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September 18, 2007

British Columbia Utilities Commission
6th Floor, 900 Howe Street
Vancouver, B.C. V6Z 2N3

Attention: Mr. R.J. Pellatt, Commission Secretary

Dear Sir:

Re: Terasen Gas Inc. ("TGI") and Terasen Gas (Vancouver Island) Inc. ("TGVI") Application for System Extension & Customer Connection Changes Review (the "Application") Project No. 3698472

Response to the British Columbia Utilities Commission ("BCUC" or the "Commission") Information Request ("IR") No. 1

On July 31, 2007, Terasen Gas filed the Application as referenced above. In accordance with Commission Order No. G-90-07 setting out the Regulatory Timetable for the Application, TGI and TGVI respectfully submit the attached response to BCUC IR No. 1.

Due to the amount of data required to be retrieved in response to Questions 6.1 and 6.2, the Companies regret that they were unable to complete these responses in time for submission, therefore, the Companies respectfully advise the Commission the response to Questions 6.1 and 6.2 will be provided as soon as practicably possible, but no later than Monday, September 24, 2007.

If there are any questions regarding the attached, please contact Mr. Tom Loski, Director, Regulatory Affairs at (604) 592-7464.

Yours very truly,

TERASEN GAS INC. and
TERASEN GAS (VANCOUVER ISLAND) INC.

Original signed by: Tom Loski

For: Scott A. Thomson

cc (e-mail only): Registered Parties

Attachment

1.0 Reference: Exhibit B-1 p. 6 and Appendix 1

Other Utilities - Service Line Extension Policy

1.1 Please set out the Service Line Extension Policies of other gas distribution companies in Canada.

Response:

Utility: Atco Gas

Location: Alberta

Regulatory Document: Terms and Conditions for Distribution Service Connects Schedule C Non Discretionary Charges

Service Line Attachment Policy:

Schedule C Charges for Service Lines and Meter Relocations

1. Service Lines: Applicable for all services except those eligible for grants under the Rural Gas Act.

   1.1 Basic Charge: A basic charge of $100.00 will be levied for each point of delivery.

   1.2 Pipe Installation:

ATCO Gas (North)		
Service Line Diameter	**Summer**	**Winter**
15.9 mm or 26 mm (up to and including 15 metres)	$340	$590
Linear charge for length over 15 metres	$28/metre	$50/metre
42.2 mm or 60.3 mm (up to 15 metres)	$510	$860
Linear charge for length over 15 metres	$43/metre	$72/metre
Greater than 60 mm	Contract Price	Contract Price
Credit for provision of service line trench in 4-party installation	$40	$200

Note:
1. Winter and Summer conditions are determined by the ATCO Gas representative on site. Typically winter conditions are 150mm or more of frozen ground conditions and 300mm or more of snow cover. If construction occurs within the winter construction season as determined by ATCO Gas, winter construction rates will apply.
2. The customer will be charged for the Primary Service line from the property line to the Gas Meter location when the main is located outside the customer's property.
3. The customer will be charged for the Primary Service line from the edge of easement to the Gas Meter location when the main is located in an easement within the customer's property.

ATCO Gas (South)		
Service Line Diameter	**Summer**	**Winter**
15.9 mm or 26 mm (up to and including 15 metres)	$240	$430
Linear charge for length over 15 metres	$21/metre	$36/metre
42.2 mm or 60.3 mm (up to 15 metres)	$510	$860
Linear charge for length over 15 metres	$43/metre	$72/metre
Greater than 60 mm	Contract Price	Contract Price
Credit for provision of service line trench in 4-party installation	$40	$200

Note:
1. Winter and Summer conditions are determined by the ATCO Gas representative on site. Typically winter conditions are 150mm or more of frozen ground conditions and 300mm or more of snow cover. If construction occurs within the winter construction season as determined by ATCO Gas, winter construction rates will apply.
2. The customer will be charged for the Primary Service line from the property line to the Gas Meter location when the main is located outside the customer's property.
3. The customer will be charged for the Primary Service line from the edge of easement to the Gas Meter location when the main is located in an easement within the customer's property.

Utility: Altagas

Location: Alberta

Regulatory Document: Natural Gas Service Rules

Service Line Attachment Policy:

$35 Account Activation Charge "Non-Refundable Contributions: Applications or service will require a non-refundable customer contribution. In most cases, a standard contribution is all that is required. Standard contributions are filed for acknowledgement with the Board when they are initially established and, thereafter, whenever they are changed. If it is not appropriate to consider an application for service under a standard contribution, it will be evaluated individually to determine a specific non-refundable contribution. Services considered to be uneconomic with a standard contribution will require an additional non-refundable contribution. The calculation of non refundable contributions will be based on a net present value analysis that includes the following criteria: a) An estimate of the total capital costs of providing service; b) An estimate of the total annual operating and maintenance costs of providing service; c) The Alberta Energy and Utilities Board-approved return on common equity, interest rates, depreciation rates, income taxes and capital structure; d) An estimate of the expected net revenue that will result from the service."

Utility: Union Gas

Location: Ontario

Regulatory Document: EB-2005-0520 Exhibit B-1 Appendix A Distribution New Business Guidelines

Service Line Attachment Policy:

Service Line Installation is free of charge up to 20 metres of service line to connect a customer. Services over 20 metres require the prior agreement of the customer to pay an "excess charge" of $30.00 per metre. This charge reflects a company-wide average of summer versus winter pricing, open versus built-up conditions and company versus contractor crew pricing. It is Union's practice to not charge customers an "application charge" for a new service if they commit to install a natural gas furnace or natural gas-powered appliance that operates as a main heat source (i.e. fireplace). If the customer does not plan to install a furnace but some other natural gas appliance(s), Union will usually run an economic analysis to ensure the gas load covers the cost of the gas service. In the event there's an economic shortfall, the customer requesting the gas service may receive a charge.

Utility: Enbridge Gas

Location: Ontario

Regulatory Document: Website

Service Line Attachment Policy:

New Account Charge - $25. Service Line Installation is free of charge up to 30 metres from the property line (measured from the Owner's property line, up to a maximum of 2 metres past the building face). An extra charge of $32 per metre (plus GST) beyond the distance will be billed to the Owner on the Owner's Bill.

Utility: Gaz Metro

Location: Quebec

Regulatory Document: Website

Service Line Attachment Policy:

Free connection to the gas grid (home must be within the vicinity of the gas grid). However, as per Section 4.3 of the Tariffs - Economically Unjustifiable Investments: "When the revenues generated from a customer for whom the service address is newly connected to the natural gas distribution network do not allow the distributor to benefit from profitable investments in accordance with the conditions approved by the Régie de l'énergie, the distributor may request a contribution from the customer, payable before work begins or recovered over the contract term, and, if applicable, a commitment for minimal consumption. In the case of disagreement, the customer may have recourse to the Régie de l'énergie."

Utility: Pacific Northern Gas

Location: Northern British Columbia

Regulatory Document: Separate Tariffs for Each Service Territory

Service Line Attachment Policy:

Fort St John and Area – $30 Application Fee

26.7 mm – Plowed - $359.14 Fixed Charge + 2.88 per metre
Trenched - $359.14 Fixed Charge + 6.39 per metre
33.4 mm – Plowed - $370.48 Fixed Charge + 4.02 per metre
Trenched - $370.48 Fixed Charge + 7.49 per metre
42.2 mm – Plowed - $442.33 Fixed Charge + 4.95 per metre
Trenched - $442.33 Fixed Charge + 8.41 per metre
60.3 mm – Plowed - $556.48 Fixed Charge + 6.79 per metre
Trenched - $556.48 Fixed Charge + 9.98 per metre

Frost or Rock conditions – the rate to be applied is two times that specified in the above service line Installation rate for "no Frost and no Rock" conditions for all sizes.

Dawson Creek and Area – No Application Fee

Fixed Charge.
A fixed charge of $150.00 will be levied for each point of delivery.

Cost per Meter for each point of Delivery for Summer Construction and Winter Construction (Approx. 3rd Monday in November to First Monday in April)

Summer		Winter
26.7 mm -	First 50 Metres - $ 14.00 per metre Over 50 Metres - $ 4.40 per metre	$ 31.00 per metre
42.2 mm -	First 50 Metres - $ 18.00 per metre Over 50 Metres - $ 6.40 per metre	$ 39.00 per metre
60.3 mm -	First 50 Metres - $ 22.00 per metre	$ 46.00
Over 60.3 -	Actual Cost	

PNG West - $30 Application Fee

All new service line customers will be charged $1,000 for the service connection. A standard service is to be considered up to 20 meters in length, inside of property. All extra footage is to be charged at $19.00 per metre.

1.2 Would Terasen agree that the basis of many policies is or has been the length of the service line from the distribution main?

Response:

Terasen would agree that the length of the service line from the distribution main is an important component of the different gas distribution companies' Service Line Extension Policies, but it is not the sole determinant of these policies. There are many different cost considerations and connection policy issues that are specific to each utility that need to be taken into account in determining an appropriate Service Line Extension Policy.

1.3 What in Terasen's view would be a suitable distance based on its study of predecessor companies' policies and those of other gas distribution companies in Canada?

Response:

Terasen does not think that there is a suitable length of pipe based on the other gas distribution companies, as their policies and cost structures are different than those of TGI and TGVI. Therefore, what may be a suitable distance from the distribution main for a specific company may be different from what is suitable for TGI and TGVI. Additionally, as noted in response to Question 1.4, the Company estimates the cost of service lines based upon a geographical costing model and the forecast length of the service line rather than an average service line length. Therefore even if the Company

used an average service line length, the cost would vary depending upon the geographic location of the service.

With regard to predecessor TGI company policies', prior to the Commission issued System Extension Guidelines (the "SET Guidelines") in September 1996, Terasen (formerly BC Gas) installed up to 20 meters of service line measured from the property line to the meter at no charge. Extra charges of $11 per meter were applied to service line lengths in excess of 20 meters. Extra charges were also levied for frost, concrete and pavement breaking.

In 1996, TGI's SLCA application proposed a cost-based approach (i.e. the SLCA of $1,100) as the basis for setting the upper limit on its investment in service lines in recognition of the fact that construction conditions and costs vary significantly from place to place for reasons that are unrelated to the length of the service line. The Companies continue to consider the cost basis (i.e. the SLCA updated to current levels as proposed in the application) to be the appropriate method for establishing the upper limit on its investment in service lines.

With reference to TGVI, prior to 2005 when TGVI adopted TGI's Main Extension and Service Line Attachment Policies as per Negotiated Settlement, Commission Order G-126-05, TGVI installed a service line up to 20 metres free of charge if the customer committed to an annual minimum consumption of 53 GJs per year.

1.4 How much in $2008 would the installation of that length of pipe and a meter cost?

Response:

As indicated above the Companies do not think it is appropriate to use the service line length provisions in other utility connection policies as a basis for the TGI and TGVI service line connection policies. The Companies' service line installation costs vary depending on the geographical location of the service line installation and the length of service line. Differentiating by geographical location is critical because major differences in the ease of service line installation exist throughout the service territory. Soil conditions in parts of the interior allow for a relatively easy service line installation, while West Vancouver has rock impeding installation, while much of the Lower Mainland has pavement and concrete that must be broken and replaced. Based on 2006 data, the average service line length for TGI is 20.4 metres, and for TGVI it is 17.3 metres. For illustrative purposes, please find below a list of examples of service line cost estimates based on geographical location:

	Cost	Length	Fixed Charge		Cost/Installation
Vancouver	$36 X	20.4 metres	+$326	=	$1060/service
Fraser Valley	$26 X	20.4 metres	+$575	=	$1105/service
Vancouver Island	$31 X	17.3 metres	+$277	=	$813/service

The applicable meter costs are $325 per meter for TGI and $245 per meter for TGVI.

