Expenditure	Planned Savings	TRC
	Planned	Actual	Variance	Annual Energy Savings			NPV Energy Savings						
	Incentives / Non-Incentives	Incentives / Non-Incentives	Incentives / Non-Incentives	Forecast	Actual	Variance							
1 Program 1													
2 Program 2													
3 Program 3													
4 Etc.													

If not expressly discussed in EEC Report, for each program:
Show # of participants in program vs. Total customers in class
Describe program activities
Include a fully functioning spreadsheet for all cost-effectiveness tests which shows all calculations and inputs (i.e. Costs, benefits, measure life, net to gross, etc.)
Discuss all assumptions, back-up assumptions with empirical research, best practices, research from other jurisdictions
Breakout for FEI, FEVI
Include calculation of tonnes GHG saved and overall calculation of $/tonne GHG

Comparison with Other Utilities

Provide a table in the form of Table 3.5 in the Terasen EEC Application, that compares Fortis Energy Utilities DSM programming with that of other utilities

Historical Comparison

	1	2	3	4	5
	2008	2009	2010	2011	2012
1 Total DSM Spend					
2 DSM spend/customer (based on totaly utility customers)					
3 DSM spend/total utility revenue					
4 DSM spend/margin					
5 DSM evaluation costs					

for all years in application

* For each table, include row and column numbers.

Taken from Exhibit B-4 FEU CONFIDENTIAL Application EEC Financial Model Live Spreadsheets filed June 17, 2011

High Level Summary

Notes:
- In some cases there are slight variances compared to the respective EEC Annual Reports due to rounding.
- n/a = not applicable
- TBD = to be determined

2008 EEC Program Areas and Results	Expenditures ($000s)						Energy Savings (GJ)		TRC	SCT
	Approved		Actual		Variance		Actual			
	Incentives	Non-Incentives	Incentives	Non-Incentives	Incentives	Non-Incentives	Annual	NPV	Actual	Actual
Residential	n/a	n/a	**1,079**	**635**	n/a	n/a	**32,047**	**339,117**	**1.2**	**2.7**
FEI	n/a	n/a	1,079	635	n/a	n/a	32,047	339,117	**1.2**	2.7
FEVI	n/a	n/a	-	-	n/a	n/a	-	-	-	-
Commercial	n/a	n/a	**220**	**112**	n/a	n/a	**32,536**	**273,624**	**2.1**	**4.2**
FEI	n/a	n/a	220	112	n/a	n/a	32,536	273,624	2.1	4.2
FEVI	n/a	n/a	-	-	n/a	n/a	-	-	-	-
Other Portfolio Level Activities	n/a	n/a	-	**929**	n/a	n/a	-	-	-	-
FEI	n/a	n/a	-	929	n/a	n/a	-	-	-	-
FEVI	n/a	n/a	-	-	n/a	n/a	-	-	-	-
Total	**1,500**	**1,624**	**1,299**	**1,676**	**(201)**	**52**	**64,582**	**612,741**	**1.3**	**2.1**

Note that DSM approved funding was established only at the portfolio level in 2008 (source: page 5 of 2009 EEC Annual Report).

2009 EEC Program Areas and Results	Expenditures ($000s)						Energy Savings (GJ)		TRC	SCT
	Approved		Actual		Variance		Actual			
	Incentives	Non-Incentives	Incentives	Non-Incentives	Incentives	Non-Incentives	Annual	NPV	Actual	Actual
Residential	n/a	n/a	**2,022**	**166**	n/a	n/a	**55,031**	**574,607**	**1.2**	**3.1**
FEI	n/a	n/a	1,975	138	n/a	n/a	52,901	553,543	1.2	3.1
FEVI	n/a	n/a	47	28	n/a	n/a	2,130	21,063	1.4	3.8
Commercial	n/a	n/a	**925**	**147**	n/a	n/a	**74,373**	**693,352**	**2.1**	**5.5**
FEI	n/a	n/a	874	140	n/a	n/a	70,804	653,874	2.1	5.5
FEVI	n/a	n/a	51	7	n/a	n/a	3,569	39,478	2.0	5.4
Conservation for Affordable Housing	n/a	n/a	229	5	n/a	n/a	**1,352**	**14,236**	**0.7**	**1.1**
FEI	n/a	n/a	229	5	n/a	n/a	1,352	14,236	0.7	1.1
FEVI	n/a	n/a	-	n/a	n/a	n/a	-	-	-	-
Joint initiatives	n/a	n/a	**7**	**428**	n/a	n/a	**210**	**1,905**	**0.8**	**2**
FEI	n/a	n/a	7	405	n/a	n/a	210	1,905	0.8	2
FEVI	n/a	n/a	-	23	n/a	n/a	-	-	-	-
Conservation, Education & Outreach	n/a	n/a	**n/a**	**611**	n/a	n/a	**n/a**	**n/a**	**n/a**	**n/a**
FEI	n/a	n/a	n/a	530	n/a	n/a	n/a	n/a	n/a	n/a
FEVI	n/a	n/a	n/a	81	n/a	n/a	n/a	n/a	n/a	n/a
Enabling Activities	n/a	n/a	**n/a**	307	n/a	n/a	**n/a**	**n/a**	**n/a**	**n/a**
FEI	n/a	n/a	n/a	57	n/a	n/a	n/a	n/a	n/a	n/a
FEVI	n/a	n/a	n/a	250	n/a	n/a	n/a	n/a	n/a	n/a
Other Portfolio Level Activities	n/a	n/a	**n/a**	**1,297**	n/a	n/a	**n/a**	**n/a**	**n/a**	**n/a**
FEI	n/a	n/a	n/a	1225	n/a	n/a	n/a	n/a	n/a	n/a
FEVI	n/a	n/a	n/a	72	n/a	n/a	n/a	n/a	n/a	n/a
Total	**1,500**	**1,624**	3,183	2,961	**1,683**	**1,337**	**130,965**	**1,284,100**	**1.2**	**3.1**

Note that DSM approved funding was established for program areas in the EEC Decision, so funding approval was only at the portfolio level for part of the year in 2009, making it very challenging to report on actual vs approved for this particualar year (source: page 5 of 2009 EEC Annual Report).
**These numbers have been updated from what was reported in 2009 EEC Annual Report (Table 4-2).*

2010 EEC Program Areas and Results	Expenditures ($000s)				Energy Savings (GJ)		TRC	SCT
	Approved	Actual		Variance	Actual			
		Incentives	Non-Incentives		Annual	NPV	Actual	Actual
Residential	**3,572**	**2,803**	**440**	**(329)**	**62,037**	**606,851**	**0.9**	**2.7**
FEI	3,275	2,686	329	(260)	59,965	586,021	1.0	2.8
FEVI	297	117	111	(69)	2,072	20,830	0.6	1.8
Commercial	**14,532**	**2,401**	**169**	**(11,962)**	**103,856**	**815,113**	**1.7**	**4.5**
FEI	13,163	1,964	120	(11,079)	82,678	658,188	1.7	4.5
FEVI	1,369	437	49	(883)	21,178	156,925	1.7	4.4
Conservation for Affordable Housing	**3,000**	**49**	**275**	**(2,676)**	**3,297**	**19,479**	**0.8**	**0.9**
FEI	2,400	39	256	(2,105)	2,637	15,520	0.7	0.7
FEVI	600	10	19	(571)	660	3,959	1.8	3.6
Joint initiatives	**1,648**	**29**	**429**	**(1,190)**	**748**	**5,700**	**0.1**	**0.3**
FEI	1,346	14	419	(913)	748	5,700	0.1	0.7
FEVI	302	15	10	(277)	n/a	n/a	n/a	n/a
Conservation, Education & Outreach	**3,538**	**n/a**	**1,616**	**(1,922)**	**n/a**	**n/a**	**n/a**	**n/a**
FEI	2,890	n/a	1,415	(1,475)	n/a	n/a	n/a	n/a
FEVI	648	n/a	201	(447)	n/a	n/a	n/a	n/a
Innovative Technology	**2,812**	**5,959**	**5**	**3,152**	**(161,228)**	**(706,551)**	**1.2**	**1**
FEI	2,334	5,816	5	3,487	(162,911)	(726,396)	1.3	1
FEVI	478	143	-	(335)	1,683	19,845	0.3	0.8
Interruptible Industrial	**435**	**n/a**	**4**	**(431)**	**n/a**	**n/a**	**n/a**	**n/a**
FEI	435	n/a	4	(431)	n/a	n/a	n/a	n/a
FEVI	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a
High Carbon Fuel Switching	**1,510**	**178**	**123**	**(1,209)**	**(3,828)**	**(38,632)**	**1.4**	**1.2**
FEI	1,510	29	47	(1,434)	(626)	(6,103)	1.2	1
FEVI	-	149	76	225	(3,204)	(32,529)	1.5	1.2
Other Portfolio Level Activities - Includes Enabling Activities	**-**	**n/a**	**3,221**	**3,221**	**n/a**	**n/a**	**n/a**	**n/a**
FEI	-	n/a	2,666	2,666	n/a	n/a	n/a	n/a
FEVI	-	n/a	555	555	n/a	n/a	n/a	n/a
Total	**31,047**	**11,419**	**6,282**	**(13,346)**	**4,882**	**701,959**	**1.1**	**1.6**

Note that EEC funding was approved for the overall program areas and was not specified by incentives and non-incentives.

2011 EEC Program Areas and Results (Projected)	Expenditures ($000s)				Energy Savings (GJ)		TRC	SCT
	Approved	Projected		Variance	Projected			
		Incentives	Non-Incentives		Annual	NPV	Projected	Projected
Residential	**3,572**	**1,710**	**825**	**(1,037)**	**21,288**	**187,405**	**0.8**	**2.0**
FEI	3,275	1,373	689	(1,213)	17,030	149,446	0.8	2.0
FEVI	297	337	136	176	4,258	37,959	0.8	2.1
Commercial	**14,532**	**3,092**	**172**	**(11,268)**	**133,090**	**1,144,831**	**1.2**	**3.3**
FEI	13,163	2,701	138	(10,324)	117,077	1,021,668	1.2	3.3
FEVI	1,369	391	34	(944)	16,013	123,163	1.1	2.9
Conservation for Affordable Housing	**3,000**	**1,462**	**1,109**	**(429)**	**13,519**	**105,500**	**0.7**	**1.2**
FEI	2,400	1,170	888	(342)	10,816	84,514	0.7	1.3
FEVI	600	292	221	(87)	2,703	20,986	0.7	1.1
Joint initiatives	**1,648**	**2,677**	**605**	**1,634**	**87,916**	**901,539**	**0.9**	**2.6**
FEI	1,346	2,428	514	1,596	79,180	814,827	0.9	2.6
FEVI	302	249	91	38	8,736	86,712	0.9	2.3
Conservation, Education & Outreach	**3,538**	**n/a**	**3,538**	**-**	**n/a**	**n/a**	**n/a**	**n/a**
FEI	2,890	n/a	2,890	-	n/a	n/a	n/a	n/a
FEVI	648	n/a	648	-	n/a	n/a	n/a	n/a
Innovative Technology	**5,625**	**3,931**	98	**(1,596)**	**(225,928)**	**(1,349,901)**	**1.8**	**1.2**
FEI	4,669	3,926	88	**(655)**	(225,989)	(1,350,618)	1.8	1.2
FEVI	956	5	10	**(941)**	61	717	0.2	0.4
Interruptible Industrial	**1,875**	**1,610**	**156**	**(109)**	**71,000**	**490,032**	**TBD**	**TBD**
FEI	1,875	1,610	156	**(109)**	71,000	490,032	TBD	TBD
FEVI	-	-	-	**-**	-	-	n/a	n/a
High Carbon Fuel Switching	**1,510**	**420**	**104**	**(986)**	**(8,600)**	**(86,875)**	1.8	**1.3**
FEI	-	100	21	**121**	(1,720)	(17,116)	1.7	1.3
FEVI	1,510	320	83	**(1,107)**	(6,880)	(69,759)	1.8	1.3
Other Portfolio Level Activities - Includes Enabling Activities	-	**n/a**	5,365	**5,365**	**n/a**	**n/a**	**n/a**	**n/a**
FEI	-	n/a	5,365	**5,365**	n/a	n/a	n/a	n/a
FEVI	-	n/a	1,008	**1,008**	n/a	n/a	n/a	n/a
Total	**35,300**	14,902	11,972	**(8,426)**	**21,286**	**902,496**	**1.1**	**1.5**

Note that EEC funding was approved for the overall program areas and was not specified by incentives and non-incentives.
Note that all figures listed above for 2011 are projections and therefore are subject to change. In some cases, such as with the Industrial program area, energy savings and benefit/cost calculations have not been verified or developed yet.
**These numbers are updated from what was reported in 2010 EEC Annual Report (Table 2-7).*

Program Area Details

Notes:
- In some cases there are slight variances compared to the respective EEC Annual Reports due to rounding.
- TBD = to be determined

Residential

Residential Program Area - 2008	Energy Savings (GJ)	
	Annual	NPV
ENERGY STAR Heating System Upgrade	**16,597**	**179,709**
FEI	16,597	179,709
FEVI	-	-
ENERGY STAR Heating System Upgrade - No VSM	**8,393**	**90,876**
FEI	8,393	90,876
FEVI	-	-
Fireplace	**7,056**	**68,532**
FEI	7,056	68,532
FEVI	-	-
Total	**32,046**	**339,117**

Residential Program Area - 2009	Energy Savings (GJ)	
	Annual	NPV
ENERGY STAR Heating System Upgrade	**28,409**	**299,201**
FEI	27,882	293,682
FEVI	527	5,519
ENERGY STAR Heating System Upgrade - LiveSmart BC	**21,945**	**231,121**
FEI	21,532	226,799
FEVI	413	4,322
EnerChoice Fireplace	**4,677**	**44,285**
FEI	3,487	33,062
FEVI	1,190	11,223
Total	**55,031**	**574,607**

Residential Program Area - 2010	Energy Savings (GJ)	
	Annual	NPV
ENERGY STAR Heating System Upgrade	**25,017**	**245,135**
FEI	24,346	238,325
FEVI	671	6,810
ENERGY STAR Heating System Upgrade - LiveSmart BC	**35,944**	**352,295**
FEI	34,729	339,960
FEVI	1,215	12,335
Furnace Service TLC - 2010	-	-
FEI	-	-
FEVI	-	-
Domestic Hot Water	**275**	**2,259**
FEI	243	1,990
FEVI	32	269
Energy Choice Fireplace Consumer Incentive	**800**	**7,161**
FEI	646	5,746
FEVI	154	1,415
Non Program Specific expenses	-	-
FEI	-	-
FEVI	-	-
Total	**62,036**	**606,850**

Residential Program Area - 2011 (Projected)	Energy Savings (GJ)	
	Annual	NPV
Furnace Service TLC - 2011	-	-
FEI	-	-
FEVI	-	-
Domestic Hot Water Heaters	**7,152**	**59,445**
FEI	5,722	47,415
FEVI	1,430	12,030
EnerChoice Fireplace	**14,136**	**127,961**
FEI	11,309	102,031
FEVI	2,827	25,930
EnerGuide 80 Townhome Pilot	-	-
FEI	-	-
Non Program Specific & Studies	-	-
FEI	-	-
FEVI	-	-
Total	**21,288**	**187,406**

Commercial

Commercial Program Area - 2008	Energy Savings (GJ)	
	Annual	NPV
Efficient Boiler Program - Retrofit	**5,629**	**71,961**
FEI	5,629	71,961
FEVI	-	-
Commercial Energy Assessment	**18,431**	**179,009**
FEI	18,431	179,009
FEVI	-	-
Destination Conservation	**8,475**	**22,654**
FEI	8,475	22,654
FEVI	-	-
Total	**32,535**	**273,624**

Commercial Program Area - 2009	Energy Savings (GJ)	
	Annual	NPV
Efficient Boiler Program - Retrofit	**57,098**	**635,496**
FEI	54,422	605,888
FEVI	2,676	29,608
Efficient Boiler Program - New Construction	**892**	**9,869**

FEI	-	-
FEVI	892	9,869
Light Commercial ENERGY STAR Boiler Program - Retrofit	**3,197**	**35,589**
FEI	3,197	35,589
FEVI	-	-
Energy Assessment Program - Retrofit	**13,186**	**12,396**
FEI	13,186	12,396
FEVI	-	-
Total	**74,373**	**693,350**

Commercial Program Area - 2010	Energy Savings (GJ)	
	Annual	NPV
Spray N Save Program	**1,536**	**6,322**
FEI	-	-
FEVI	1,536	6,322
Efficient Boiler Program - Retrofit	**39,721**	**408,264**
FEI	36,802	378,622
FEVI	2,919	29,642
Efficient Boiler Program - New Construction	**2,733**	**28,152**
FEI	2,630	27,055
FEVI	103	1,097
Light Commercial ENERGY STAR Boiler Program - Retrofit	**6,957**	**71,841**
FEI	6,311	64,926
FEVI	646	6,915
Light Commercial ENERGY STAR Boiler Program - New Construction	**91**	**936**
FEI	91	936
FEVI	-	-
Efficient Commercial Water Heater Program - Retrofit	**736**	**5,762**
FEI	592	4,607
FEVI	144	1,155
Efficient Commercial Water Heater Program - New Construction	**-**	**-**
FEI	-	-
FEVI	-	-
Energy Assessment Program - Retrofit	**21,570**	**20,106**
FEI	17,446	16,247
FEVI	4,124	3,859
PSECA Initiaitive Program - Retrofit	**29,928**	**271,355**
FEI	18,222	163,420
FEVI	11,706	107,935
Fireplace Timers Pilot Program - Retrofit	**585**	**2,374**
FEI	585	2,374
FEVI	-	-
Non Program Specific Expenses	**-**	**-**
FEI	-	-
FEVI	-	-
Total	**103,857**	**815,112**

Commercial Program Area - 2011 (Projected)	Energy Savings (GJ)	
	Annual	NPV
Efficient Boiler Program - Retrofit	**43,849**	**459,876**
FEI	40,565	424,785
FEVI	3,284	35,091
Efficient Boiler Program - New Construction	**7218**	**75624**
FEI	7,013	73,434
FEVI	205	2,190
Light Commercial ENERGY STAR Boiler Program - Retrofit	**12537**	**131636**
FEI	10,922	114,375
FEVI	1,615	17,261
Light Commercial ENERGY STAR Boiler Program - New Construction	**971**	**10167**
FEI	971	10167
FEVI	-	-
Efficient Commercial Water Heater Program - Retrofit	**4166**	**42726**
FEI	3,805	39,842
FEVI	361	2,884
Efficient Commercial Water Heater Program - New Construction	**339**	**3332**
FEI	254	2,656
FEVI	85	676
Energy Assessment Program - Retrofit	**23,790**	**22,213**
FEI	19,349	18,058
FEVI	4,441	4,155
PSECA Initiative Program - Retrofit	**36,327**	**381,585**
FEI	30,830	322,840
FEVI	5,497	58,745
Fireplace Timers Pilot Program - Retrofit	**1,290**	**5,271**
FEI	1,200	4,901
FEVI	90	370
Radiant Tube Heaters Pilot Program - Retrofit	**275**	**2,880**
FEI	275	2,880
FEVI	-	-
Spray Valve Program - Retrofit	**2297**	**9392**
FEI	1,861	7,601
FEVI	436	1,791
Spray Valve Program - New Construction	**32**	**129**
FEI	32	129
FEVI	-	-
Non Program Specific expenses	-	-
FEI	-	-
FEVI	-	-

Taken from Exhibit B-9 FEU Response to BCUC IR No. 1 Attachment 191.1

Total	**133,091**	**1,144,831**

Conservation for Affordable Housing

Conservation for Affordable Housing - 2009	Energy Savings (GJ)	
	Annual	NPV
Meridian Village	**1,352**	**14,236**
FEI	1,352	14,236
FEVI	-	-
Energy Conservation for Affordable Housing Forum	-	-
FEI	-	-
FEVI	-	-
Total	**1,352**	**14,236**

Conservation for Affordable Housing - 2010	Energy Savings (GJ)	
	Annual	NPV
REnEW Program	-	-
FEI	-	-
FEVI	-	-
Energy Savings Kits	**3,297**	**19,479**
FEI	2,637	15,520
FEVI	660	3,959
Energy Conservation Assistance Program	**-**	**-**
FEI	-	-
FEVI	-	-
Studies and Non-Program Specific Expenditures	-	-
FEI	-	-
FEVI	-	-
Total	**3,297**	**19,479**

Conservation for Affordable Housing - 2011 (Projected)	Energy Savings (GJ)	
	Annual	NPV
REnEW Program Performance Forecast	-	-
FEI	-	-
FEVI	-	-
Energy Savings Kits	**6,584**	**39,168**
FEI	5,267	31,271
FEVI	1,317	7,897
Energy Conservation Assistance Program	**6,935**	**66,331**
FEI	5,548	53,242
FEVI	1,387	13,089
Studies and Non-Program Specific Expenditures	**-**	**-**
FEI	-	-
FEVI	-	-
Total	**13,519**	**105,499**

Joint Initiatives

Joint initiatives - 2009	Energy Savings (GJ)	
	Annual	NPV
EcoEnergy Home Energy Assessments (D-visits) through LiveSmart BC	-	-
FEI	-	-
FEVI	-	-
Tier 3 ENERGY STAR Washer and Dryer Rebate with FortisBC - six week Pilot	**210**	**1,905**
FEI	210	1,905
FEVI	-	-
Total	**210**	**1,905**

Joint initiatives - 2010	Energy Savings (GJ)	
	Annual	NPV
EcoEnergy Home Energy Assessments (D-visits) through LiveSmart BC	-	-
FEI	-	-
FEVI	-	-
ENERGY STAR Washer Program	**328**	**2,801**
FEI	328	2,801
FEVI	-	-
Water Saver Program	**420**	**2,899**
FEI	420	2,899
FEVI	-	-
Weatherization Pilot (COV)	-	-
FEI	-	-
Non Program Specific & Studies	-	-
FEI	-	-
FEVI	-	-
Total	**748**	**5,700**

Joint initiatives - 2011 (Projected)	Energy Savings (GJ)	
	Annual	NPV
LiveSmart BC - 2010 program contribution	**22,538**	**246,004**
FEI	21,463	234,273
FEVI	1,075	11,731
LiveSmart BC - 2011 program contribution	**44,573**	**474,721**
FEI	40,503	431,354
FEVI	4,070	43,367
Home Efficiency Web Portal	-	-
FEI	-	-
FEVI	-	-
Tier 4 ENERGY STAR Clothes Washer Program - BCH Partnership	**17,955**	**156,111**
FEI	14,364	124,498
FEVI	3,591	31,613
Tier 4 ENERGY STAR Clothes Washer Program - FortisBC Inc. Partnership	**2,850**	**24,702**
FEI	2,850	24,702
FEVI	-	-
Non Program Specific & Studies	-	-
FEI	-	-
FEVI	-	-
Total	**87,916**	**901,538**

Taken from Exhibit B-9 FEU Response to BCUC IR No. 1 Attachment 191.1

Conservation, Education & Outreach

Note that there are no energy savings directly attributable to Conservation, Education & Outreach.