Note:

- Fixed Charge – represents the average cost for a crew and vehicle per service lines. Variances between regions are due to driving distance, crew make up, and equipment requirements such as back hoes.
- Gas Meter – average gas meter costs are an average of all meter costs for each region and include large industrial, commercial and residential meters. Average gas meter cost on Vancouver Island is less than TGI because there are relatively few large industrial meters installed on Vancouver Island.

2.0 Reference: Exhibit B-1, Application, p. 18

Customer Connection Charge – SLIF Elimination

"The minimum contribution (SLIF) of $215 be eliminated;"

2.1 Please confirm that the $215 SLIF is treated as a contribution in aid of construction (CIAC) that reduces gross plant and thereby rate base.

Response:

Confirmed. The $215 SLIF is treated as a contribution in aid of construction and reduces the increase in rate base from the main extension by that same amount.

2.2 Is the $215 SLIF treated as a CIAC in the TGI and TGVI main extension tests ("MX Test")?

Response:

Yes, the $215 SLIF is treated as a CIAC for both TGI's and TGVI's main extension test.

2.3 Using MX Test with and without a SLIF, calculate main extension contributions for the TGI customer below.

Average Annual Consumption (GJ) – Residential Rate 1	30
Main Direct Cost	$1,600
Service Line Direct Cost	$1,100

Response:

The total contribution amount will be the same under both scenarios. When the $215 SLIF is included and the TGI MX Test is run under the parameters listed above, the additional required contribution is $2,698, resulting in a total contribution of $2,913 ($215 plus $2,698). When the SLIF is reduced to $0 and the other parameters are left unchanged, the required contribution is $2,913.

Making the same comparison between SLIF=$215 and SLIF=$0 at a more typical consumption level of 100 GJ/yr. would result in required contributions of $969 and $1,184 respectively.

2.4 Using MX Test with and without a SLIF, calculate main extension contributions for the TGVI customer below.

Average Annual Consumption (GJ) – Residential Rate 1	30
Main Direct Cost	$1,600
Service Line Direct Cost	$1,100

Response:

The total contribution amount will be the same under both scenarios. When the $215 SLIF is included and the TGVI MX Test is run under the parameters listed above, the required contribution is $1,895, resulting in a total contribution of $2,110 ($215 plus $1,895). When the SLIF is reduced to $0 and the other parameters are left unchanged, the required contribution is $2,110.

Making the same comparison between SLIF=$215 and SLIF=$0 at a more typical consumption level of 60 GJ/yr would result in required contributions of $501 and $716 respectively.

2.5 Calculate the impact on the Actual 2006 TGI and TGVI rate base if $215 SLIF was eliminated.

Response:

If the SLIF had been eliminated for 2006, and using 2006 actuals as the basis for this calculation, the rate base would be affected as follows:

TGVI

Incremental Rate Base	
Plant Additions	$540,000
Plant Depreciation	-
Plant Closing	540,000
Mid Year Adjustment	(270,000)
Mid Year Incremental Rate Base	$270,000

TGI

Incremental Rate Base	
Plant Additions	$2,615,000
Plant Depreciation	-
Plant Closing	2,615,000
Mid Year Adjustment	(1,307,500)
Mid Year Incremental Rate Base	$1,307,500

Please also refer to the response to Question 29.1.

2.6 Calculate the impact on the Actual 2006 TGI and TGVI revenue requirement if $215 SLIF was eliminated.

Response:

If the SLIF had been eliminated for 2006, and using 2006 actuals as the basis for this calculation, the revenue requirement would be affected as follows:

TGVI

Incremental Revenue Requirement	
Return on Rate Base	$18,212
Depreciation	0
Tax	(266)
Incremental Revenue Requirement	$17,946

This calculation is based on the following assumptions.

Assumptions		
Total CIAC Service Line Fees	$540,000	
SLCA Change		
Tax Rate	33.00%	
CCA Class 1	4.00%	
Capital Structure	Cost	Weighting
Short-term Debt	4.86%	2.88%
Long-term Debt	4.91%	57.12%
Equity	9.50%	40.00%
		100.00%

TGI

Incremental Revenue Requirement

Return on Rate Base	$97,218
Depreciation	0
Tax	(5,925)
Incremental Revenue Requirement	$91,293

This calculation is based on the following assumptions.

Assumptions

Total CIAC Service Line Fees	$ 2,615,000		
SLCA Change			
Tax Rate		33.00%	
CCA Class 1		4.00%	
Capital Structure	Cost		Weighting
Short-term Debt		4.00%	7.82%
Long-term Debt		7.07%	57.18%
Equity		8.80%	35.00%
			100.00%

3.0 Reference: Exhibit B-1, Application, p. 21

MX Test – Inputs - O & M

3.1 For TGI and TGVI, please provide the actual 2006 and forecast 2007 incremental O&M per customer by rate class.

Response:

The following are the per customer incremental O&M costs by rate class used in the main extension tests for 2006 and 2007

2006 Main Extension Test O&M by Rate Class	
TGI - updated based on July 1, 2006 rates	
	Fixed OM
PRC1 (Rate 1)	75
PRC2 (Rate 2)	98
PRC3 (Rate 2)	98
PRC4 (Rate 3/23)	98
PRC5 (Rate 4)	646
PRC 6 (Rate 5/25)	646
PRC 7 (Rate 6)	646
PRC 8 (Rate 7/27)	646
PRC 9 (Rate 22)	646
TGVI	
	Fixed OM
PRC1 (RGS)	75
PRC2 (SCS-1)	98
PRC 10 (SCS 2)	98
PRC3 (LCS-1)	98
PRC4 (LCS-2)	98
PRC5 (LCS-3)	646
PRC 11 (ILF)	646
PRC 12 (HLF)	646
PRC 13 (AGS)	646

4.0 Reference: Exhibit B-1, Application, p. 22

MX Test – Inputs – SI Charge

"The SI charge has been increased by inflation from its original calculation and is currently $0.35/GJ. TGVI has traditionally used a transmission SI based methodology. Prior to 2006, the TGVI SI charge as part of the then current 15 year discounted revenue requirement MX test was $0.50/GJ.

A SI analysis for both TGVI and TGI was re-run using distribution five year growth and peak day forecasts for each utility consistent with the original TGI methodology. The resulting distribution SI for TGI is $0.16/GJ, and $0.151/GJ for TGVI. The Companies believe that a consistent approach across both TGI and TGVI would be preferential as it would remove unnecessary complexity from the MX test. A distribution derived SI charge is consistent with this philosophy."

4.1 Please show the calculation of the TGI and TGVI distribution SI charges, $0.16/G and $0.151/GJ respectively.

Response:

The SI charge allocates the cost of system improvements on the distribution system that result from increases to system capacity. The methodology originally developed in 1994 by TGI for estimating this cost was followed using updated inputs for TGI and TGVI.

The approach is to use a five year forecast of system improvement costs and the growth in peak day demand over that period. The first step in the calculation is to divide all the system improvement costs by the growth in peak day to arrive at a cost per peak GJ added. The cost per peak GJ is then converted into a charge that is applied to all of the GJs consumed on an annual basis. The conversion from peak GJ to GJ consumed annually is carried out by converting the peak GJ figure into annual consumption by dividing the peak GJ by (365 days * load factor). The capital carrying cost is used to arrive at a charge applied to all GJs consumed throughout the analysis period (currently 20 years).

Peak Day Demand Increase

Peak Day Forecast - from 2006 Resource Plans

TGI (TJ)

	2006	2007	2008	2009	2010	2011	Total
Coastal	938.6	952.9	968.2	984.8	997.0	1007.1	
Interior	339.4	344.4	349.5	354.5	358.4	360.4	
Total	**1278.0**	**1297.3**	**1317.7**	**1339.3**	**1355.4**	**1367.5**	
Yearly Increase		**19.3**	**20.4**	**21.6**	**16.1**	**12.1**	**89.5**

TGVI (TJ)

	2006	2007	2008	2009	2010	2011	Total
	107.9	111.1	114.4	118	121.7	125.3	
Yearly Increase		**3.2**	**3.3**	**3.6**	**3.7**	**3.6**	**17.4**

Annual Demand

TGI (TJ)

Annual Demand for non-Interruptible Rates 1-6, 23 & 25 - from 2006 Resource Plans

	2006	2007	2008	2009	2010	2011
Coastal	93,436	93,359	94,678	96,425	97,728	99,009
Interior	44,758	44,924	45,456	46,105	46,607	47,018
Total	**138,194**	**138,283**	**140,134**	**142,530**	**144,335**	**146,027**

TGVI (TJ)

	2006	2007	2008	2009	2010	2011
All Rates except ICP & JV	12,123	12,391	12,675	12,981	13,315	13,678

Load Factors

TGI

2007	2008	2009	2010	2011	5 Yr. Avg
0.292	**0.291**	**0.292**	**0.292**	**0.293**	**0.292**

TGVI

2007	2008	2009	2010	2011	5 Yr. Avg
0.306	0.304	0.301	0.300	0.299	**0.302**

System Improvements – 5 Year Forecast

TGI

	2007	2008	2009	2010	2011	Grand Total
TGI Total	$2,302,032	$4,232,082	$4,165,730	$4,329,075	$2,180,200	**$17,209,119**
TGVI Total	$1,570,237	$75,800	$635,750		$1,117,000	**$3,398,787**

TGI System Improvement Charge Calculation

Increase to Peak Day over 5 years 2007 to 2011 (2006 is base year) = **89.5 TJ**

System Improvement 2007 to 2011 Budget = **$17,209,119**

Investment Cost per GJ of Peak Capacity = 5 Yr. Peak Day increase in GJ / System Improvement 5 Yr. Budget Cost
= **$ 192.28 /GJ**

Investment Cost per GJ of Annual Capacity = Investment Cost per GJ of Peak Capacity / (# of days in a year X load factor)
= **$ 1.80 /GJ**

Levelized Cost/GJ = Cost per GJ of Annual Capacity * Capital Carrying Costs
= **$ 0.160 /GJ**

TGVI System Improvement Charge Calculation

Increase to Peak Day over 5 years 2007 to 2011 (2006 is base year) = **17.4 TJ**

System Improvement 2007 to 2011 Budget = **$3,398,787**

Investment Cost per GJ of Peak Capacity = 5 Yr. Peak Day increase in GJ / System Improvement 5 Yr. Budget Cost
= **$ 195.33 /GJ**

Investment Cost per GJ of Annual Capacity = Investment Cost per GJ of Peak Capacity / (# of days in a year X load factor)
= **$ 1.77 /GJ**

Levelized Cost/GJ = Cost per GJ of Annual Capacity * Capital Carrying Cost
= **$ 0.151 /GJ**

4.2 For 2002-2006, provide the net book value of the TGI and TGVI total transmission plant and total distribution plant (show the gross plant, and accumulated depreciation) by year.