Innovative Technologies

Innovative Technology- 2010	Energy Savings (GJ)	
	Annual	NPV
Solar Thermal Hot Water	**4,262**	**48,898**
FEI	2,579	29,053
FEVI	1,683	19,845
NGV Commercial Vehicles	**(165,490)**	**(755,449)**
FEI	(165,490)	(755,449)
FEVI	-	-
Hydronic and Combination Heating Systems	-	-
FEI	-	-
FEVI	-	-
Residential GSHP Systems	-	-
FEI	-	-
FEVI	-	-
Commercial/Industrial GSHP Systems	-	-
FEI	-	-
FEVI	-	-
Total	**(161,228)**	**(706,551)**

Innovative Technology - 2011 (Projected)	Energy Savings (GJ)	
	Annual	NPV
Commercial NGV Demonstration Program	**(228,131)**	**(1,376,306)**
FEI	(228,131)	(1,376,306)
FEVI	-	-
SolarBC Schools Incentive Program	**326**	**3,758**
FEI	265	3,042
FEVI	61	716
Solar Air Heating PSECA Program	**1,458**	**17,817**
FEI	1,458	17,817
FEVI	-	-
Solar Residential Hot Water PILOT	**420**	**4,829**
FEI	420	4,829
FEVI	-	-
Non Program Specific expenses	-	-
FEI	-	-
FEVI	-	-
Total	**(225,927)**	**(1,349,902)**

Industrial

Industrial Program - 2011 (Projected)	Energy Savings (GJ)	
	Annual	NPV
Energy Audit Funding Program	-	-
FEI	-	-
FEVI	-	-
Heat Exchanger Program - PILOT	**70,000**	**483,130**
FEI	70,000	483,130
FEVI	-	-
Heat Exchanger Pulp and Paper Mills	**TBD**	**TBD**
FEI	TBD	TBD
FEVI	-	-
Burner Management Control	**1,000**	**6,902**
FEI	1,000	6,902
FEVI	-	-
Non Program Specific Expenses	-	-
FEI	-	-
FEVI	-	-
Total	**71,000**	**490,032**

High Carbon Fuel Switching

High Carbon Fuel Switching- 2010	Energy Savings (GJ)	
	Annual	NPV
Swtich N Shrink Program	**(3,827)**	**(38,632)**
FEI	(626)	(6,103)
FEVI	(3,204)	(32,529)
Total	**(3,827)**	**(38,632)**

High Carbon Fuel Switching - 2011 (Projected)	Energy Savings (GJ)	
	Annual	NPV
Swtich N Shrink Program	**(8,600)**	**(86,875)**
FEI	(1,720)	(17,116)
FEVI	(6,880)	(69,759)
Total	**(8,600)**	**(86,875)**

Enabling Activities

Note that there are no energy savings directly attributable to Enabling Activities.

Program Expenditure Details

Notes:
- In some cases there are slight variances due to rounding.
- 2008 Non-Incentives expenditure breakdown sourced from Attachment 55.3 in Sept 2009 RRA BCUC IR.2.55.3.
- Evaluation expenditures in 2008 have been broken out here by program but were applied only as a Portfolio level expenditure in 2008.

Residential

Residential Program Area - 2008	Expenditures ($000s)						
	Incentives	Non-Incentives					
		Total	Admin	Marketing and Outreach	Evaluation	Outside Contractor	Others
ENERGY STAR Heating System Upgrade	**528**	**148**	**95**	-	**53**	-	-
FEI	528	**148**	95	-	53	-	-
FEVI	-	-	-	-	-	-	-
ENERGY STAR Heating System Upgrade - No VSM)	**267**	**448**	**421**	-	**27**	-	-
FEI	267	**448**	421	-	27	-	-
FEVI	-	-	-	-	-	-	-
EnerChoice Fireplace	**284**	**141**	**119**	-	**22**	-	-
FEI	284	**141**	119	-	22	-	-
FEVI	-	-	-	-	-	-	-
Total	**1,079**	**737**	**635**	-	**102**	-	-

Residential Program Area - 2009	Expenditures ($000s)						
	Incentives	Non-Incentives					
		Total	Admin	Marketing and Outreach	Evaluation	Outside Contractor	Others
ENERGY STAR Heating System Upgrade	**1,119**	**115**	**65**	**50**	-	-	-
FEI	1,098	101	61	40	-	-	-
FEVI	21	14	4	10	-	-	-
ENERGY STAR Heating System Upgrade - LiveSmart BC	**864**	**7**	**7**	-	-	-	-
FEI	848	7	7	-	-	-	-
FEVI	16	-	-	-	-	-	-
EnerChoice Fireplace	**40**	**45**	**6**	**39**	-	-	-
FEI	30	31	5	26	-	-	-
FEVI	10	14	1	13	-	-	-
Total	**2,023**	**167**	**78**	**89**	-	-	-

Residential Program Area - 2010	Expenditures ($000s)						
	Incentives	Non-Incentives					
		Total	Admin	Marketing and Outreach	Evaluation	Outside Contractor	Others
ENERGY STAR Heating System Upgrade	**989**	**62**	**56**	**6**	-	-	-
FEI	962	51	45	6	-	-	-
FEVI	27	11	11	-	-	-	-
ENERGY STAR Heating System Upgrade - LiveSmart BC	**1,420**	-	-	-	-	-	-
FEI	1,372	-	-	-	-	-	-
FEVI	48	-	-	-	-	-	-
Furnace Service TLC - 2010	**356**	**154**	**92**	**47**	**15**	-	-
FEI	320	112	73	27	12	-	-
FEVI	36	42	19	20	3	-	-
Domestic Hot Water	**17**	**64**	**5**	**58**	-	-	-
FEI	15	52	4	47	-	-	-
FEVI	2	12	1	11	-	-	-
EnerChoice Fireplace - Consumer Program	**20**	**51**	**6**	**45**	-	-	-
FEI	16	40	4	36	-	-	-
FEVI	4	11	2	9	-	-	-
Non Program Specific expenses	-	**109**	**10**	**11**	**23**	**64**	-
FEI	-	74	1	9	12	52	-
FEVI	-	35	9	2	11	12	-
Total	**2,802**	**440**	**169**	**167**	**38**	**64**	-

Residential Program Area - 2011 (Projected)	Expenditures ($000s)						
	Incentives	Non-Incentives					
		Total	Admin	Marketing and Outreach	Evaluation	Outside Contractor	Others
Furnace Service TLC - 2011	**460**	**146**	**100**	**30**	**16**	-	-
FEI	368	120	82	25	13	-	-
FEVI	92	26	18	5	3	-	-
Domestic Hot Water Heaters	**530**	**178**	**52**	**105**	**20**	-	-
FEI	429	138	42	80	16	-	-
FEVI	101	40	10	25	4	-	-
EnerChoice Fireplace	**720**	**146**	**21**	**100**	**25**	-	-
FEI	576	117	17	80	20	-	-
FEVI	144	29	4	20	5	-	-
EnerGuide 80 Townhome Pilot	-	**154**	-	-	-	-	**154**
FEI	-	154	-	-	-	-	154
Non Program Specific & Studies	-	**200**	**20**	**20**	**40**	**120**	-
FEI	-	160	16	16	32	96	-
FEVI	-	40	4	4	8	24	-
Total	**1,710**	**824**	**193**	**255**	**101**	**120**	**154**

Commercial

Commercial Program Area - 2008	Expenditures ($000s)						
	Incentives	Non-Incentives					
		Total	Admin	Marketing and Outreach	Evaluation	Outside Contractor	Others
Commercial Boiler Upgrade	**97**	**46**	**28**	-	**18**	-	-
FEI	97	46	28	-	18	-	-
FEVI	-	-	-	-	-	-	-
Commercial Energy Assessments	**-**	**142**	**84**	-	**58**	-	-
FEI	-	142	84	-	58	-	-
FEVI	-	-	-	-	-	-	-
Destination Conservation	**123**	**27**	-	-	**27**	-	-
FEI	123	27	-	-	27	-	-
FEVI	-	-	-	-	n/a	-	-
Total	**220**	**215**	**112**	-	**103**	-	-

Commercial Program Area - 2009	Expenditures ($000s)						
	Incentives	Non-Incentives					
		Total	Admin	Marketing and Outreach	Evaluation	Outside Contractor	Others
Efficient Boiler Program - Retrofit	**822**	**106**	**105**	**1**	**-**	**-**	**-**
FEI	783	101	100	1	-	-	-
FEVI	39	5	5	-	-	-	
Efficient Boiler Program - New Construction	**13**	**2**	**2**	**-**	**-**	**-**	**-**
FEI	-	-	-	-	-	-	-
FEVI	13	2	2	-	-	-	-
Light Commercial ENERGY STAR Boiler Program - Retrofit	**32**	**20**	**9**	**9**	**2**	**-**	**-**
FEI	32	20	9	9	2	-	-
FEVI	-	-		-	-	-	-
Energy Assessment Program - Retrofit	**59**	**18**	**18**	**-**	**-**	**-**	**-**
FEI	59	18	**18**	-	-	-	-
FEVI	-	-	-	-	-	-	-
Total	**926**	**146**	**134**	**10**	**2**	**0**	**0**

Commercial Program Area - 2010	Expenditures ($000s)						
	Incentives	Non-Incentives					
		Total	Admin	Marketing and Outreach	Evaluation	Outside Contractor	Others
Spray N Save Program	**12**	**5**	**5**	-	-	-	
FEI	-	-	-	-	-	-	-
FEVI	12	4	**5**	-	-	-	-
Efficient Boiler Program - Retrofit	**1,286**	**28**	**4**	**4**	**20**	-	-
FEI	1,189	23	3	3	17	-	-
FEVI	97	5	1	1	3	-	-
Efficient Boiler Program - New Construction	**80**	**2**	**2**	-	**2**	-	-
FEI	74	1	1	-	1	-	-
FEVI	6	1	1	-	1	-	-
Light Commercial ENERGY STAR Boiler Program - Retrofit	**102**	**6**	**2**	**4**	-	-	-
FEI	90	5	2	3	-	-	-
FEVI	12	1	-	1	-	-	-
Light Commercial ENERGY STAR Boiler Program - New Construction	**0**	**0**	-	-	-	-	-
FEI	0	0	-	-	-	-	-
FEVI	-	-	-	-	-	-	-

Taken from Exhibit B-9 FEU Response to BCUC IR No. 1 Attachment 191.2

Efficient Commercial Water Heater Program - Retrofit	**18**	**4**	**1**	**3**	**-**	**-**	**-**
FEI	15	3	1	2	-	-	-
FEVI	3	1	-	1	-	-	-
Efficient Commercial Water Heater Program - New Construction	**-**	**-**	**-**	**-**	**-**	**-**	**-**
FEI	-	-	-	-	-	-	-
FEVI	-	-	-	-	-	-	-
Energy Assessment Program - Retrofit	**82**	**27**	**11**	**-**	**16**	**-**	**-**
FEI	66	25	9	-	16	-	-
FEVI	16	2	2	-	-	-	-
PSECA Initiaitive Program - Retrofit	**810**	**31**	**25**	**-**	**6**	**-**	**-**
FEI	519	25	25	-	-	-	-
FEVI	291	6	-	-	6	-	-
Fireplace Timers Pilot Program - Retrofit	**10**	**-**	**-**	**-**	**-**	**-**	**.**
FEI	10	-	-	-	-	-	-
FEVI	-	-	-	-	-	-	-
Non Program Specific Expenses	**-**	**69**	**54**	**15**	**-**	**-**	**-**
FEI	-	39	27	12	-	-	-
FEVI	-	30	27	3	-	-	-
Total	**2,400**	**172**	**104**	**26**	**44**	-	-

Commercial Program Area - 2011 (Projected)	Expenditures ($000s)						
	Incentives	Non-Incentives					
		Total	Admin	Marketing and Outreach	Evaluation	Outside Contractor	Others
Efficient Boiler Program - Retrofit	**1,415**	**31**	**4**	**6**	**21**	**-**	**-**
FEI	1,308	25	3	5	17	-	-
FEVI	107	6	1	1	4	-	-
Efficient Boiler Program - New Construction	**209**	**3**	**-**	**-**	**3**	**-**	**-**
FEI	197	2	-	-	2	-	-
FEVI	12	1	-	-	1	-	-
Light Commercial ENERGY STAR Boiler Program - Retrofit	**185**	**12**	**3**	**9**	**-**	**-**	**-**
FEI	156	9	2	7	-	-	-
FEVI	29	3	1	2	-	-	-
Light Commercial ENERGY STAR Boiler Program - New Construction	**14**	**1**	**1**	**-**	**-**	**-**	**-**
FEI	14	1	1	-	-	-	-
FEVI	-	-	-	-	-	-	-
Efficient Commercial Water Heater Program - Retrofit	**106**	**11**	**3**	**8**	**-**	**-**	**-**
FEI	99	9	2	7	-	-	-
FEVI	7	2	1	1	-	-	-
Efficient Commercial Water Heater Program - New Construction	**9**	**2**	**1**	**1**	**-**	**-**	**-**
FEI	7	2	1	1	-	-	-
FEVI	2	-	-	-	-	-	-
Energy Assessment Program - Retrofit	**90**	**29**	**21**	**8**	**-**	**-**	**-**
FEI	73	27	20	7	-	-	-
FEVI	17	2	1	1	-	-	-
PSECA Initiative Program - Retrofit	**1,008**	**33**	**33**	**-**	**-**	**-**	**-**
FEI	800	24	24	-	-	-	-
FEVI	208	9	9	-	-	-	-
Fireplace Timers Pilot Program - Retrofit	**22**	**-**	**-**	**-**	**-**	**-**	**-**
FEI	20	-	-	-	-	-	-
FEVI	2	-	-	-	-	-	-
Radiant Tube Heaters Pilot Program - Retrofit	**3**	**7**	**6**	**-**	**1**	**-**	**-**
FEI	3	7	6	-	1	-	-
FEVI	-	-	-	-	-	-	-
Spray Valve Program - Retrofit	**25**	**4**	**2**	**2**	**-**	**-**	**-**
FEI	20	3	2	1	-	-	-
FEVI	5	1	-	1	-	-	-
Spray Valve Program - New Construction	**-**	**-**	**-**	**-**	**-**	**-**	**-**
FEI	-	-	-	-	-	-	-
FEVI	-	-	-	-	-	-	-
Non Program Specific expenses	**-**	**40**	**22**	**18**	**-**	**-**	**-**
FEI	-	32	16	16	-	-	-
FEVI	-	8	6	2	-	-	-
Total	**3,086**	**173**	**96**	**52**	**25**	**-**	**-**

Conservation for Affordable Housing

Conservation for Affordable Housing - 2009	Expenditures ($000s)						
	Incentives	Non-Incentives					
		Total	Admin	Marketing and Outreach	Evaluation	Outside Contractor	Others
Meridian Village	**229**	-	-	-	-	-	-
FEI	229	-	-	-	-	-	-
FEVI	-	-	-	-	-	-	-
Energy Conservation for Affordable Housing Forum	-	**5**	-	**5**	-	-	-
FEI	-	5	-	5	-	-	-
FEVI	-	-	-	-	-	-	-
Total	**229**	**5**	**0**	**5**	-	-	-

Conservation for Affordable Housing - 2010	Expenditures ($000s)						
	Incentives	Non-Incentives					
		Total	Admin	Marketing and Outreach	Evaluation	Outside Contractor	Others
REnEW Program	-	**148**	**15**	**7**	**4**	**114**	**7**
FEI	-	148	**15**	**7**	**4**	**114**	**7**
FEVI	-	-	-	-	-	-	-
Energy Savings Kits	**49**	**55**	**44**	**9**	**1**	**0**	**0**
FEI	39	44	35	7	1	-	-
FEVI	10	11	9	2	-	-	-
Energy Conservation Assistance Program	-	-	-	-	-	-	-
FEI	-	-	-	-	-	-	-
FEVI	-	-	-	-	-	-	-
Studies and Non-Program Specific Expenditures	-	**72**	**36**	**7**	-	**29**	-
FEI	-	65	33	7	-	26	-
FEVI	-	7	4	1	-	3	-
Total	**49**	**275**	**95**	**24**	**6**	**143**	**7**

Conservation for Affordable Housing - 2011 (Projected)	Expenditures ($000s)						
	Incentives	Non-Incentives					
		Total	Admin	Marketing and Outreach	Evaluation	Outside Contractor	Others
REnEW Program Performance Forecast	-	**185**	**18.5**	**18**	**5.55**	**134**	**9**
FEI	-	150	15	15	5	108	8
FEVI	-	35	4	3	1	26	1
Energy Savings Kits	**110**	**123**	**96**	**24**	**3**	-	-
FEI	88	98	76	20	2	-	-
FEVI	22	25	20	5	1	-	-
Energy Conservation Assistance Program	**1,352**	**766**	**536**	**207**	**23**	-	-
FEI	1,082	613	429	166	18	-	-
FEVI	270	153	107	41	5	-	-
Studies and Non-Program Specific Expenditures	-	**35**	**11**	-	-	**25**	-
FEI	-	27	8	-	-	19	-
FEVI	-	8	2	-	-	6	-
Total	**1,462**	**1,109**	**661**	**249**	**31**	**159**	**9**

Joint Initiatives

Joint initiatives - 2009	Expenditures ($000s)						
	Incentives	Non-Incentives					
		Total	Admin	Marketing and Outreach	Evaluation	Outside Contractor	Others
EcoEnergy Home Energy Assessments (D-visits) through LiveSmart BC &	-	**428**	**1**	-	**10**	**8**	**409**
FEI	-	405	1	-	8	6	389
FEVI	-	23	-	-	2	2	20
Tier 3 ENERGY STAR Washer and Dryer Rebate with FortisBC - six week Pilot	**7**	-	-	-	-	-	-

Taken from Exhibit B-9 FEU Response to BCUC IR No. 1 Attachment 191.2

FEI	7	-	-	-	-	-	-
FEVI	-	-	-	-	-	-	-
Total	**7**	**428**	**1**	-	**10**	**8**	**409**

Joint initiatives - 2010	Expenditures ($000s)						
	Incentives	Non-Incentives					
		Total	Admin	Marketing and Outreach	Evaluation	Outside Contractor	Others
EcoEnergy Home Energy Assessments (D-visits) through LiveSmart BC	15	**365**	**5**	-	-	-	**360**
FEI	15	349	4	-	-	-	345
FEVI	-	16	1	-	-	-	15
ENERGY STAR Washer Program	**7**	-	-	-	-	-	-
FEI	7	-	-	-	-	-	-
FEVI	-	-	-	-	-	-	-
Water Saver Program	**7**	**7**	**3**	**4**	-	-	-
FEI	8	7	3	4	-	-	-
FEVI	-	-	-	-	-	-	-
Weatherization Pilot (COV)	-	**15**	**15**	-	-	-	-
FEI	-	15	15	-	-	-	-
Non Program Specific & Studies	-	**41**	**3**	-	**18**	**20**	-
FEI	-	33	3	-	14	16	-
FEVI	-	8	-	-	4	4	-
Total	**29**	**428**	**26**	**4**	**18**	**20**	**360**

Joint initiatives - 2011 (Projected)	Expenditures ($000s)						
	Incentives	Non-Incentives					
		Total	Admin	Marketing and Outreach	Evaluation	Outside Contractor	Others
LiveSmart BC - 2010 program contribution	**558**	**100**	**6**	**6**	**18**	**24**	**47**
FEI	531	85	5	5	15	20	40
FEVI	27	15	1	1	3	4	7
LiveSmart BC - 2011 program contribution	**1,756**	**180**	**70**	**35**	**50**	**25**	-
FEI	1,596	162	63	32	45	22	-
FEVI	160	18	7	3	5	3	-
Home Efficiency Web Portal	-	**60**	-	-	-	**60**	-
FEI	-	50	-	-	-	50	-
FEVI	-	10	-	-	-	10	-
Tier 4 ENERGY STAR Clothes Washer Program - BCH Partnership	**315**	**50**	**50**	-	-	-	-
FEI	252	42	42	-	-	-	-
FEVI	63	8	8	-	-	-	-
Tier 4 ENERGY STAR Clothes Washer Program - FortisBC Inc. Partnership	**50**	**15**	-	**15**	-	-	-
FEI	50	15	-	15	-	-	-
FEVI	-	-	-		-	-	-
Non Program Specific & Studies	-	**200**	**20**	**95**	**40**	**45**	-
FEI	-	160	16	76	32	36	-
FEVI	-	40	4	19	8	9	-
Total	**2,679**	**605**	**146**	**151**	**108**	**154**	**47**

Conservation, Education & Outreach

Conservation, Education & Outreach - 2009	Expenditures ($000s)						
	Incentives	Non-Incentives					
		Total	Admin	Marketing and Outreach	Evaluation	Outside Contractor	Others
Print and Online Publications	-	**221**	-	**221**	-	-	-
FEI	-	209	-	209	-	-	-
FEVI	-	12	-	12	-	-	-
Trade Shows and Events	-	**102**	**102**	-	-	-	-
FEI	-	76	76	-	-	-	-
FEVI	-	26	26	-	-	-	-
Students and Schools Outreach	-	**117**	**117**	-	-	-	-
FEI	-	77	77	-	-	-	-
FEVI	-	40	40	-	-	-	-
Energy Champion Program	-	**126**	**118**	**8**	-	-	-
FEI	-	123	115	8	-	-	-
FEVI	-	3	3	-	-	-	-
Team Terasen Outreach	-	**45**	**45**	-	-	-	-
FEI	-	45	45	-	-	-	-
FEVI	-	-	-	-	-	-	-
Total	-	**611**	**382**	**229**	-	-	-