Response:

The net book value of total transmission plant and total distribution plant for TGI and TGVI is as follows:

2002

TGI	Gross Plant	Accumulated Depreciation	Net Book Value
Transmission	815,482	119,304	696,178
Distribution	1,383,077	255,532	1,127,545

TGVI	Gross Plant	Accumulated Depreciation	Net Book Value
Transmission	295,410	41,937	253,473
Distribution	265,210	40,148	225,062

2003

TGI	Gross Plant	Accumulated Depreciation	Net Book Value
Transmission	887,977	132,019	755,958
Distribution	1,604,552	276,778	1,327,774

TGVI	Gross Plant	Accumulated Depreciation	Net Book Value
Transmission	272,250	47,349	224,901
Distribution	305,405	51,966	253,439

2004

TGI	Gross Plant	Accumulated Depreciation	Net Book Value
Transmission	911,854	154,321	757,533
Distribution	1,671,826	318,314	1,353,512

TGVI	Gross Plant	Accumulated Depreciation	Net Book Value
Transmission	274,322	53,453	220,869
Distribution	318,411	58,716	259,695

2005

TGI	Gross Plant	Accumulated Depreciation	Net Book Value
Transmission	917,374	172,737	744,637
Distribution	1,735,666	339,217	1,396,449

TGVI	Gross Plant	Accumulated Depreciation	Net Book Value
Transmission	278,065	59,387	218,678
Distribution	332,466	65,632	266,834

2006

TGI	Gross Plant	Accumulated Depreciation	Net Book Value
Transmission	910,710	183,329	727,381
Distribution	1,820,212	356,299	1,463,913

TGVI	Gross Plant	Accumulated Depreciation	Net Book Value
Transmission	289,636	64,869	224,767
Distribution	344,944	73,017	271,927

4.3 For 2002-2006, provide the TGI and TGVI transmission and distribution plant additions by year. Also show the ratio of transmission to distribution plant additions.

Response:

2002		**Ratio**
TGI	**Additions**	
Transmission	7,083	13.74%
Distribution	44,455	86.26%
TGVI	**Additions**	
Transmission	2,177	25.45%
Distribution	6,377	74.55%

2003		
TGI	**Additions**	
Transmission	11,899	13.64%
Distribution	75,319	86.36%
TGVI	**Additions**	
Transmission	1,580	13.34%
Distribution	10,266	86.66%

2004

TGI	**Additions**	
Transmission	13,301	15.46%
Distribution	72,737	84.54%

TGVI	**Additions**	
Transmission	1,367	13.58%
Distribution	8,700	86.42%

2005

TGI	**Additions**	
Transmission	2,100	3.70%
Distribution	54,720	96.30%

TGVI	**Additions**	
Transmission	11,352	63.94%
Distribution	6,401	36.06%

2006

TGI	**Additions**	
Transmission	12,678	17.33%
Distribution	60,459	82.67%

TGVI	**Additions**	
Transmission	10,219	59.38%
Distribution	6,991	40.62%

4.4 For 2002-2006, provide the TGI and TGVI transmission system improvement plant additions and distribution system improvement plant additions by year. Also show the ratio of transmission to distribution system improvements.

Response:

TGI and TGVI transmission system improvement related plant additions and distribution system improvements from 2002 to 2006 are as follows:

TGI

	Applicant Number	Description	2002	2003	2004	2005	2006
Transmission	CPCN	Armstrong Compressor	4,330				
Distribution							
	22	DP/SI's Previous Years	136	179	1	0	0
	63	System Improvements	1,409	6,161	4,045	4,450	2,240
	64	Unscheduled System Improvements	3,197	155	64	0	
			4,742	6,495	4,110	4,450	2,240
		Transmission ratio	48%	0%	0%	0%	0%
		Distribution ratio	52%	100%	100%	100%	100%

TGVI

	Applicant Number	Description	2002	2003	2004	2005	2006
Transmission							
Distribution							
	22	DP/SI's Previous Years					
	63	System Improvements			16	0	563
	64	Unscheduled System Improvements					
			0	0	16	0	563
		Transmission ratio			0%		0%
		Distribution ratio			100%		100%

4.5 For TGI and TGVI, recalculate and show the calculation of the SI charge including transportation system improvement costs.

Response:

The calculation of the SI charge for TGI and TGVI builds on the response to Question 4.1 where the distribution SI charge is explained. An estimation of a transmission SI charge is provided in this response, but it is based on inputs and methodology that would have to be further validated before it could be included as an input into Terasen's main extension tests, in the event that was deemed appropriate.

Terasen's preliminary estimate for a transmission SI charge for TGI and TGVI has been determined to be $0.181/GJ and $0.406/GJ of annual consumption respectively. Combined with the proposed Distribution SI, TGI would have a SI charge of $0.341/GJ while TGVI's SI charge would be $0.557. The transmission SI charges are based on:

> TGI: As per the 2006 TGI Resource Plan, there are two transmission expansion projects in the 20 yr period (2007 – 2026 inclusive). Both projects are in the Interior and are scheduled to be added in 2015. They are: Okanagan Reinforcement Project for $38.7 million and the Kitchener-B Compressor Unit addition for $23.5 million. No transmission expansion projects in the Lower Mainland are included. The Nichol – Coquitlam loop or portions thereof are not required if the Mt. Hayes LNG facility proceeds or if Burrard Thermal is retired in 2014 as currently anticipated by BC Hydro.
>
> TGVI: The only facility included for the Core market is the Mt. Hayes LNG Facility. Since the primary justification of the LNG facility is avoided gas supply costs and the balance avoided transmission costs, the LNG facility has been split 88% gas supply and 12% transmission. So 12% of the LNG capital costs are counted as a transmission system improvement in 2011. This is 12% x $214.5 million = $25.7 million.

The calculation of the transmission SI charge is analogous to the distribution calculation (from response to Question 4.1) where increases in transmission capacity are allocated to consumption. One difference is that the transmission costs are examined over a 20 year period due to the infrequent nature of these types of improvements.

Terasen continues to be of the opinion that the accurate estimation of the cost and timing of large transmission system improvements is difficult and is subject to large swings driven at times by the decisions taken by large industrial customers. Misapplication of a transmission SI charge could prevent the attachment of otherwise economic customers which help to keep rates low for all ratepayers. To that effect, it is recommended that transmission SI costs be recovered through rates rather than through an SI charge applied to new customers.

5.0 Reference: Main Extension Review and Service Line Cost Allowance

Exhibit B-1, Application, Attachment 3, Schedule 1 and 2

MX Test – Past Performance

5.1 Please provide copies of the latest TGI and TGVI Plant Accounting manuals and their issue date.

Response:

Please refer to Attachment 5.1 for the latest Asset Accounting Policy and Procedures Manual issued in 2002.

5.2 Please provide the latest copies the TGI and TGVI policy and procedures manuals used by the individuals performing the main extension tests. Also provide the issue date of the manuals.

Response:

Please refer to Attachment 5.2 which contains the most current version of the MX Test policy which applies to TGI and TGVI which was last updated on January 12, 2006.

Procedures for carrying out the main extension test are kept in an on-line knowledge base. There are various training modules covering the different aspects of the test (a sample is also included in Attachment 5.2). The knowledge base is updated on an ongoing basis as required, with the most recent updates made earlier in 2007. Individuals performing the test receive initial training which is supplemented as changes are implemented.

5.3 Please file the 1996 BC Gas Service Line Cost Allowance Proposal.

Response:

Please refer to Attachment 5.3.

5.4 Please file the last Main Extension Review and Service Line Cost Allowance report that TGI submitted to the Commission.

Response:

Please refer to Attachment 5.4

5.5 For TGI and TGVI, provide the total number of main extensions and the number of contributory main extensions by year for 2002 – 2006.

Response:

The table below lists the total number of main extensions and contributory mains by company. As a result of the integration of TGVI (then Centra Gas) with TGI business processes and systems, data for main extensions prior to 2004 was not migrated, therefore, TGVI results are not readily available for years prior to 2004.

Company	Year	Main Extensions Completed	Number of Contributory Mains
TGI	2006	618	39
	2005	736	42
	2004	561	18
	2003	407	11
	2002	319	32
TGVI	2006	282	11
	2005	256	1
	2004	207	0

5.6 Please complete the following tables.

Year	Forecast New Mains Dollars Spent	Actual New Mains Dollars Spent	Variance (Forecast-Actual) ($)	Main Extension Contributions ($)*	# of Mains Installed
2006		$7,765,000			
2005		$7,211,000			
2004		$5,264,000			
2003		$4,150,190			
2002		$4,574,000			

TGVI

Year	Forecast New Mains Dollars Spent	Actual New Mains Dollars Spent	Variance (Forecast-Actual) ($)	Main Extension Contributions ($)*	# of Mains Installed
2006		$7,765,000			
2005		$7,211,000			
2004		$5,264,000			

*Main extension contribution amount entered in the general ledger.

Response:

The tables have been updated with the available data. Some data for 2002 was not available for TGI due to technical issues with retrieving information from the database. This issue could not be resolved in time for the submission of this response. In the case of TGVI, main extension test forecast and contribution data only began to be available in Q2 2006 for reasons explained in detail in response to Question 9.2. As such, 2006 forecast costs understates the total forecasted cost for that year. TGVI expects that the beginning in 2007 will accurately capture forecasted costs as TGVI is now sharing the same system and processes as TGI for which reliable results are being obtained.

Variances in forecasted TGI main extension costs during the period of 2004-5 are in part attributable to changes in the Company's order fulfillment system combined with standard costing data used to estimate main costs. The more efficient processing of orders combined with costing data based on historical data produced an over estimation of main costs during that period. However, rising construction costs experienced in 2006 due to a robust construction sector closed the gap between forecasted and actual costs so that forecasted versus actual results were in close agreement for TGI as a whole.

Note: The TGI Actual New Mains Dollars Spent costs have been updated for the years 2002 & 2003 while the TGVI figures have been populated with the numbers originally submitted in Schedule 2 of the Application. The Application contained minor inaccuracies that are corrected in this response.

TGI

	Forecast New Mains Dollars Spent	Actual New Mains Dollars Spent	Variance (Forecast-Actual) ($)	Main Extension Contributions ($)*	# of Mains Installed
2006	$7,723,570	$7,765,000	($41,430)	$215,813	618
2005	$9,490,325	$7,211,000	$2,279,325	$718,636	736
2004	$6,877,713	$5,264,000	$1,613,713	$4,821	561
2003	$2,887,105	$4,212,000	($1,324,895)	$19,662	407
2002	Data Unavailable	$4,119,000	Data Unavailable	Data Unavailable	319

TGVI

	Forecast New Mains Dollars Spent [1]	Actual New Mains Dollars Spent	Variance (Forecast-Actual) ($) [1]	Main Extension Contributions ($)	# of Mains Installed
2006	$1,449,843	$3,399,000	($1,949,157)	$31,649	282
2005	Data Unavailable	$3,604,000	N/A	N/A	256
2004	Data Unavailable	$2,437,000	N/A	N/A	207

Notes 1: Forecasted costs only became available in Q2, 2006. TGVI migrated its order processing application to TGI's system. Historical data was not incorporated into the new system. Forecasted costs for 2006 are understated as they only include a partial year's data. Actual data for the years 2004-06 are accurate.

5.7 Please provide the number of mains representing a 10% sample of the TGI and TGVI main extensions installed in 2006.

Response:

In 2006, there were 618 main extensions completed for TGI and 282 main extension completed for TGVI. A 10% sample for each company would result in 62 main extensions for TGI and 28 main extensions for TGVI.

5.8 Please calculate the confidence intervals represented by the 10% sample of the TGI and TGVI main extensions installed in 2006.

Response:

Based on 2006 data where there were 618 main extensions for TGI and 282 main extensions for TGVI, a sample of 10% in each case would represent a confidence interval of +/-11.8% for TGI and +/-17.5% for TGVI at a 95% confidence level.

5.9 For the TGVI main extensions installed in 2006, calculate the TGI and TGVI sample sizes required for confidence intervals of 90 percent and 95 percent.