Conservation, Education & Outreach - 2010	Expenditures ($000s)						
	Incentives	Non-Incentives					
		Total	Admin	Marketing and Outreach	Evaluation	Outside Contractor	Others
CEO Portfolio Administration	-	**32**	**3**	**15**	**14**	-	-
FEI	-	28	2	14	12	-	-
FEVI	-	4	1	1	2	-	-
Residential and General Public Education and Outreach	-	**1,118**	**375**	**705**	**15**	**23**	-
FEI	-	975	296	644	15	20	-
FEVI	-	143	79	61	-	3	-
Commercial Customers Education and Outreach	-	**313**	**68**	**152**	-	**93**	-
FEI	-	285	58	134	-	93	-
FEVI	-	28	10	18	-	-	-
Conservation for Affordable Housing Education and Outreach	-	**10**	**10**	-	-	-	-
FEI	-	8	8	-	-	-	-
FEVI	-	2	2	-	-	-	-
School Outreach	-	**143**	**132**	-	-	**11**	-
FEI	-	119	110	-	-	9	-
FEVI	-	24	22	-	-	2	-
Total	-	**1,616**	**588**	**872**	**29**	**127**	-

Conservation, Education & Outreach - 2011 (Projected)	Expenditures ($000s)						
	Incentives	Non-Incentives					
		Total	Admin	Marketing and Outreach	Evaluation	Outside Contractor	Others
CEO Portfolio Administration	-	**138**	**60**	**78**	-	-	-
FEI	-	100	50	50	-	-	-
FEVI	-	38	23	15	-	-	-
Residential and General Public Education and Outreach	-	**1,775**	**620**	**815**	**90**	**250**	-
FEI	-	1,500	520	700	80	200	-
FEVI	-	275	100	115	10	50	-
Commercial Customers Education and Outreach	-	**900**	**450**	**190**	-	**260**	-
FEI	-	700	350	150	-	200	-
FEVI	-	200	100	40	-	60	-
Conservation for Affordable Housing Education and Outreach	-	**255**	**115**	**115**	-	**25**	-
FEI	-	200	90	90	-	20	-
FEVI	-	55	25	25	-	5	-
School Outreach	-	**470**	**335**	**90**	**15**	**30**	-
FEI	-	390	275	80	10	25	-
FEVI	-	80	60	10	5	5	-
Total	-	**3,538**	**1,580**	**1,288**	**105**	**565**	-

Innovative Technologies

Innovative Technology- 2010	Expenditures ($000s)						
	Incentives	Non-Incentives					
		Total	Admin	Marketing and Outreach	Evaluation	Outside Contractor	Others
Solar Thermal Hot Water	**372**	-	-	-	-	-	-
FEI	229	-	-	-	-	-	-
FEVI	143	-	-	-	-	-	-
NGV Commercial Vehicles	**5,587**	**2**	**2**	-	-	-	-
FEI	5,587	2	2	-	-	-	-
FEVI	-	-	-	-	-	-	-
Hydronic and Combination Heating Systems	-	-	-	-	-	-	-
FEI	-	-	-	-	-	-	-
FEVI	-	-	-	-	-	-	-
Residential GSHP Systems	-	-	-	-	-	-	-
FEI	-	-	-	-	-	-	-
FEVI	-	-	-	-	-	-	-
Commercial/Industrial GSHP Systems	-	**3**	-	-	3	-	-
FEI	-	3	-	-	-	-	-
FEVI	-	-	-	-	-	-	-
Total	**5,959**	**5**	**2**	-	**3**	-	-

Innovative Technology - 2011 (Projected)	Expenditures ($000s)

Taken from Exhibit B-9 FEU Response to BCUC IR No. 1 Attachment 191.2

Innovative Technology - 2011 (Projected)	Incentives	Non-Incentives					
		Total	Admin	Marketing and Outreach	Evaluation	Outside Contractor	Others
Commercial NGV Demonstration Program	**3,780**	**1**	**1**	-	-	-	-
FEI	3,780	1	1	-	-	-	-
FEVI	-	-	-	-	-	-	-
SolarBC Schools Incentive Program	**27**	-	-	-	-	-	-
FEI	22	-	-	-	-	-	-
FEVI	5	-	-	-	-	-	-
Solar Air Heating PSECA Program	**73**	**5**	**5**	-	-	-	-
FEI	73	5	5	-	-	-	-
FEVI	-	-	-	-	-	-	-
Solar Residential Hot Water PILOT	**50**	**26**	**1**	**1**	**24**	-	-
FEI	50	26	1	1	24	-	-
FEVI	-	-	-	-	-	-	-
Non Program Specific expenses	-	**66**	**66**	-	-	-	-
FEI	-	56	56	-	-	-	-
FEVI	-	10	10	-	-	-	-
Total	**3,930**	**98**	**73**	**1**	**24**	-	-

Industrial

Industrial Program - 2011 (Projected)	Expenditures ($000s)						
	Incentives	Non-Incentives					
		Total	Admin	Marketing and Outreach	Evaluation	Outside Contractor	Others
Energy Audit Funding Program	**200**	-	-	-	-	-	-
FEI	200	-	-	-	-	-	-
FEVI	-	-	-	-	-	-	-
Heat Exchanger Program - PILOT	**500**	**50**	**50**	-	-	-	-
FEI	500	50	50	-	-	-	-
FEVI	-	-	-	-	-	-	-
Heat Exchanger Pulp and Paper Mills	**1000**	-	-	-	-	-	-
FEI	1000	-	-	-	-	-	-
FEVI	-	-	-	-	-	-	-
Burner Management Control	**13**	-	-	-	-	-	-
FEI	13	-	-	-	-	-	-
FEVI	-	-	-	-	-	-	-
Non Program Specific Expenses	-	**3**	**3**	-	-	-	-
FEI	-	3	3	-	-	-	-
FEVI	-	-	-	-	-	-	-
Total	**1,713**	**53**	**53**	-	-	-	-

High Carbon Fuel Switching

High Carbon Fuel Switching- 2010	Expenditures ($000s)						
	Incentives	Non-Incentives					
		Total	Admin	Marketing and Outreach	Evaluation	Outside Contractor	Others
Swtich N Shrink Program	**178**	**122**	**8**	**113**	-	-	-
FEI	29	46	1	45	-	-	-
FEVI	149	76	7	68	-	-	-
Total	**178**	**122**	**8**	**113**	-	-	-

High Carbon Fuel Switching - 2011 (Projected)	Expenditures ($000s)						
	Incentives	Non-Incentives					
		Total	Admin	Marketing and Outreach	Evaluation	Outside Contractor	Others
Swtich N Shrink Program	**420**	**104**	**8**	**96**	-	-	-
FEI	100	21	2	19	-	-	-
FEVI	320	83	6	77	-	-	-
Total	**420**	**104**	**8**	**96**	-	-	-

Enabling Activities

Enabling Activities - 2009	Expenditures ($000s)						
	Incentives	Non-Incentives					
		Total	Admin	Marketing and Outreach	Evaluation	Outside Contractor	Others
Research and Evaluation	-	**15**	-	-	-	**15**	-
FEI	-	12	-	-	-	12	-
FEVI	-	3	-	-	-	3	-
Efficiency Partners Program	-	**27**	**27**	-	-	-	-
FEI	-	7	-	-	-	-	-
FEVI	-	20	-	-	-	-	-
Codes and Standards	-	**13**	**9**	**2**	-	**2**	-
FEI	-	10	8	1	-	1	-
FEVI	-	3	1	1	-	1	-
Pilot Programs	-	**252**	-	-	-	-	**252**
FEI	-	28	-	-	-	-	28
FEVI	-	224	-	-	-	-	224
Total	-	**307**	**36**	**2**	-	**17**	**252**

Enabling Activities - 2010	Expenditures ($000s)						
	Incentives	Non-Incentives					
		Total	Admin	Marketing and Outreach	Evaluation	Outside Contractor	Others
Research and Evaluation	-	**340**	-	-	-	**340**	-
FEI	-	272	-	-	-	272	-
FEVI	-	68	-	-	-	68	-
Efficiency Partners Program	-	**93**	**25**	**19**	**3**	**46**	-
FEI	-	55	20	5	2	28	-
FEVI	-	38	5	14	1	18	-
Codes and Standards	-	**18**	**4**	**10**	**1**	**3**	-
FEI	-	15	4	8	1	2	-
FEVI	-	3	-	2	-	1	-
Pilot Programs	-	-	-	-	-	-	-
FEI	-	-	-	-	-	-	-
FEVI	-	-	-	-	-	-	-
Energy Management Funding	-	**460**	**205**	-	-	-	**255**
FEI	-	445	205	-	-	-	240
FEVI	-	15	-	-	-	-	15
Total	-	**911**	**234**	**29**	**4**	**389**	**255**

* Note that in Table 11-7 of the 2010 EEC Annual Report $255K of this $460K is listed as "Incentive Expenditures" for the Energy Specialist Program. However, there are no direct GJ savings associated with this program and therefore incentive expenditures for this program were included in the non-incentive expeditures at the portfolio level.

Enabling Activities - 2011 (Projected)	Expenditures ($000s)						
	Incentives	Non-Incentives					
		Total	Admin	Marketing and Outreach	Evaluation	Outside Contractor	Others
Research and Evaluation	-	**238**	-	-	-	**238**	-
FEI	-	190	-	-	-	190	-
FEVI	-	48	-	-	-	48	-
Efficiency Partners Program	-	**422**	**152**	**112**	**12**	**146**	-
FEI	-	317	118	69	10	120	-
FEVI	-	105	34	43	2	26	-
Codes and Standards	-	**75**	**44**	**22**	-	**9**	-
FEI	-	60	38	14	-	8	-
FEVI	-	15	6	8	-	1	-
Pilot Programs	-	-	-	-	-	-	-
FEI	-	-	-	-	-	-	-
FEVI	-	-	-	-	-	-	-
Energy Management Funding	-	**1,684**	**339**	-	-	-	**1345**
FEI	-	1,391	226	-	-	-	1165
FEVI	-	293	113	-	-	-	180
Total	-	**2,419**	**535**	**134**	**12**	**393**	**1,345**

* Note that in Table 11-15 and section 11.2.4.4.1 of the 2010 EEC Annual Report $1,345K of this $1,684K is listed as "Incentive Expenditures" for the Energy Specialist and Community Energy Manager programs. However, there are no direct GJ savings associated with this program and therefore incentive expenditures for these programs were included in the non-incentive expeditures at the portfolio level.

Program Area Details

Notes:
- In some cases there are slight variances compared to the respective EEC Annual Reports due to rounding.
- n/a = not applicable
- TBD = to be determined
- Tonnes greenhouse gas emissions (GHG) saved have been calculated using the NPV energy savings for each program.

Residential

Residential Program Area - 2008	Energy Savings (GJ)		Participants	Free Ridership	GHG saved (tonnes)	TRC	SCT
	Annual	NPV					
ENERGY STAR Heating System Upgrade	**16,597**	**179,709**	**2,110**	**-**	**9,165**	**-**	**-**
FEI	16,597	179,709	2,110	43%	9,165	1.4	3.2
FEVI	-	-	-	-	-	-	-
ENERGY STAR Heating System Upgrade - No VSM	**8,393**	**90,876**	**1,067**	**-**	**4,635**	**-**	**-**
FEI	8,393	90,876	1,067	43%	4,635	1	2.1
FEVI	-	-	-	-	-	-	-
Fireplace	**7,056**	**68,532**	**1,198**	**-**	**3,495**	**-**	**-**
FEI	7,056	68,532	1,198	24%	3,495	1.3	2.8
FEVI	-	-	-	-	-	-	-
Total	**32,046**	**339,117**	**4,375**	**n/a**	**17,295**	**1.2**	**2.7**

Residential Program Area - 2009	Energy Savings (GJ)		Participants	Free Ridership	GHG saved (tonnes)	TRC	SCT
	Annual	NPV					
ENERGY STAR Heating System Upgrade	**28,409**	**299,201**	**4,474**	**-**	**15,259**	**-**	**-**
FEI	27,882	293,682	4391	43%	14,978	1.1	3
FEVI	527	5,519	83	43%	281	0.9	2.4
ENERGY STAR Heating System Upgrade - LiveSmart BC	**21,945**	**231,121**	**3456**	**-**	**11,787**	**-**	**-**
FEI	21,532	226,799	3391	43%	11,567	1.2	3.1
FEVI	413	4,322	65	43%	220	1.2	3.1
EnerChoice Fireplace	**4,677**	**44,285**	**794**	**-**	**2,259**	**-**	**-**
FEI	3,487	33,062	592	24%	1,686	2.6	6.9
FEVI	1,190	11,223	202	24%	572	2.4	6.4
Total	**55,031**	**574,607**	**8,724**	**n/a**	**29,305**	**1.2**	**3.1**

Residential Program Area - 2010	Energy Savings (GJ)		Participants	Free Ridership	GHG saved (tonnes)	TRC	SCT
	Annual	NPV					
ENERGY STAR Heating System Upgrade	**25,017**	**245,135**	**3,955**	**-**	**12,502**	**-**	**-**
FEI	24,346	238,325	3,849	43%	12,155	1.0	2.6
FEVI	671	6,810	106	43%	347	0.9	2.6
ENERGY STAR Heating System Upgrade - LiveSmart BC	**35,944**	**352,295**	**5,681**	**-**	**17,967**	**-**	**-**
FEI	34,729	339,960	5,489	43%	17,338	1.1	3.1
FEVI	1,215	12,335	192	43%	629	0.9	3.1
Furnace Service TLC - 2010	**-**	**-**	**15,461**	**-**	**-**	**-**	**-**
FEI	-	-	13,911	-	-	-	-
FEVI	-	-	1,550	-	-	-	-
Domestic Hot Water	**275**	**2,259**	**172**	**20%**	**115**	**-**	**-**
FEI	243	1,990	152	20%	101	0.3	0.5
FEVI	32	269	20	20%	14	0.2	0.5
Energy Choice Fireplace Consumer Incentive	**800**	**7,161**	**135**	**-**	**365**	**-**	**-**
FEI	646	5,746	109	24%	293	1.1	2.8
FEVI	154	1,415	26	24%	72	1.1	2.7
Non Program Specific expenses	**-**	**-**	**-**	**-**	**-**	**-**	**-**
FEI	-	-	-	-	-	-	-
FEVI	-	-	-	-	-	-	-
Total	**62,036**	**606,850**	**25,404**	**n/a**	**30,949**	**0.9**	**2.7**

Residential Program Area - 2011 (Projected)	Energy Savings (GJ)		Participants	Free Ridership	GHG saved (tonnes)	TRC	SCT
	Annual	NPV					
Furnace Service TLC - 2011	**-**	**-**	**20,000**	**-**	**-**	**-**	**-**
FEI	-	-	16,000	-	-	-	-
FEVI	-	-	4,000	-	-	-	-
Domestic Hot Water Heaters	**7,152**	**59,445**	**3,725**	**20%**	**3,032**	**-**	**-**
FEI	5,722	47,415	2,980	20%	2,418	0.6	0.9
FEVI	1,430	12,030	745	20%	614	0.6	1.5
EnerChoice Fireplace	**14,136**	**127,961**	**2,400**	**24%**	**6,526**	**-**	**-**
FEI	11,309	102,031	1,920	24%	5,204	2.2	2.1
FEVI	2,827	25,930	480	24%	1,322	2.3	6
EnerGuide 80 Townhome Pilot	**-**	**-**	**-**	**-**	**-**	**-**	**-**
FEI	-	-	-	-	-	-	-
Non Program Specific & Studies	**-**	**-**	**-**	**-**	**-**	**-**	**-**
FEI	-	-	-	-	-	-	-
FEVI	-	-	-	-	-	-	-
Total	**21,288**	**187,406**	**26,125**	**n/a**	**9,558**	**0.8**	**2**

Commercial

Commercial Program Area - 2008	Energy Savings (GJ)		Participants	Free Ridership	GHG saved (tonnes)	TRC	SCT
	Annual	NPV					
Efficient Boiler Program - Retrofit	**5,629**	**71,961**	**5**	**-**	**3,670**	**2**	**-**
FEI	5,629	71,961	5	18%	3,670	2.1	5.0
FEVI	-	-	-	-	-	-	-
Commercial Energy Assessment	**18,431**	**179,009**	**73**	**-**	**9,129**	**2.1**	**-**
FEI	18,431	179,009	73	10%	9,129	2.1	4.5
FEVI	-	-	-	-	-	-	-
Destination Conservation	**8,475**	**22,654**	**75**		**1,155**	**2**	**-**
FEI	8,475	22,654	75	0%	1,155	1.7	2.5
FEVI	-	-	-	-	-	-	-
Total	**32,535**	**273,624**	**153**		**13,955**	**2.1**	**4.2**

Commercial Program Area - 2009	Energy Savings (GJ)		Participants	Free Ridership	GHG saved (tonnes)	TRC	SCT
	Annual	NPV					
Efficient Boiler Program - Retrofit	**57,098**	**635,496**	**64**	**18%**	**32,410**	**-**	**-**
FEI	54,422	605,888	61	18%	30,900	2.0	5.4
FEVI	2,676	29,608	3	18%	1,510	2.0	5.4
Efficient Boiler Program - New Construction	**892**	**9,869**	**1**	**18%**	**503**	**-**	**-**
FEI	-	-	-	-	-	-	-
FEVI	892	9,869	1	18%	503	2.0	5.4
Light Commercial ENERGY STAR Boiler Program - Retrofit	**3,197**	**35,589**	**11**	**18%**	**1,815**	**3.3**	**-**
FEI	3,197	35,589	11	18%	1,815	3.3	8.7
FEVI	-	-	-	-	-	-	-
Energy Assessment Program - Retrofit	**13,186**	**12,396**	**49**	**10%**	**632**	**-**	**-**
FEI	13,186	12,396	49	10%	632	2.4	6.7
FEVI	-	-	-	-	-	-	-
Total	**74,373**	**693,350**	**125**	**n/a**	**35,361**	**2.1**	**5.5**

Commercial Program Area - 2010	Energy Savings (GJ)		Participants	Free Ridership	GHG saved (tonnes)	TRC	SCT
	Annual	NPV					
Spray N Save Program	**1,536**	**6,322**	**194**	**-**	**322**	**-**	**-**
FEI	-	-	-	-	-	-	-
FEVI	1,536	6,322	194	12%	322	3.9	10.6
Efficient Boiler Program - Retrofit	**39,721**	**408,264**	**96**	**-**	**20,821**	**-**	**-**
FEI	36,802	378,622	88	18%	19,310	1.4	4
FEVI	2,919	29,642	8	18%	1,512	1.2	3.5
Efficient Boiler Program - New Construction	**2,733**	**28,152**	**4**	**-**	**1,436**	**-**	**-**
FEI	2,630	27,055	3	18%	1,380	1.6	4.6

Taken from Exhibit B-9 FEU Response to BCUC IR No. 1 Attachment 191.2

FEVI	103	1,097	1	18%	56	1.3	3.5
Light Commercial ENERGY STAR Boiler Program - Retrofit	**6,957**	**71,841**	**30**	**-**	**3,664**	**-**	**-**
FEI	6,311	64,926	26	18%	3,311	1.6	4.7
FEVI	646	6,915	4	18%	353	1.2	3.2
Light Commercial ENERGY STAR Boiler Program - New Construction	**91**	**936**	**1**	**-**	**48**		
FEI	91	936	1	18%	48	4.8	14.2
FEVI	-	-	-	-	-	-	-
Efficient Commercial Water Heater Program - Retrofit	**736**	**5,762**	**9**	**-**	**294**	**-**	**-**
FEI	592	4,607	7	5%	235	1.1	3.2
FEVI	144	1,155	2	5%	59	0.9	2.5
Efficient Commercial Water Heater Program - New Construction	**-**	**-**	**-**	**-**	**-**	**-**	**-**
FEI	-	-	-	-	-	-	-
FEVI	-	-	-	-	-	-	-
Energy Assessment Program - Retrofit	**21,570**	**20,106**	**68**	**-**	**1,025**	**-**	**-**
FEI	17,446	16,247	55	35%	829	2.4	7.4
FEVI	4,124	3,859	13	35%	197	2.9	4.6
PSECA Initiaitive Program - Retrofit	**29,928**	**271,355**	**28**	**-**	**13,839**		
FEI	18,222	163,420	15	0%	8,334	2.2	5.3
FEVI	11,706	107,935	13	0%	5,505	1.9	4.6
Fireplace Timers Pilot Program - Retrofit	**585**	**2,374**	**195**	**-**	**121**		
FEI	585	2,374	195	0%	121	2.3	6.5
FEVI	-	-	-	-	-	-	-
Non Program Specific Expenses	**-**	**-**	**-**	**-**	**-**	**-**	**-**
FEI	-	-	-	-	-	-	-
FEVI	-	-	-	-	-	-	-
Total	**103,857**	**815,112**	**625**	**n/a**	**41,571**	**1.7**	**4.5**

Commercial Program Area - 2011 (Projected)	Energy Savings (GJ)		Participants	Free Ridership	GHG saved (tonnes)	TRC	SCT
	Annual	NPV					
Efficient Boiler Program - Retrofit	**43,849**	**459,876**	**106**	**-**	**23,454**	**-**	**-**
FEI	40,565	424,785	97	18%	21,664	1.4	4
FEVI	3,284	35,091	9	18%	1,790	1.4	3.6
Efficient Boiler Program - New Construction	**7218**	**75624**	**10**	**-**	**3,857**	**-**	**-**
FEI	7,013	73,434	8	18%	3,745	1.6	4.6
FEVI	205	2,190	2	18%	112	1.2	3.3
Light Commercial ENERGY STAR Boiler Program - Retrofit	**12537**	**131636**	**55**	**-**	**6,713**	**-**	**-**
FEI	10,922	114,375	45	18%	5,833	1.6	4.7
FEVI	1,615	17,261	10	18%	880	1.2	3.2
Light Commercial ENERGY STAR Boiler Program - New Construction	**971**	**10167**	**4**	**-**	**519**	**-**	**-**
FEI	971	10167	4	18%	519	1.6	4.7
FEVI	-	-	-	-	-	-	2.5
Efficient Commercial Water Heater Program - Retrofit	**4166**	**42726**	**50**	**-**	**2,179**	**-**	**-**
FEI	3,805	39,842	45	5%	2,032	1.2	3.3
FEVI	361	2,884	5	5%	147	1.0	2.5
Efficient Commercial Water Heater Program - New Construction	**339**	**3332**	**4**	**-**	**170**	**-**	**-**
FEI	254	2,656	3	5%	135	1.2	3.2
FEVI	85	676	1	5%	34	1.3	3.2
Energy Assessment Program - Retrofit	**23,790**	**22,213**	**61**	**35%**	**1,133**	**2.8**	**-**
FEI	19,349	18,058	61	35%	921	2.7	7.4
FEVI	4,441	4,155	14	35%	212	3.3	9
PSECA Initiative Program - Retrofit	**36,327**	**381,585**	**14**	**0%**	**19,461**	**0.7**	**-**
FEI	30,830	322,840	12	0%	16,465	0.7	1.7
FEVI	5,497	58,745	2	0%	2,996	1.0	2.4
Fireplace Timers Pilot Program - Retrofit	**1,290**	**5,271**	**430**	**0%**	**269**	**2.5**	**-**
FEI	1,200	4,901	400	0%	250	2.5	6.5
FEVI	90	370	30	0%	19	2.0	5.1
Radiant Tube Heaters Pilot Program - Retrofit	**275**	**2,880**	**1**	**0%**	**147**	**1.5**	**-**
FEI	275	2,880	1	0%	147	1.5	4.1
FEVI	-	-	-	-	-	-	-
Spray Valve Program - Retrofit	**2297**	**9392**	**290**	**-**	**479**	**-**	**-**
FEI	1,861	7,601	235	12%	388	2.4	6.1
FEVI	436	1,791	55	12%	91	2.4	6.1
Spray Valve Program - New Construction	**32**	**129**	**4**	**-**	**7**	**-**	**-**
FEI	32	129	4	12%	7	3.5	9
FEVI	-	-	-	-	-	-	-
Non Program Specific expenses	**-**	**-**	**-**	**-**	**-**	**-**	**-**
FEI	-	-	-	-	-	-	-
FEVI	-	-	-	-	-	-	-
Total	**133,091**	**1,144,831**	**1,029**	**n/a**	**58,386**	**1.2**	**3.3**