Response:

Confidence intervals are typically expressed as +/- a given percentage for a given confidence level (typically 90% or 95%). As discussed in the response to IR#5.8, a 10% sample would provide a confidence interval of +/-11.8% for TGI and +/-17.5% for TGVI at a 95% confidence level. That same sample would generate a confidence interval of +/-9.9% for TGI and +/-14.8% for TGVI at a 90% confidence level

6.0 Reference: Exhibit B-1, Application, Attachment 3, Schedules 3 and 4

Cost Recovery – Past Performance

6.1 Please complete the following tables.

2006 TGI Service Line Installations

Service Line Cost	Forecast Total Service Line Cost ($)	Actual Total Service Line Cost ($)	Variance (Forecast-Actual) ($)
$1,100 - 1,199		373,294	
$1,200 - 1,299		346,108	
$1,300 - 1,399		283,202	
$1,400 - 1,499		246,397	
$1,500 - 1,599		215,037	
$1,600 - 1,699		200,664	
$1,700 - 1,799		224,274	
$1,800 - 1,899		236,544	
$1,900 - 1,999		191,135	
$2000 - 2,499		809,017	
$2,500 - 2,999		763,119	
$3,000 - 3,499		512,380	
> $3,500		2,849,742	
Total			

2006 TGVI Service Line Installations

Service Line Cost	Forecast Total Service Line Cost ($)	Actual Total Service Line Cost ($)	Variance (Forecast-Actual) ($)
$1,100 - 1,199		152,720	
$1,200 - 1,299		171,107	
$1,300 - 1,399		147,612	
$1,400 - 1,499		175,865	
$1,500 - 1,599		105,445	
$1,600 - 1,699		111,807	
$1,700 - 1,799		139,237	
$1,800 - 1,899		96,479	
$1,900 - 1,999		85,595	
$2000 - 2,499		437,444	
$2,500 - 2,999		418,834	
$3,000 - 3,499		243,150	
> $3,500		1,331,248	
Total			

Response:

Response will be provided as soon as available.

6.2 For TGI and TGVI, please provide the total 2006 service line contributions collected for service lines with cost greater than $1,100 (as recorded in the general ledger).

Response:

Response will be provided as soon as available.

7.0 Reference: Exhibit B-1, Application, Attachment 3, Schedule 5

Cost Recovery – Past Performance

In Attachment 3 Schedule 5 Terasen sets out the results of 103 Main extensions carried out by TGI and 52 by TGVI, of which 67 of TGI and 33 of TGVI were for fewer than 10 customers.

7.1 How many of the above were infill; how many served multi-family developments; how many served new subdivisions; and how many new communities?

Response:

There were no infill service attachments included in Schedule 5 as infill customers are those who attach to an existing main and Schedule 5 only contained new main extensions. With regards to TGI, 15 main extensions serviced multi-family projects while 37 served new subdivisions. TGVI had 4 multi-family developments and 29 new subdivisions. Finally, no new communities were served by main extension listed in the Schedule.

7.2 For the 2007 TGI and TGVI main extensions listed in Schedule 5 completed as of July 31, 2007, please prepare a table showing the Forecast Main-Direct Cost, the Actual Main Direct Cost and the variance.

Response:

The table below summarizes the forecasted and variable costs associated with the main extensions listed in Schedule 5. Similar to the results presented in the response to Question 5.6, the TGI sample shows reasonable agreement between forecasted and actual costs while the TGVI sample suggests that the standard costing data may be underestimating actual costs. TGVI (as well as TGI) will be reviewing and updating the costing inputs used in the main extension test as part of the annual update of main extension parameters.

Main Extension Costs - Jan to Jul 2007

	Forecasted Cost	Actual Cost	Variance
TGI	$ 828,989	$ 893,262	$ (64,273)
TGVI	$ 584,430	$ 724,796	$ (140,366)

7.3 Schedule 5 presents 2007 MX data from TGI and TGVI. Please show the total customer, contribution revenues, by rate class, that TGI and TGVI, respectively, received from the accounts listed in Schedule 5.

Response:

The table below details total customer attachments and contribution paid by company and rate class for the main extensions found in Schedule 5.

	Rate Class	Total Customer Attachments	Contribution Paid ($)
TGI	**Rate 1**	1,130	$ 48,910
	Rate 2	90	$ 5,903
	Rate 3	4	$ -
TGVI	**RGS**	815	$ 809
	SCS-2	1	$ -
	LCS-1	2	$ -

7.4 Please describe what penalty, if any, customers must pay, in the event that their actual consumption is below that on which the MX test was based.

Response:

Customers do not incur a penalty if actual consumption is less than the amount used in the MX Test. Conversely, there is no benefit accorded to a customer who exceeds the forecast consumption.

Inputs into the main extension test represent the best available information at the time. Though a home builder may include a given appliance, the homeowner may choose to operate that appliance in a way other than anticipated at the time the home was constructed. Also, the home's occupants can change over time as can the choice of appliances.

Given that the forecasted profitability index in Schedule 5 as well as the results of forecast versus actual P.I. described in the response to Question 8.1 are well above 1.0, typically variances in forecasted consumption do not materially impact existing customers when all of the main extension are considered as a whole.

8.0 Reference: BCUC Letter L-11-06;

TGVI Letter to BCUC, 30 April 2006 – TGVI Review of Main Extension Test

MX Test – Past Performance

8.1 Please provide a report of the performance of the main extension tests, for each of TGI and TGVI, for all accounts beginning service during the period April 1, 2006 through June 1, 2006, inclusive. For each account please include: project number, in-service date, forecast installation cost, actual installation cost, forecast customer load, actual customer load, actual customer contribution, forecast PI ratio, and actual PI ratio.

Response:

During the period of April 1, 2006 to June 1, 2006, 981 new services were installed for TGI and TGVI. These services were attached to mains ranging in age from recently completed to over 50 years. To evaluate the actual profitability index (PI) against the forecasted PI would require the main extension test be re-run and include all of the attachments associated with the main to which the new service was attached; the total number of attachment in this case approached 10,000.

In order to respond to this request, some simplifying assumptions needed to be applied to decrease the size of the task:

1. TGVI main extensions were excluded as there is insufficient data available on historical forecast values and main extension test results.

2. Only mains completed in 2004 or later were included due to availability of historical main extension tests and forecast inputs such as actual main costs.

Applying these criteria left 219 main extensions eligible for analysis. Of this population size, a sample of 26 is being provided for the items requested above. This sample represents a confidence interval of +/-15% at a 90% confidence level. To analyze the entire population represented by the request would take 1 to 2 months to complete for the cases where adequate historical data is available. The steps required to complete the recalculation of a historical main extension test using actual data were:

a. The analysis of Terasen's billing data to identify new customer additions.

b. Retrieval of the main extension associated with the addition of the new customer. As noted earlier, some of these mains may have been installed many years ago.

c. Identification of all attachments for each main in question from engineering drawings.

d. Retrieval of actual consumption data for each attachment from the billing system.

e. Retrieval of actual installation costs from a different corporate information system.

f. Retrieval of historical main extension test results some of which exist only in hardcopy – older main extensions are stored off-site.

g. Re-running the appropriate historical main extension test using parameters from the applicable year with actual consumption and installation costs.

Results

The analysis of the sample described earlier showed close agreement between forecast and actual results. The forecast aggregate PI for the sample was 1.51 while actual results for the aggregate PI were 1.41. Due to the recent installation of some of the mains in the sample, some of the forecasted attachments have not taken place yet - for larger projects, the main extension test includes customer additions for a five year period. .The forecast additions for the main extension tests is 647 whereas 499 actual attachments had taken place to the end of June 2007, which is less than the first year and a half of the five year period of the sample extensions. The difference are attachments that are yet to be completed. For mains where there were attachments that had yet to be installed, the outstanding number of attachments were included in the re-calculation of the main extension using actuals in order to make a relevant comparison. In comparing forecast versus actual results, actual installation costs were higher than forecast while actual volumes were slightly lower than forecast. Though the combination of higher costs and lower consumption resulted in an aggregate PI that was lower than forecast, the difference in the PI is relatively small and serves to show that overall the main extension test is doing a good job of evaluating the economic viability of attaching new customers.

In comparing forecast versus actual results, actual installation costs were higher than forecast while actual volumes were slightly lower than forecast. Though the combination of higher costs and lower consumption resulted in an aggregate PI that was lower than forecast, the difference in the PI is relatively small and serves to show that overall the main extension test is doing a good job of evaluating the economic viability of attaching new customers.

Further evidence that the Company is adding new customers that are primarily economical can be found in examining the broader population of 981 new customers that were added between April 1, 2006 and June 1, 2006. Of this group of new customers, 464 customers were residential customers (both TGI and TGVI) with 12 months of consumption history. Their average consumption was determined to be 93.1 GJ/yr. which is agrees very closely with the aggregate average of TGI and TGVI for 2006. Finally, the results of forecast versus actual 2006 TGI main extension installation costs detailed in the response to Question 5.6 lend further support that the inputs into the main extension are accurately determining the economic viability of a main extension. As such, the Company believes that this data supports the proposals put forth in the Application to reduce the threshold for individual main extensions and to ensure that the aggregate population of main extensions has a PI of 1.1 or greater.

Project #	In Service Date	Forecast Installation Cost	Actual Installation Cost	Forecast Customer Load	Actual Customer Load	Actual Customer Contribution	Forcast P.I. Ratio	Actual P.I. Ratio
4100001324	10/17/2003	$ 20,316	$ 27,309	3,399	3,479	$ -	2.50	1.70
4100001511	2/24/2003	$ 13,166	$ 11,753	880	1,078	$ -	1.01	1.44
4100001707	3/31/2004	$ 46,641	$ 36,755	3,816	4,522	$ -	1.24	1.41
4100002061	8/17/2004	$ 17,085	$ 22,759	3,645	2,232	$ -	3.18	1.45
4100002065	1/23/2004	$ 18,788	$ 11,121	2,254	2,471	$ -	1.85	2.80
4100005182	5/28/2004	$ 80,187	$ 53,379	5,819	4,052	$ -	1.03	1.20
4100008892	7/21/2005	$ 42,600	$ 44,330	7,040	10,564	$ -	1.20	2.00
4100010333	10/8/2003	$ 51,031	$ 31,823	5,680	3,033	$ -	1.57	1.57
4100012275	5/26/2005	$ 40,554	$ 25,348	3,250	1,237	$ -	1.10	1.26
4100012371	7/28/2004	$ 31,353	$ 37,942	2,400	2,130	$ -	1.20	1.30
4100015119	10/22/2004	$ 19,172	$ 35,406	2,316	3,848	$ -	2.02	2.04
4100015516	4/21/2004	$ 9,517	$ 16,012	2,028	1,160	$ -	2.90	1.35
4100020636	6/29/2004	$ 50,472	$ 74,109	4,100	3,694	$ -	1.36	1.38
4100022081	5/27/2005	$ 15,704	$ 31,392	1,064	1,108	$ -	1.14	0.86
4100022083	5/27/2005	$ 26,663	$ 50,517	2,129	2,659	$ -	1.30	1.38
4100022811	2/13/2005	$ 100,837	$ 99,180	7,742	7,538	$ -	1.30	1.12
4100023174	10/22/2004	$ 16,340	$ 25,679	4,255	3,054	$ -	4.25	1.60
4100023178	11/17/2004	$ 8,160	$ 15,621	1,137	1,806	$ -	2.52	1.71
4100023387	3/8/2005	$ 8,584	$ 19,580	1,299	1,854	$ -	2.54	1.65
4100025243	7/20/2005	$ 39,877	$ 83,534	4,309	4,541	$ -	1.92	1.11
4100025847	7/16/2004	$ 8,516	$ 8,669	2,100	1,560	$ -	2.10	1.30
4100026509	5/12/2005	$ 31,500	$ 49,852	2,630	2,480	$ -	1.30	1.16
4100026578	3/2/2005	$ 27,257	$ 40,659	1,737	2,221	$ -	1.02	1.37
4100029553	7/27/2005	$ 28,764	$ 43,648	2,180	2,615	$ -	1.19	1.19
4100030841	10/20/2004	$ 19,913	$ 19,592	1,272	1,099	$ -	1.00	1.12
4100032690	12/1/2004	$ 16,048	$ 20,705	1,627	1,409	$ -	1.74	1.37
Total		**$ 789,045**	**$ 936,674**	**80,108**	**77,444**	**$ -**	**1.51**	**1.41**

9.0 Reference: 2006 TGVI Review of Main Extension Test, BCUC IR No. 1, BCUC IR 3.2.1

MX Test – Past Performance

"TGVI will be able to provide a report on forecasted installation cost versus actual installation costs for the period of January 1, 2006 to December 31, 2006 by the end of April 2007."

9.1 For main extensions installed from January 1, 2006 to December 31, 2006 please provide the report comparing the forecast installation cost with the actual installation costs.

Response:

As discussed in the response to Question 5.6, actual TGVI main costs for 2006 were $3,399,000. Available records show forecast main extension costs of $1,449,843 but this amount only reflects a portion of the year's forecast due to TGVI's migration to TGI order fulfillment system. In regard to reporting on forecast cost vs. actual, BCUC Order No: G-161-06 Approving 2007 Rates, 2007 Cost of Service and Revenue Deficiency Deferral Account Balance as at December 31, 2005 stated "The Commission finds that reporting in the first quarter of 2008 on a random sampling of 10 percent plus inclusion of each year's five highest cost main extensions installed from January 1, 2006 to December 31, 2007 is acceptable". As such TGVI had not prepared a report for the end of April 2007.

9.2 For the first 30 TGI and TGVI main extensions installed in 2005, provide the forecast, actual and normalized actual consumption by main extension by year for 2005-2007. If the main extension contains more than one rate class also provide a breakdown of consumption by rate class.

Response:

The tables below summarize the data requested. Historical main extension test results are not readily available for TGVI, and would be an extremely arduous task to complete. Prior to the integration of TGVI into TGI's order processing system in 2006, records related to the TGVI main extension tests existed only in hardcopy format. When TGVI adopted the TGI main extension test as directed in Order No. G-126-05, the Commission accepted in Letter No. L-11-06 that a report of TGVI's historical main extension performance based on the old main extension test "is of limited use now that TGVI has adopted the same test as TGI". As such, Terasen has not attempted to integrate any of the available hardcopy historical TGVI main extension data into the systems currently used. Based on this, the response only contains 30 main extensions from TGI.

Analysis of the data shows that the estimates used to forecast load in the main extension tests provide a good estimate for the purposes of determine economic viability of a given project. For the time period of 2005 to 2007, the normalized actual consumption was 95% of the forecasted value. A closer examination on a year by year basis reveals that first year actuals (2005) were 82% of forecast, but that the second year's (2006) actual consumption was 103% of forecast. The third year (2007) actual consumption is 95% of forecast, but this last year only contains six months of data so it is difficult to draw conclusions for this year. Also, some main extension projects have yet to complete the installation of all planned attachments in 2007 which also serves to reduce the consumption for that year.

The lower than forecast consumption for the first year is attributable to timing difference between the main extension test and how mains and service lines are installed in the field. There is typically some period of time between the completion of the main extension and the attachments of services. Also, the services are not all attached at the same point in time; they are usually spread out over several months. Finally, consumption can take time to ramp-up to normal consumption values.

TGI - 2005 Main Extensions - Forecast Consumption (GJ)

		Total Consumption			Rate 1 Consumption			Rate 2/3 Consumption		
Main Number	Year of Attachments	2005	2006	2007	2005	2006	2007	2005	2006	2007
4100021209	1	2,100	4,970	2,485	2,100	4,970	2,485			
4100028907	1	138	138	69	138	138	69			
	1	525	525	262	525	525	262			
4100023527	2	0	420	210	0	420	210			
	1	2,890	2,890	1,445	2,890	2,890	1,445			
	2	0	5,058	2,529	0	5,058	2,529			
4100028435	3	0	0	2,529	0	0	2,529			
	1	662	662	331	662	662	331			
	2	0	662	331	0	662	331			
4100035475	3	0	0	289	0	0	289			
4100035739	1	103	103	51	103	103	51			
	1	68	68	34	68	68	34			
4100037358	2	0	68	34	0	68	34			
	1	3,405	3,405	1,702	3,405	3,405	1,702			
	2	0	3,405	1,702	0	3,405	1,702			
4100024865	3	0	0	1,106	0	0	1,106			
	1	1,200	1,200	600	1,200	1,200	600			
4100027028	2	0	900	450	0	900	450			
	1	100	100	100	100	100	100			
4100035750	2	0	3,224	1,612	0	0	0	0	3,224	1,612
4100030720	1	1,001	1,001	500	1,001	1,001	500			
		200	200	100	200	200	100			
4100015740	1	0	400	200	0	400	200			
	1	519	519	260	519	519	260			
	2	0	726	363	0	726	363			
4100029227	3	0	0	260	0	0	260			
	1	965	965	483	965	965	483			
4100026810	2	0	676	338	0	676	338			
4100032169	1	222	222	111	222	222	111			
	1	180	180	90	180	180	90			
4100037129	2	0	270	135	0	270	135			
	1	331	331	165	331	331	165			
	2	0	331	165	0	331	165			
4100030656	3	0	0	124	0	0	124			
	1	400	400	200	400	400	200			
4100038996	2	0	800	400	0	800	400			
	1	1,064	1,064	532	1,064	1,064	532			
4100022083	2	0	1,064	532	0	1,064	532			
	1	365	365	182	365	365	182			
4100004006	2	0	365	182	0	365	182			
	1	2,450	2,450	1,225				2,450	2,450	1,225
4100005128	2	0	2,100	1,050				0	2,100	1,050
	1	1,200	1,200	600				1,200	1,200	600
	2	0	1,200	600				0	1,200	600
4100005197	3	0	0	110	0	0	110			
	1	500	500	250	500	500	250			
4100008852	2	0	300	150	0	300	150			
4100008892	1	7,040	7,040	3,520				7,040	7,040	3,520
4100008892	1	1,064	1,064	532	1,064	1,064	532			
	1	1,350	1,350	675	1,350	1,350	675			
4100031850	2	0	1,530	765	0	1,530	765			
	1	470	470	235	470	470	235			
4100001712	2	0	470	235	0	470	235			
4100021906	1	798	798	798	798	798	798			
	1	840	840	420	840	840	420			
4100022000	2	0	720	360	0	720	360			
	1	382	382	191	382	382	191			
4100001712	2	0	127	64	0	127	64			
Total		**32,531**	**60,217**	**34,974**						

Grand Total for All Years	**127,722**

TGI - 2005 Main Extensions - Normalized Consumption (GJ)

		Total Consumption			Rate 1 Consumption			Rate 2/3 Consumption		
Main Number	Year of Attachments	2005	2006	2007	2005	2006	2007	2005	2006	2007
4100021209	1	1,880	4,162	2,290	1,880	4,162	2,290			
4100028907	1	45	137	84	45	137	84			
	1	273	917	516	273	917	516			
4100023527	2	0	166	243	0	166	243			
	1	4,826	8,570	4,182	4,826	8,570	4,182			
4100028435	2	0	189	190	0	189	190			
	1	465	1,315	783	465	1,315	783			
4100035475	2	0	145	201	0	145	201			
4100035739	1	94	106	66	94	106	66			
4100037358	1	68	101	56	68	101	56			
	1	1,739	5,958	3,885	1,739	5,958	3,885			
	2	0	823	940	0	823	940			
4100024865	3	0	0	5	0	0	5			
	1	931	1,865	819	931	1,865	819			
4100027028	2	0	108	185	0	108	185			
4100035750	1	1,960	1,559	462	142	208	137	1,819	1,351	325
4100030720	1	444	703	379	444	703	379			
4100015740	1	0	490	421	0	490	421			
	1	539	853	453	539	853	453			
	2	0	862	488	0	862	488			
4100029227	3	0	0	152	0	0	152			
4100026810	1	717	2,303	964	717	2,303	964			
4100032169	1	131	129	75	131	129	75			
4100037129	1	36	34	19	36	34	19			
	1	308	736	436	308	736	436			
4100030656	2	0	168	254	0	168	254			
	1	113	233	139	113	233	139			
4100038996	2	283	445	262	283	445	262			
	1	944	1,752	863	944	1,752	863			
4100022083	2	0	722	390	0	722	390			
	1	352	466	248	352	466	248			
4100004006	2	0	310	162	0	310	162			
4100005128	1	2,185	5,481	2,681	2,185	5,481	2,681			
	1	587	1,369	752				587	1,369	752
	2	0	963	496				0	963	496
4100005197	3	0	0	85	0	0	85			
	1	582	692	371	582	692	371			
4100008852	2	0	299	175	0	299	175			
4100008892	1	3,852	10,564	4,252				3,852	10,564	4,252
4100008892	1	993	1,166	635	993	1,166	635			
	1	951	1,178	589	951	1,178	589			
4100031850	2	0	1,211	786	0	1,211	786			
	1	409	597	301	409	597	301			
4100001712	2	0	312	224	0	312	224			
4100021906	1	450	891	430	450	891	430			
	1	302	420	209	302	420	209			
4100022000	2	0	200	158	0	200	158			
	1	151	267	121	151	267	121			
4100001712	2	0	127	138	0	127	138			
Total		**26,613**	**62,063**	**33,014**						

Grand Total for All Years	**121,689**

TGI - 2005 Main Extensions - Actual Consumption (GJ)