Conservation for Affordable Housing

Conservation for Affordable Housing - 2009	Energy Savings (GJ)		Participants	Free Ridership	GHG saved (tonnes)	TRC	SCT
	Annual	NPV					
Meridian Village	**1,352**	**14,236**	**124**	**-**	**726**	**0.7**	**-**
FEI	1,352	14,236	124	-	726	0.7	1.1
FEVI	-	-	-	-	-	-	-
Energy Conservation for Affordable Housing Forum	**-**	**-**	**83**	**-**	**-**	**-**	**-**
FEI	-	-	83	-	-	-	-
FEVI	-	-	-	-	-	-	-
Total	**1,352**	**14,236**	**207**	**n/a**	**726**	**0.7**	**1.1**

Conservation for Affordable Housing - 2010	Energy Savings (GJ)		Participants	Free Ridership	GHG saved (tonnes)	TRC	SCT
	Annual	NPV					
REnEW Program	**-**	**-**	**59**	**-**	**-**	**-**	**-**
FEI	-	-	59	-	-	-	-
FEVI	-	-	-	-	-	-	-
Energy Savings Kits	**3,297**	**19,479**	**5,258**	**0.27**	**993**	**2.3**	**-**
FEI	2,637	15,520	4,206	0.27	792	2.3	4.4
FEVI	660	3,959	1,052	0.27	202	2.4	4.4
Energy Conservation Assistance Program	**-**	**-**	**-**	**-**	**-**	**-**	**-**
FEI	-	-	-	-	-	-	1
FEVI	-	-	-	-	-	-	0.8
Studies and Non-Program Specific Expenditures	**-**	**-**	**-**	**-**	**-**	**-**	**-**
FEI	-	-	-	-	-	-	-
FEVI	-	-	-	-	-	-	-
Total	**3,297**	**19,479**	**5,317**	**n/a**	**993**	**0.8**	**0.9**

Conservation for Affordable Housing - 2011 (Projected)	Energy Savings (GJ)		Participants	Free Ridership	GHG saved (tonnes)	TRC	SCT
	Annual	NPV					
REnEW Program Performance Forecast	**-**	**-**	**55**	**-**	**-**	**-**	**-**
FEI	-	-	44	-	-	-	-
FEVI	-	-	11	-	-	-	-
Energy Savings Kits	**6,584**	**39,168**	**10,500**	**27%**	**1,998**	**2.2**	**-**
FEI	5,267	31,271	8,400	27%	1,595	2.2	4.4

Taken from Exhibit B-9 FEU Response to BCUC IR No. 1 Attachment 191.2

FEVI	1,317	7,897	2,100	27%	403	2.3	4.4
Energy Conservation Assistance Program	**6,935**	**66,331**	**1,200**	**4%**	**3,383**	**0.6**	**-**
FEI	5,548	53,242	960	4%	2,715	0.6	1
FEVI	1,387	13,089	240	4%	668	0.6	0.8
Studies and Non-Program Specific Expenditures	-	-	-	-	-	-	-
FEI	-	-	-	-	-	-	-
FEVI	-	-	-	-	-	-	-
Total	**13,519**	**105,499**	**11,755**	**n/a**	**5,380**	**0.7**	**1.2**

Joint Initiatives

Joint initiatives - 2009	Energy Savings (GJ)		Participants	Free Ridership	GHG saved (tonnes)	TRC	SCT
	Annual	NPV					
EcoEnergy Home Energy Assessments (D-visits) through LiveSmart BC	-	-	-	-	-	-	-
FEI	-	-	-	-	-	-	-
FEVI	-	-	-	-	-	-	-
Tier 3 ENERGY STAR Washer and Dryer Rebate with FortisBC - six week Pilot	**210**	**1,905**	**130**	**43%**	**97.16**	**0.8**	**-**
FEI	210	1,905	130	43%	97.16	0.8	1.9
FEVI	-	-	-	-	-	-	-
Total	**210**	**1,905**	**130**	**n/a**	**97.16**	**0.8**	**2**

Joint initiatives - 2010	Energy Savings (GJ)		Participants	Free Ridership	GHG saved (tonnes)	TRC	SCT
	Annual	NPV					
EcoEnergy Home Energy Assessments (D-visits) through LiveSmart BC	-	-	-	-	-	-	-
FEI	-	-	-	-	-	-	-
FEVI	-	-	-	-	-	-	-
ENERGY STAR Washer Program	**328**	**2,801**	**130**	**-**	**143**	**-**	**-**
FEI	328	2,801	130	10%	143	0.8	2.2
FEVI	-	-	-	-	-	-	-
Water Saver Program	**420**	**2,899**	**-**	**-**	**148**	**-**	**-**
FEI	420	2,899	500	16%	148	2.0	5.6
FEVI	-	-	-	-	-	-	-
Weatherization Pilot (COV)	-	-	-	-	-	-	-
FEI	-	-	-	-	-	-	-
Non Program Specific & Studies	-	-	-	-	-	-	-
FEI	-	-	-	-	-	-	-
FEVI	-	-	-	-	-	-	-
Total	**748**	**5,700**	**130**	**n/a**	**291**	**0.1**	**0.3**

Joint initiatives - 2011 (Projected)	Energy Savings (GJ)		Participants	Free Ridership	GHG saved (tonnes)	TRC	SCT
	Annual	NPV					
LiveSmart BC - 2010 program contribution	**22,538**	**246,004**	**2,264**	**-**	**12,546**	**1.1**	**-**
FEI	21,463	234,273	2,156	12%	11,948	1.1	3
FEVI	1,075	11,731	108	12%	598	1.0	2.7
LiveSmart BC - 2011 program contribution	**44,573**	**474,721**	**5,607**	**-**	**24,211**	**1.0**	**-**
FEI	40,503	431,354	5,097	12%	21,999	1.0	2.8
FEVI	4,070	43,367	510	12%	2,212	1.0	2.8
Home Efficiency Web Portal	-	-	-	-	-	-	-
FEI	-	-	-	-	-	-	-
FEVI	-	-	-	-	-	-	-
Tier 4 ENERGY STAR Clothes Washer Program - BCH Partnership	**17,955**	**156,111**	**6,300**	**-**	**7,962**	**1.0**	**-**
FEI	14,364	124,498	5,040	5%	6,349	1.0	2
FEVI	3,591	31,613	1,260	5%	1,612	1.0	2
Tier 4 ENERGY STAR Clothes Washer Program - FortisBC Inc. Partnership	**2,850**	**24,702**	**1,000**	**-**	**1,260**	**0.9**	**-**
FEI	2,850	24,702	1,000	5%	1,260	0.9	2
FEVI	-	-	-	-	-	-	2
Non Program Specific & Studies	-	-	-	-	-	-	-
FEI	-	-	-	-	-	-	-
FEVI	-	-	-	-	-	-	-
Total	**87,916**	**901,538**	**15,171**	**n/a**	**45,978**	**0.9**	**2.6**

Conservation, Education & Outreach

Note that there are no energy savings directly attributable to Conservation, Education & Outreach.

Innovative Technologies

Innovative Technology- 2010	Energy Savings (GJ)		Participants	Free Ridership	GHG saved (tonnes)	TRC	SCT
	Annual	NPV					
Solar Thermal Hot Water	**4,262**	**48,898**	**31**	**0%**	**2,494**	**-**	**-**
FEI	2,579	29,053	20	0%	1,482	0.2	0.6
FEVI	1,683	19,845	11	0%	1,012	0.3	0.8
NGV Commercial Vehicles	**(165,490)**	**(755,449)**	**82**	**0%**	**(38,528)**	**-**	**-**
FEI	(165,490)	(755,449)	82	0%	(38,528)	1.4	1
FEVI	-	-	-	0%	-	-	-
Hydronic and Combination Heating Systems	-	-	-	-	-	-	-
FEI	-	-	-	-	-	-	-
FEVI	-	-	-	-	-	-	-
Residential GSHP Systems	-	-	-	-	-	-	-
FEI	-	-	-	-	-	-	-
FEVI	-	-	-	-	-	-	-
Commercial/Industrial GSHP Systems	-	-	-	-	-	-	-
FEI	-	-	-	-	-	-	-
FEVI	-	-	-	-	-	-	-
Total	**(161,228)**	**(706,551)**	**113**	**n/a**	**(36,034)**	**1.2**	**1.0**

Innovative Technology - 2011 (Projected)	Energy Savings (GJ)		Participants	Free Ridership	GHG saved (tonnes)	TRC	SCT
	Annual	NPV					
Commercial NGV Demonstration Program	**(228,131)**	**(1,376,306)**	**54**	**0%**	**(70,192)**	**1.9**	**-**
FEI	(228,131)	(1,376,306)	54	0%	(70,192)	1.9	2.2
FEVI	-	-	-	-	-	-	-
SolarBC Schools Incentive Program	**326**	**3,758**	**8**	**0%**	**192**	**0.2**	**-**
FEI	265	3,042	6	0%	155	0.2	0.6
FEVI	61	716	2	0%	37	0.2	0.5
Solar Air Heating PSECA Program	**1,458**	**17,817**	**6**	**0%**	**909**	**0.4**	**-**
FEI	1,458	17,817	6	0%	909	0.4	1.2
FEVI	-	-	-	-	-	-	-
Solar Residential Hot Water PILOT	**420**	**4,829**	**30**	**0%**	**246**	**0.2**	**-**
FEI	420	4,829	30	0%	246	0.2	0.3
FEVI	-	-	-	-	-	-	-
Non Program Specific expenses	-	-	-	-	-	-	-
FEI	-	-	-	-	-	-	-
FEVI	-	-	-	-	-	-	-
Total	**(225,927)**	**(1,349,902)**	**98**	**n/a**	**(68,845)**	**1.8**	**1.2**