		Total Consumption			Rate 1 Consumption			Rate 2/3 Consumption		
Main Number	Year of Attachments	2005	2006	2007	2005	2006	2007	2005	2006	2007
4100021209	1	1,903.1	4,212.6	2,317.5	1,903.1	4,212.6	2,317.5			
4100028907	1	46.1	138.3	84.8	46.1	138.3	84.8			
	1	276.4	928.4	522.5	276.4	928.4	522.5			
4100023527	2	0.0	168.5	245.8	0.0	168.5	245.8			
	1	4,884.8	8,674.9	4,232.6	4,884.8	8,674.9	4,232.6			
4100028435	2	0.0	191.1	192.8	0.0	191.1	192.8			
	1	470.3	1,330.9	792.4	470.3	1,330.9	792.4			
4100035475	2	0.0	146.4	203.1	0.0	146.4	203.1			
4100035739	1	95.6	107.7	67.0	95.6	107.7	67.0			
4100037358	1	68.8	102.7	56.4	68.8	102.7	56.4			
	1	1,760.5	6,031.2	3,932.2	1,760.5	6,031.2	3,932.2			
	2	0.0	833.3	951.4	0.0	833.3	951.4			
4100024865	3	0.0	0.0	5.3	0.0	0.0	5.3			
	1	942.5	1,888.2	829.1	942.5	1,888.2	829.1			
4100027028	2	0.0	109.1	187.7	0.0	109.1	187.7			
4100035750	1	1,984.3	1,578.1	467.8	143.4	210.1	138.4	1,840.9	1,368.0	329.4
4100030720	1	449.8	711.1	383.7	449.8	711.1	383.7			
4100015740	1	0.0	495.7	425.9	0.0	495.7	425.9			
	1	545.9	863.1	458.9	545.9	863.1	458.9			
	2	0.0	872.1	493.9	0.0	872.1	493.9			
4100029227	3	0.0	0.0	153.9	0.0	0.0	153.9			
4100026810	1	726.0	2,330.7	975.8	726.0	2,330.7	975.8			
4100032169	1	132.4	130.4	76.2	132.4	130.4	76.2			
4100037129	1	36.4	34.1	18.7	36.4	34.1	18.7			
	1	312.0	745.4	441.3	312.0	745.4	441.3			
4100030656	2	0.0	170.1	256.6	0.0	170.1	256.6			
	1	114.7	235.6	140.7	114.7	235.6	140.7			
4100038996	2	286.1	450.0	265.2	286.1	450.0	265.2			
	1	956	1,773	874	956	1,773	874			
4100022083	2	0	731	394	0	731	394			
	1	356	472	251	356	472	251			
4100004006	2	0	314	164	0	314	164			
4100005128	1	2,212	5,548	2,714	2,212	5,548	2,714			
	1	594	1,386	761				594	1,386	761
	2	0	975	502				0	975	502
4100005197	3	0	0	86	0	0	86			
	1	589	700	376	589	700	376			
4100008852	2	0	303	177	0	303	177			
4100008892	1	3,899	10,693	4,304				3,899	10,693	4,304
4100008892	1	1,005	1,180	643	1,005	1,180	643			
	1	963	1,192	596	963	1,192	596			
4100031850	2	0	1,226	796	0	1,226	796			
	1	414	604	305	414	604	305			
4100001712	2	0	316	227	0	316	227			
4100021906	1	455	902	435	455	902	435			
	1	306	425	212	306	425	212			
4100022000	2	0	202	160	0	202	160			
	1	153	270	122	153	270	122			
4100001712	2	0	129	140	0	129	140			
Total		**26,937**	**62,820**	**33,417**						

Grand Total for All Years	**123,174**

10.0 Reference: TGVI Application for Approval of Forecast Rates and Revenue Requirements 2006, BCUC IR No. 1, BCUC IR 29.11.2

MX Test – Past Performance

10.1 For TGI and TGVI provide the 2006 actual and 2007 forecast incentive cost per customer addition by rate class.

Response:

Terasen does not currently capture Demand Side Management (DSM) incentives per customer addition by rate class. This is because DSM incentives are available to both new and existing customers, and for both groups, incentives are not automatically provided. Rather all participants in Terasen DSM incentive programs must specifically apply to Terasen in order to participate. Therefore some existing customers and some new customers will participate in DSM programs, and some will not.

To address the specific reference to TGVI above, at the present time, incentive costs are not incorporated into the main extension test. For TGI and TGVI, DSM incentive costs are recovered from all customers. Terasen believes that it is appropriate to recover DSM incentive costs from all customers, as all customers benefit from the addition of economic customers. Adding economic customers to the system has the long term effect of making the system more efficient and helps to keep rates lower. If the incentive costs were added to the main extension test costs, it would result in each main being less economic than it otherwise would have been and this may result in customers making sub-optimal economic decisions. Therefore, current customers would not benefit from the addition of these economic customers. As such, Terasen believes it is appropriate at this time to charge incentive costs to all customers.

Given that Terasen does not allocate DSM incentives paid per customer added, but rather tracks DSM activity on a per participant level, the table below is provided for information. It outlines the DSM incentives that were provided to successful TGI and TGVI program applicants in 2006. Depending on the program, the incentive per customer ranged from $75 to $1,000 and was only paid to the customers that applied and met the qualifications for an incentive. Please note that the Total Incentive amount(s) shown in the table below are based on the cost incurred in 2006 as well as committed in 2006. For TGVI, total incentives were $336,200 (per TGVI Annual Report Tab 1.8.0). For TGI, this amount was $1,169,000. For 2007, total DSM incentive amounts paid to customers are expected to be approximately the same as 2006 for TGVI and approximately $1,500,000 for TGI.

2006 Terasen DSM Incentive Programs			
TGI	**# of participants approved**	**$ per incentive**	**Total incentive amount**
Residential New Construction Heating Program	1180	$500	$590,000
Energy Star Heating Upgrade	2026	$250 - $350	$638,800
Efficient Boiler Program	8	variable	$191,600
TGVI	**# of participants approved**	**$ per incentive**	**Total incentive amount**
Think Grand	346	$1,000	$346,000
Switch and Save - conversion of heating system	233	$300	$69,900
Switch and Save - conversion of heating system to Energy Star	303	$600	$181,800
Switch and Save - conversion of water heater	217	$400	$86,800
Yank the Tank - conversion of water water	146	$400	$58,400
Energy Bandit - conversion of heating system	92	$300	$27,600
Energy Bandit - conversion of heating system to Energy Star	98	$450	$44,100
Build Smart	196	$75	$14,700

Please note that Terasen Gas had contributions from partners for these programs so did not incur the entire incentive as an expense
Please note that the Efficient Boiler Program numbers are for all applications received and/or approved for New Construction only for 2006
Please note that the figures for Switch and Save are for the entire program period, not just for 2006. The program ran from September 1 2005 to February 28 2006
Please note that some Yank the Tank participants were new customers and some were not
Please note that some of the Energy Bandit participants were new customers and some were not

10.2 Please provide the average margin ($/GJ) by rate class used in the TGI and TGVI main extension tests.

Response:

The average margin ($/GJ) by rate class is a combination of fixed and variable components consisting of the basic charge and the delivery charge. As such the

average margin would vary for each customer based on their forecast consumption. The margin based inputs currently in use for the TGI and TGVI main extension test are provided in the two tables below. The inputs are consistent with the approved rates for 2007.

TGI Margin Inputs

	2007 Values
Rate 1	
Basic Charge for 12 months	$ 131.28
Delivery Charge per GJ	$ 2.736
Rate 2	
Basic Charge for 12 months	$ 275.52
Delivery Charge per GJ	$ 2.291
Rate 3 & 23	
Basic Charge for 12 months	$ 1,469.76
Delivery Charge per GJ	$ 1.974
Rate 4	
Basic Charge for 12 months	$ 4,872.00
Delivery Charge per GJ	$ 0.705
Rate 5 & 25	
Basic Charge for 12 months	$ 6,504.00
Delivery Charge per GJ	$ 0.548
Demand Charge per GJ	$ 13.543
Rate 6	
Basic Charge for 12 months	$ 684.00
Delivery Charge per GJ	$ 3.140
Rate 7 & 27	
Basic Charge for 12 months	$ 9,756.00
Delivery Charge per GJ	$ 0.915
Rate 22	
Basic Charge for 12 months	$ 40,632.00
Delivery Charge per GJ	$ 0.677

TGVI Margin Inputs

	2007 Values
RGS	
Basic Charge for 12 months	$ 126.00
Delivery Charge per GJ	$ 4.885
SCS-1	
Basic Charge for 12 months	$ 113.40
Delivery Charge per GJ	$ 7.353
SCS-2	
Basic Charge for 12 months	$ 402.36
Delivery Charge per GJ	$ 5.896
LCS-1	
Basic Charge for 12 months	$ 732.00
Delivery Charge per GJ	$ 3.188
LCS-2	
Basic Charge for 12 months	$ 1,173.84
Delivery Charge per GJ	$ 2.285
LCS-3	
Basic Charge for 12 months	$ 2,418.12
Delivery Charge per GJ	$ 2.057
ILF	
Basic Charge for 12 months	$ 3,000.00
Delivery Charge per GJ	$ 0.358
HLF	
Basic Charge for 12 months	$ 3,000.00
Delivery Charge per GJ	$ (1.154)
Demand Charge	$ 47.18
AGS	
Basic Charge for 12 months	$ 480.00
Delivery Charge per GJ	$ 2.367

TGI Margin Inputs

	2007 Values
Rate 1	
Monthly Basic Charge	$ 131.28
Delivery Charge per GJ	$ 2.736
Rate 2	
Monthly Basic Charge	$ 275.52
Delivery Charge per GJ	$ 2.291
Rate 3 & 23	
Monthly Basic Charge	$ 1,469.76
Delivery Charge per GJ	$ 1.974
Rate 4	
Monthly Basic Charge	$ 4,872.00
Delivery Charge per GJ	$ 0.705
Rate 5 & 25	
Monthly Basic Charge	$ 6,504.00
Delivery Charge per GJ	$ 0.548
Demand Charge per GJ	$ 13.543
Rate 6	
Monthly Basic Charge	$ 684.00
Delivery Charge per GJ	$ 3.140
Rate 7 & 27	
Monthly Basic Charge	$ 9,756.00
Delivery Charge per GJ	$ 0.915
Rate 22	
Monthly Basic Charge	$ 40,632.00
Delivery Charge per GJ	$ 0.677

TGVI Margin Inputs

	2007 Values
RGS	
Monthly Basic Charge	$ 126.00
Delivery Charge per GJ	$ 4.885
SCS-1	
Monthly Basic Charge	$ 113.40
Delivery Charge per GJ	$ 7.353
SCS-2	
Monthly Basic Charge	$ 402.36
Delivery Charge per GJ	$ 5.896
LCS-1	
Monthly Basic Charge	$ 732.00
Delivery Charge per GJ	$ 3.188
LCS-2	
Monthly Basic Charge	$ 1,173.84
Delivery Charge per GJ	$ 2.285
LCS-3	
Monthly Basic Charge	$ 2,418.12
Delivery Charge per GJ	$ 2.057
ILF	
Monthly Basic Charge	$ 3,000.00
Delivery Charge per GJ	$ 0.358
HLF	
Monthly Basic Charge	$ 3,000.00
Delivery Charge per GJ	$ (1.154)
Demand Charge	$ 47.18
AGS	
Monthly Basic Charge	$ 480.00
Delivery Charge per GJ	$ 2.367

11.0 Reference: Exhibit B-1, p. 19;

TGVI Application for Approval of Forecast Rates and Revenue Requirements 2006, Table 4.5, p. 20;

2005 TGI and TGVI ROE Review, BCUC IR No. 1, BCUC IR 20.2-20.3

Cost Recovery – Past Performance

"For the purpose of the review, forecast costs, consumption and attachments were used. The MX test results for this sample resulted in PIs that ranged from 0.05 to 30.16 for the individual MX tests prior to consideration of any contribution in aid of construction."

11.1 For negative main extension test forecast errors (actual consumption less than forecast and actual capital cost greater than forecast), please explain who is responsible for the recovery of the shortfall (e.g. customer on the main extension, existing ratepayers, or shareholders).

Response:

The Main Extension Test is a point in time calculation that forecasts 20 years of consumption based upon current consumption estimates from the Residential End User Study. Over the course of the twenty years of consumption, the customer may use more or less gas due to a number of factors such as efficiency of equipment, conservation, and addition of additional appliances. Similar to current customers, the individual customer on a new main is not responsible if consumption is less than forecast. If consumption is different than forecast, this may impact the annual demand forecasts and may therefore result in a change in delivery rates.

The Company forecasts capital costs based upon the most current costs for installing mains and services. If the actual capital costs are different than those forecast, rate base will increase or decrease more or less than forecast.