Industrial

Industrial Program - 2011 (Projected)	Energy Savings (GJ)		Participants	Free Ridership	GHG saved (tonnes)	TRC	SCT
	Annual	NPV					
Energy Audit Funding Program	-	-	**10**	-	-	-	-
FEI	-	-	10	-	-	-	-

Taken from Exhibit B-9 FEU Response to BCUC IR No. 1 Attachment 191.2

FEVI	-	-	-	-	-	-	-
Heat Exchanger Program - PILOT	**70,000**	**483,130**	**1**	**-**	**24,640**	**2.4**	**-**
FEI	70,000	483,130	1	-	24,640	2.4	-
FEVI	-	-	-	-	-	-	-
Heat Exchanger Pulp and Paper Mills	**TBD**	**TBD**	**TBD**	**-**	**-**	**TBD**	**TBD**
FEI	TBD	TBD	TBD	-	-	TBD	**TBD**
FEVI	-	-	-	-	-	-	-
Burner Management Control	**1,000**	**6,902**	**1**	**-**	**352**	**4.0**	**-**
FEI	1,000	6,902	1	-	352	4.0	-
FEVI	-	-	-	-	-	-	-
Non Program Specific Expenses	**-**	**-**	**-**	**-**	**-**	**-**	**-**
FEI	-	-	-	-	-	-	-
FEVI	-	-	-	-	-	-	-
Total	**71,000**	**490,032**	**12**	**n/a**	**24,992**	**TBD**	**TBD**

High Carbon Fuel Switching

High Carbon Fuel Switching- 2010	Energy Savings (GJ)		Participants	Free Ridership	GHG saved (tonnes)	TRC	SCT
	Annual	NPV					
Swtich N Shrink Program	**(3,827)**	**(38,632)**	**178**	**0.5**	**(1,970.23)**	**1.4**	**-**
FEI	(626)	(6,103)	29	0.5	(311.25)	1.2	1
FEVI	(3,204)	(32,529)	149	0.5	(1,658.98)	1.5	1.2
Total	**(3,827)**	**(38,632)**	**178**	**0.5**	**(1,970.23)**	**1.4**	**1.2**

High Carbon Fuel Switching - 2011 (Projected)	Energy Savings (GJ)		Participants	Free Ridership	GHG saved (tonnes)	TRC	SCT
	Annual	NPV					
Swtich N Shrink Program	**(8,600)**	**(86,875)**	**420**	**50%**	**(4,431)**	**1.8**	**-**
FEI	(1,720)	(17,116)	100	50%	(873)	1.7	1.3
FEVI	(6,880)	(69,759)	320	50%	(3,558)	1.8	1.4
Total	**(8,600)**	**(86,875)**	**420**	**50%**	**(4,431)**	**1.8**	1.3

Enabling Activities

Note that there are no energy savings directly attributable to Enabling Activities.

113.0 Reference: Energy Efficiency and Conservation

Exhibit B-9, BCUC IRs 1.192.4 and 192.4.4

Comparison to Other Utilities

113.1 Please complete the table filed in response to BCUC IR 192.4 with the 2012 DSM plans or requests for FEU, GazMetro, Manitoba Hydro and any other utilities for whom 2012 projected DSM budgets are known. Please include both proposed plans such as that of FEU, and utility DSM plans that have been approved.

Response:

Please see the table below. Note the following when reviewing this table:

- FortisBC Energy Utilities' 2010 DSM expenditure does not include high-carbon fuel switching expenditures
- The 2010 information in this table is based on public information from various sources. 2012 DSM Budget numbers were procured from one-on-one interviews with the respective utilities listed.
- All 2012 DSM Budget figures are considered to be proposed. None had been officially approved at the time these utilities were contacted.
- 2012 DSM Budget figures have been rounded to one decimal place (nearest $100,000).
- See the footnotes referenced in the 2012 DSM Budget column for more information on the explanation and sources for these budget figures.
- "n/a" = not available
- Note that a decimal error was made in the previously submitted version of this table. PSE's asset base was actually $8.81 billion in 2010 not $8.81 million.

Company Name	Utility Type	2010 EEC Costs ($ millions)	Year Started EEC	EEC Funding Treatment	Company Earns on EEC	Customer Base	EEC FTE	Total Employees	2010 Asset Base ($millions)	2010 Revenues ($millions)	% spend on EEC of Revenue	EEC Spend per Customer ($)	Annual Energy Savings (PJs)	$/ Energy Saved (GJ)	2010 Sales Volumes (PJs)	2012 Projected DSM Budget ($ millions)
FortisBC Energy Utilities	Natural gas	11.8	1991	DSM costs are treated as capital and amortized over fixed time period	Yes	948,970	15	1,443	3,124	1,516	0.78%	12.43	0.174	67.82	233.5	74.5 [1]
FortisBC Electric	Electric	3.95	1989	DSM costs are treated as capital and amortized over fixed time period.	Yes	161,019	9.4	549	975	257	1.54%	24.53	0.10	40.64	10.96	7.7 [2]
BC Hydro	Electric	134.792	late-1980s	DSM costs are treated as capital and amortized over fixed time period	Yes	1,830,985	131	5,842	18,093	3,822	3.53%	73.62	2.77	48.69	180.84	205.7 [3]
ATCO Gas	Natural Gas	1.7	2001	As O&M	No	1,057,369	18	2,185	1,421	747	0.23%	1.61	0.09	18.89	237	5.5 [4]
Union Gas	Natural gas	22.627	1997	DSM costs are recovered through a rate base	Yes	1,344,000	48.7	2,200	5,600	1,830	1.24%	16.84	3.62	6.25	1513.27	27.4 [5]
Enbridge Gas Distribution	Natural gas	25.47	1995	DSM costs are recovered through a rate base	Yes	1,900,000	26.5	1,961	3,837	2,475	1.03%	13.41	3.00	8.48	425.7	28.1 [6]
Gaz Metro	Natural gas	12.219	1999	As O&M	Yes	179,370	9	1,320	3,600	2,250	0.54%	68.12	1.22	10.04	209.26	12.3 [7]
Manitoba Hydro	Combined	20.77	1989	DSM costs are amortized over fixed time period	No	264,000	50	6,000	581	454	4.57%	78.67	1.77	11.71	151.74	13.1 [8]
SaskEnergy	Natural gas	1.07	2001	As O&M	No	352,000	9	1,100	1,600	952	0.11%	3.04	0.21	5.14	146	1.8 [9]
Pacific Gas and Electric	Combined	627.4	Mid-1970s	Public Purpose Fund	Yes	9,400,000	350	20,000	45,679	13,840	4.53%	66.74	5.12	122.65	423	483.6 [10]
Southern California Gas	Natural gas	172.4	Mid-1980s	Public Purpose Fund	Yes	20,700,000	30	7,067	7,986	3,822	4.51%	8.33	2.95	58.37	999.6	120.2 [11]
Puget Sound Energy	Combined	19.9	early 1980s	DSM costs are recovered via a rider on customer bill	Yes	1,750,000	120	2,900	8,810	3,320	0.60%	11.37	0.12	170.48	214.4	n/a [12]
Northwest Natural Gas	Natural gas	22.5	1980	DSM costs are treated as capital and amortized over fixed time period	Yes	673,997	2	1,028	2,617	791	2.84%	33.38	0.44	50.72	112	24.5 [13]

Table Footnotes:

1. Note: This number includes planned expenditures on high-carbon fuel switching programs.
2. Source: FortisBC Inc. 2012 – 2013 Revenue Requirements and Review of 2012 Integrated System Plan Application ~ Project No. 3698620.
3. Note: This is for BC Hydro fiscal year 2012. Source: 2008 LTAP.

4. Note: This number includes a one-time $600K research study and $1 million pilot study expenditure. Not included in this number is a $3 million capital expenditure for alternative energy projects and a $1 million capital expenditure for Atco Gas' Energy Education Mobile. Source: ATCO Gas General Rate Application - Filing 2011-2012 (December 2010).
5. Note: In addition to this funding, Union Gas is allowed to apply for an incremental 10% ($2.74 million) for low income programs and is allowed to overspend by 15% ($4.11 million) on program costs overall if they achieve 100% of their pre-authorized results. Source: Keith Boulton, Director, Energy Conservation & Residential Marketing, Union Gas Ltd.
6. Note: Same as with Union Gas, in addition to this funding, Enbridge is allowed to apply for an incremental 10% for low income programs and is allowed to overspend by 15% on program costs overall if they achieve 100% of their pre-authorized results. Source: Bill Chitata, Program Manager - Business Market Developments, Enbridge Gas Distribution Inc.
7. Source: Gaz Metro, Cause Tarifaire 2012, R-3752-2011.
8. Note: This is the DSM budget for the natural gas side only (the electricity DSM budget is $39.9 million). Also, note that Manitoba Hydro's fiscal year is April 1 to March 31. This budget applies to the 2012/13 fiscal year and is reported in 2010 dollars. Source: Cheryl Pilek, Power Smart Planning, Evaluation & Research, Manitoba Hydro.
9. Note: Includes all regular DSM program costs including marketing and advertising but does not include employee wages. Source: James Gates, Senior Engineer, Customer Technology, SaskEnergy.
10. Note: The California utilities' budgets are issued based on 3 year program cycles. Currently, they are operating in the 2010-2012 cycle (budget = $1.338 billion). The figure listed here was reached by taking the remaining budget for 2011-2012 and dividing it by 2. Also note that this figure includes EM&V but does not include low income programs. Low income programs are approved under a separate program cycle. Source: PG&E 2010 EE Annual Report.
11. Note: The California utilities' budgets are issued based on 3 year program cycles. Currently, they are operating in the 2010-2012 cycle (budget = $291.4 million). The figure listed here was reached by taking the remaining budget for 2011-2012 and dividing it by 2. Also note that this figure includes EM&V but does not include low income programs. Low income programs are approved under a separate program cycle. Source: SCG 2010 EE Annual Report.
12. Puget Sound Energy was not able to share their proposed 2012 DSM budget yet as it is still awaiting preliminary approval from their Board of Directors and stakeholder advisory group. Their 2012 DSM plan is set to be finalized by November 2011. Source: Liz Norton, Manager, Natural Gas Development and Marketing Puget Sound Energy, Puget Sound Energy.
13. Source: Holly J. Meyer, Environmental Programs Manager, Northwest Natural.

Historical Comparison

		1	2	3
		2009	**2010**	**2011 (Projected)**
1	Total DSM Spend ($ thousands)	$ 6,144	$ 17,701	$ 26,874
2	DSM spend/customer (based on total utility customers)	$ 7	$ 19	$ 28
3	DSM spend/total utility revenue	0.38%	1.15%	1.93%
4	DSM spend/margin	0.92%	2.73%	4.27%
5	DSM Evaluation Costs	$ 27,000	$ 77,000	$ 75,000

Customer (based on totaly utility customers)	939,000	949,000	957,000
Total Utility Revenue ($ thousands)	$ 1,600,000	$ 1,537,000	$ 1,390,000
Margin ($ thousands)	$ 668,000	$ 648,000	$ 630,000

Deferral Account Additions (Before Tax)	4,099	12,674	25,683
Deferral Account Variance from Annual Report Spend	(2,045)	(5,027)	(1,191)

Deferral account additions are different than EEC Annual Report "Spend"

The EEC Annual Report spend reflects the commitments + actual non-incentive and incentive expenses; whereas the deferral account only accumulates what is actually spent.