The following is the process for determining contributions and refunds of contributions:

If the main extension test determined that the customers attaching to the main extension required a contribution, customers must pay that contribution in order to receive service. For contributing main extensions, the Company reviews the main extension five years after the in service date to determine if any refunds are required. All customers attaching to the contributing main extension within the first five years are required to pay a contribution. If more customers attach than were originally forecast to attach to the contributing main, the contributions received from all customers will be higher than required by the original forecast. In this case, at the end of five years, the Company will refund customers on a prorated basis such that the original contribution required from all customers equals the actual contributions received.

The Company does not re-run the MX test using actual consumption and actual costs to determine if a refund is required. This approach is taken to reduce the administrative

cost of reviewing main extensions. To review each main extension based upon actual costs and volumes is a very time consuming process as noted in response to Question 8.1. The process currently in place ensures that customers pay a contribution when required, but significant process and therefore costs, are not incurred to manage the administration of refunds. Therefore, refunds are not given for consumption being higher than forecast, nor additional contribution required if forecast volume is lower than forecast.

11.2 Please calculate the 2006 and 2007 TGVI revenue requirement impact of 22% of TGVI's residential customers using 58.2 GJ/year instead of less than 20 GJ/year. Also calculate the rate impact on residential customers.

Response:

Please also refer to the response to Question 15.1.

In the 2006 – 2007 Revenue Requirement Application, filed in 2005, TGVI estimated that for 22% of its residential customers the annual gas consumption was less than 20 GJ with average use per customer of 58.2 GJ/year on a system wide basis. Based on 2006 actual data, the percentage of residential customers using less than 20 GJ/year was approximately 12.4% with the average use per customer at 11.2 GJ/year for this subset of customers. The average use per residential customer on a system wide basis was 59.3 GJ/year.

Table 1 below compares the revenue requirement for 2006 and 2007, as filed in the Settlement Update on November 24, 2006, to the recalculated 2006 and 2007 revenue requirement resulting from increasing the usage of 12.4% of TGVI residential customers from 11.2 GJ/year to 59.3 GJ/year.

For the recalculated revenue requirements the total cost of gas was proportionately increased to reflect the increase in residential volumes. Table 2 shows this and other assumptions made to estimate the incremental revenue requirement. All other items have been held consistent with the information provided in the Settlement Update including customer rates which were set according to formula. The results of this hypothetical scenario would not affect rates but would change the revenue surplus.

Table 1

As Filed	2006	2007
Revenue Requirement	$195,458,740	$207,097,938
Total T-Service and SalesRevenue	$169,357,740	$180,333,745
Revenue Surplus	$10,844,421	$16,222,051

Recalculated	2006	2007
Revenue Requirement	$199,559,091	$211,437,689
Total T-Service and SalesRevenue	$174,804,426	$185,979,938
Revenue Surplus	$12,190,757	$17,528,493

Difference	2006	2007
Revenue Requirement	$4,100,350	$4,339,750
Total T-Service and SalesRevenue	$5,446,686	$5,646,193
Revenue Surplus	$1,346,336	$1,306,442

Table 2

		2006	2007	
1	Customers using >20GJ	8,559	8,559	Based on May 1, 2006 through April 30, 2007
2	Average usage (GJ)	11.2	11.2	Based on May 1, 2006 through April 30, 2007
3	Total Usage (GJ)	95,861	95,861	
4				
5	Average RGS usage	59.3	59.3	
6	Incremental usage	48.1	48.1	Line 5 - Line 2
7				
8	Incremental volumes	411,688	411,688	Line 6 X Line 1
9	RGS total volume	4,404,485	4,614,718	
10	RGS volumes recalculated	4,816,173	5,026,406	
11				
12	Cost of Gas ($)	96,731,910	105,451,685	Settlement Update Schedule 26
13	Total Core Volumes (GJ)	11,602,159	11,943,334	Settlement Update Schedule 26
14	CoG per GJ	8.34	8.83	
15	Total core volumes recalculated	12,013,847	12,355,022	Line 13 + Line 8
16	CoG recalculated ($)	100,164,319	109,086,615	
17				
18	RGS variable rate	13.23	13.71	G-161-06 and G-126-05
19	Incremental RGS volumes	411,688	411,688	Line 8
20	Incremental revenue	5,446,686	5,646,193	

Please note that the data available on the customers using less than 20GJ is only available form May 1, 2006.

12.0 Reference: Exhibit B-1, p. 21, Table 5.1

MX Test – Customer Use Rates

12.1 Please provide a copy of the "Residential End User Study," referred to in Table 5.1.

Response:

Please refer to Attachment 12.1.

13.0 Reference: Exhibit B-1, Application, p. 13;

TGVI 2006 Review of Main Extension Test, BCUC IR No. 1, BCUC IR 1.8;

TGI 2006 Annual Review and Mid-Term Assessment Review, BCUC IR No. 1, BCUC IR 25.2(e)

MX Test – Customer Use Rates

"The MX test used to determine the SLCA included the average cost of a main on a per customer service basis. In the case of customer connecting to existing main, by determining the maximum allowance based on setting the PI to one, this customer is implicitly also contributing to the cost of the existing main in addition to the direct contribution represented by the SLIF of $215."

13.1 Does a low usage customer addition (e.g. decorative fireplace only) connecting to an existing main contribute "to the cost of the existing main in addition to the direct contribution represented by the SLIF of $215"?

Response:

In addition to the SLIF, new on-main (or infill) customers wishing to connect to the system, must make a contribution for any amount by which the cost of their service line exceeds the SLCA, regardless of their consumption. All customers, whether high volume or low volume customers contribute to system costs through their year-to-year payment of rates. The annual delivery margin payments of many low volume customers are sufficient to conclude that they are also contributing to the cost of the existing main. There are some possible combinations of very low volume customers that also have high service line costs (i.e., at or above $1,100) where the annual delivery margin payments are not enough to conclude that those customers are making a contribution to the existing main. Please see the responses to Questions 13.2 and 13.3 below for further discussion and analysis of low usage customers.

13.2 For the TGI service installation below calculate the net NPV of the service line (Cash Inflow 20 year NPV- Cash Outflow 20 year NPV).

TGI

Average Annual Consumption (GJ) – Residential Rate 1	17
Service Line Direct Cost	$1,100

Response:

Using the current TGI MX Test the 20-year NPV of a residential connection with a direct service line cost of $1,100 and average consumption of 17 GJ/year is ($504). In order to assess the impact of lower volume higher cost service connections the following table provides a breakeven analysis from two perspectives using both the current and proposed MX Tests. The first perspective assesses what level of direct service line costs is supported by a 17 GJ annual load. The second perspective assesses what level of annual consumption is required for a service line with a direct cost of $1.100 to pass the MX Test.

	Current TGI MX Test	Proposed TGI MX Test*
1. Annual Consumption Level at which a $1,100 Service Line passes the MX Test	**43 GJ**	**36 GJ**
2. Service Line Investment (Direct Cost) supported by a 17 GJ Annual Load	**$720**	**$775**
* For the proposed MX Test the $215 SLIF is eliminated, the threshold PI is set at 0.8 and the SI Charge is set at $0.16/GJ		

It should be noted that low-volume customer attachments tend to be more in the multi-family category. These attachments also tend to be low in terms of capital costs per customer attachment. It should also be noted that low-volume high-capital cost service lines are only a concern for infill customers. The forecast service line costs for low volume customers that are part of a main extension application are included in the MX Test analysis so the required customer contributions would incorporate any shortfall from the combined effect of low volumes and high service line costs.

The following table provides historical information on the frequency of occurrence of infill customers for TGI and TGVI. For TGI the frequency of infill customers has been very low in the order of 3% - 4%. For TGVI the percentage of these types of customer additions has been higher historically but has been declining as the TGVI system matures. Since converting to natural gas generally involves considerable expense on the part of a conversion customer the likelihood of making this decision to connect a very small load is quite limited. The concern with respect to low volume / high cost service line customers not making an appropriate contribution to overall system costs is consequently quite small.

		Number of New Residential "On Main" Attachments	Total Net Residential Customer Additions	Percentage of "On Main" Residential Attachments
TGI	**2003**	214	6,406	3%
	2004	417	10,768	4%
	2005	369	11,453	3%
	2006	273	9,598	3%
TGVI	**2003**	1,388	2,556	54%
	2004	1,388	3,951	35%
	2005	1,476	4,121	36%
	2006	700	3,798	18%
TGI & TGVI Combined	**2003**	1,602	8,962	18%
	2004	1,805	14,719	12%
	2005	1,845	15,574	12%
	2006	973	13,396	7%

13.3 For the TGVI service installation below calculate the net NPV of the service line (Cash Inflow 20 year NPV- Cash Outflow 20 year NPV).

TGVI

Average Annual Consumption (GJ) – Residential Rate 1	16
Service Line Direct Cost	$1,100

Response:

Using the current TVGI MX Test the 20-year NPV of a residential connection with a direct service line cost of $1,100 and average consumption of 16 GJ/year is ($151). In order to assess the impact of lower volume higher cost service connections the following table provides a breakeven analysis from two perspectives using both the current and proposed MX Tests. The first perspective assesses what level of direct service line costs is supported by a 16 GJ annual load. The second perspective assesses what level of annual consumption is required for a service line with a direct cost of $1,100 to pass the MX Test.

	Current MX Test	Proposed MX Test*
3. Annual Consumption Level at which a $1,100 Service Line passes the MX Test	**20 GJ**	**15 GJ**
4. Service Line Investment (Direct Cost) supported by a 16 GJ Annual Load	**$985**	**$1,125**

***** For the proposed MX Test the $215 SLIF is eliminated, the threshold PI is set at 0.8 and the SI Charge is set at $0.151/GJ

It should be noted that low-volume customer attachments tend to be more in the multi-family category. These attachments also tend to be low in terms of capital costs per customer attachment. It should also be noted that low-volume high-capital cost service lines are only a concern for infill customers. The forecast service line costs for low volume customers that are part of a main extension application are included in the MX Test analysis so the required customer contributions would incorporate any shortfall from the combined effect of low volumes and high service line costs.

14.0 Reference: Exhibit B-1, p. 15; TGVI Application for Approval of Forecast Rates and Revenue

Requirements 2006, Table 4.5, p. 20

MX Test – Customer Use Rates

"In TGVI's case however, the utility is experiencing increasing average annual use per customer as new customers generally have higher consumption than the average of the existing customer base."

14.1 Please explain why the average TGVI residential use was forecasted to decline from 2003-2007 if new customers generally have higher consumption than the average of the existing customer base.

Response:

At the time of the TGVI 2006 Negotiated Settlement Update, the available actual use rate data spanned the time period of 2003 to 2005 and showed evidence of a declining pattern as shown below in the graph submitted as part of the Update.

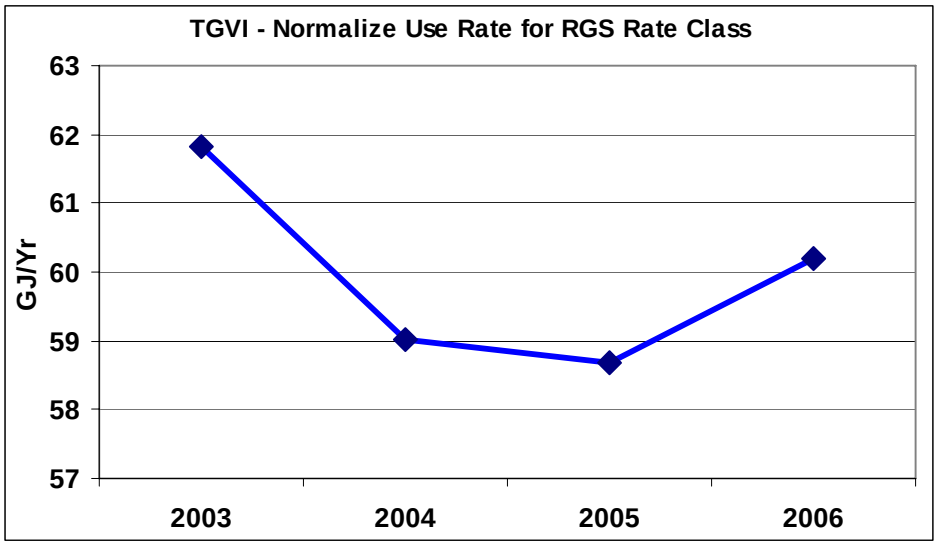
Historic and Forecast Use per Customer (GJ)

	Normal 2003	Normal 2004	Normal 2005[1]	Projected 2006[2]	Forecast 2007
RGS	60.6	57.6	58.7	58.6	57.7
SCS1	66.6	63.5	75.0	71.7	67.0
SCS2	297.0	284.7	313.6	304.4	294.3
LCS1	901.2	884.6	943.2	904.8	906.3
LCS2	2,325.0	2,325.5	2,384.3	2,310.1	2,340.1
AGS	1,247.7	1,406.8	1,338.5	1,384.3	1,391.1
LCS3	15,459.8	16,740.4	16,521.2	17,538.3	17,951.0

Notes

1. Reflects decrease of 1,736 to customer count in 2005.
2. First six months are normalized actuals, second six months are forecasted.

The System Extension & Customer Connection Changes Application is based on more current use rate data. Actual normalized residential use rates for 2006 have since become available and the results for the RGS rate class came in well ahead of the projection from the Update as seen in the graph below.



This increase in residential use rates is believed to be driven by various factors including the addition of new customers with higher use rates but also likely by pre-existing customers increasing their consumption through the addition of new natural gas appliances in the home.

14.2 Please provide the analysis that shows that new customers generally have higher consumption than the average customer of the existing customer base.

Response:

The reference in the Application to increasing annual use rates for was based on analysis that shows that average annual use in 2006 increased from the level experienced in 2005. This change is illustrated in the graph provided in the response to 14.1. While the data needed to complete the type of detailed analysis to determine the reason for this increase is not available, it is believed to be caused by a combination of higher consumption by new customers and existing customers increasing consumption through the addition of new natural gas appliances.

15.0 Reference: TGVI Application for Approval of Forecast Rates and Revenue Requirements 2006 – 2007, VIGJV IR No. 1, VIGJV IR 11.1; 2005TGI and TGVI ROE Review, BCUC IR No. 1, BCUC IR 20.2-20.3

Cost Recovery – Customer Use Rates

"There are a relatively high number of "low use" customers on Vancouver Island. In 2004, 22% of TGVI customers used less than 20GJ annually compared to 2% of TGI customers."

15.1 For TGI and TGVI please provide tables (see example below) and histograms of the frequency distribution of the annual use per customer for 2005 and 2006 using recorded and normalized figures for each of the residential, small commercial, and large commercial customer classes. Please use increments of 10 GJ, covering the entire range of consumption, and use the same scale for each year.

Frequency of TGI Residential Accounts by 2005 Use Rate

Use per Customer (Normalized)	Number of Customers	Number of Customers as a % of Total Customers
<10 GJ		
10 GJ – 19 GJ		
20 GJ -29 GJ		

Response:

The requested histograms and data table are included in Attachment 15.1.

Prior analysis of TGVI data was completed using information from the now retired MAST billing system. Using the MAST system, TGVI determined that 22% of customers used below 20 GJs per year as noted in response to Question 11.2. A closer review of how MAST provided consumption data indicates that the portion of customers consuming less than 20GJs annually is less than 22%. In part this result is because MAST pulled customer consumption data from customers that did not have a twelve month billing history. Therefore consumption volumes in this data includes customers with low consumption but that is not representative of stable full year use.

In March 2006, TGVI switched its billing system to the Energy System. The analysis provided in response to this question used data from the Energy billing system and selected only those customers who had twelve months of billing consumption data. The analysis of this data shows that the portion of TGVI's customers consuming less than 20 GJs per year is decreasing. The percentage for 2005 is 14.8%, which decreasing to 12.4% in 2006. As a comparison, TGI's percentage for 2006 was 3.5%.

As per the 2006 TGVI Annual report the percent of customers under 20 GJ can also be calculated at 10.91% or 11.18% using year end customers or average customers respectively.

10.91% = 8,559 customers below 20 GJ divided by 78,453 year end customers.

11.18% = 8,559 customers below 20 GJ divided by 76,554 average customers in 2006

15.2 For 2006 -2007 TGI and TGVI main extensions how many attachments per year were anticipated to be customers with 20 GJ or less annual consumption?

Response:

For the main extensions listed in Schedule 5, there were no attachments with anticipated consumption less than 20 GJ per year. Attaching such a small load especially in the case where that load was the only attachment on a main extension would result in the customer having to pay a significant contribution. The exception would be in the case of vertical subdivisions – where apartments are individually metered. It would not be unreasonable to have this type of dwelling consume approximately 20 GJ/yr, but the attachment of this type of customer would have been done as part of a larger main extension test which encompassed all of the apartments in a given building. Also, this type of main extension (vertical subdivision), as with other main extensions, would still need to achieve a P.I. of 1.0 or pay a contribution.

16.0 Reference: Exhibit B-1, p. 9

Energy Choice – Appliance Costs

"There are a number of technological changes that have taken place in the past few years that directly affect the market share of natural gas. For example, a requirement that new buildings use high efficiency furnaces will cost customers more than mid efficient appliances. Further, due to the venting requirements of high efficiency furnaces, a high efficient water heater is also required thus further increasing costs. While the Company supports the use of high efficient appliances, this additional cost is creating additional barriers to connect to natural gas. The Company therefore needs to ensure that customers do not pay higher connection fees as a result of pursuing energy efficiency measures."

16.1 How does the installation cost of gas appliances, for single family dwellings, compare to those in 1997?

Response:

Regulations under the Energy Efficiency Act over the last 10 years have added requirements for higher efficiency technology. While stricter regulations have resulted in the phasing out of more inefficient appliances, the capital cost of more efficient appliances and related peripherals is typically higher than less efficient appliances. The change in technology has also resulted in the need for additional training for equipment installers. Training and labour shortages across the province over the last few years has resulted in higher labour costs and subsequently increased the overall cost of the installation of gas appliances..

The table below compares the cost of high efficiency products in 2007 against mid efficient appliances in 1997. Costs for high efficiency furnaces, venting requirements and changes to hot water tank venting have added up to 35% to the gas installation costs over 1997 technology requirements.

	Mid-Efficiency (1997)	High-Efficiency Requirements (2007)	% Increase
Furnace (Averaged Installed Cost)	$ 3,000	$ 4,000	33%
Venting Costs	$ 500	$ 1,500	200%
Ducting Costs	$ 2,000	$ 2,000	
Heating Costs Subtotal	$ 5,500	$ 7,500	
Hot Water Tank (New Requirements - mid-efficient HWT w/ FVIR))	$ 600	$ 750	25%
TOTAL	**$ 6,100**	**$ 8,250**	**35%**

Sources:
Ference Weicker & Company, Process Evaluation of the BC Gas High Efficiency Furnace Program, Nov1997
Willis Energy Services Ltd, Terasen Gas Energy Market Competitive Assessment, July 2007
NRCAN, Canada's Energy Efficiency Regulations, Bulletin – March 2007

By comparison in 2007, electric baseboard installations cost approximately $350 per baseboard. For example, a 2000 sq ft. home with 3 bedrooms, 2 bathrooms, family room, front room, dining room and kitchen would require approximately 10 baseboards @ $350 or $3,500 total. This cost would include breakers, wire, thermostat, baseboard, and installation.

16.2 What does Terasen estimate as the change in installed costs of gas appliances for multiple family dwellings since 1997 due to:

16.2.1 The requirement for high-efficiency furnaces;

Response:

The Government of British Columbia, under its Energy Efficiency Act, implemented a more stringent efficiency standard of 90% Annual Fuel Utilization Efficiency (AFUE) for gas furnaces installed in residential new construction effective January, 2008.

High efficiency furnaces are typically installed in single family homes, and to a limited extent in townhouses and row houses. Condominiums if heated with natural gas would use a central boiler system that would distribute heat to individual suites through radiators or hot water baseboards.

As set out in the response to BCUC IR#1 Question 16.1, the installation cost of a high efficiency furnace in a new townhouse or row house is approximately $4,000. In 1997, the installation of a mid-efficiency furnace was approximately $3000, depending on the quality, model and distributor. Higher efficiency (condensing) technology requires additional equipment and installation requirements including; a drain or a pump to remove condensate and special training courses on how to install and repair high efficiency furnaces.

These costs, plus the additional capital cost of the equipment, have added approximately 33% to the overall cost of high efficient furnace installations, not including venting requirements which are also addressed below. British Columbia's recent construction boom has also led to higher labour costs which also impact the overall installation costs of natural gas appliances.

16.2.2 The associated physical venting costs;

Response:

There are substantial venting costs associated with the installation of high efficiency furnaces. New regulations for condensing furnaces that are to come into effect in January 1, 2008, will have an impact on gas appliance installations as a result of no longer being able to use one vent for both natural gas water heaters and natural gas furnaces.

Condensing furnaces use Type "BH" plastic (PVC) venting and these can not be common vented with other appliances, resulting in each high efficiency appliance requiring its own venting. A common installation will have two plastic vents, one for exhaust and one for combustion air. In 1997, the hot water tank and low efficiency furnace were both "B" (metal) vented together up through the roof. A type "BH" vent through the roof would be comparable in cost to a "B" vent up through the roof as high temperature PVC pipe is similar in cost to metal venting.

If there is a standard efficiency gas hot water tank and a high efficiency furnace, then the hot water tank (HWT) will have conventional "B" vent up through the roof and the furnace will be side wall vented. The requirement for a side wall vent for the high efficiency furnace results in an incremental cost between $500 -$1,000 for additional fire-proofing, labor and materials that was not applicable in 1997.

Another major difference for current installations compared to 1997, is where the furnace is located. High efficient furnaces are now typically located near an outside wall and vented through the side wall, as opposed to being located near the middle of the house and vented up through the main floor and roof. This change in design has affected the design capabilities of the builder as the preference would be to place the furnace in a closet away from an exterior wall so as to not take away valuable outside wall window space.

16.2.3 The requirement for high efficiency water heaters.

Response:

Presently, there are no requirements for high efficiency water heaters in new construction. The major effect on the gas water heater market will be the requirement for condensing furnace technology set to come into effect in 2008 as discussed above. The impact on gas water heaters is due to the increased costs of venting requirements adding 200% in venting costs to a standard installation.

A typical high efficiency gas hot water tank installation costs between $2,000-$3,500 depending on quality of installation and equipment. This compares to an

installed cost of $600-$800 for a standard gas or electric hot water tank. High efficiency hot water tanks are vented in the same manner as high efficiency furnaces.

While high efficiency water heaters are not required, significant change to natural gas water heaters has resulted in new standards and regulations in Canada requiring natural draft vented residential gas water heaters to incorporate special flammable vapour ignition-resistance (FVIR) technology to help prevent the ignition of flammable vapours from outside the water heater.

Ultimately, manufacturers will have to build all residential gas water heaters to the new standard. This will be phased in by size and type of water heater over the next two years to include larger capacity standard, power vented and direct vent water heaters

This FVIR compliant burner now adds approximately $150, or 25 % to the cost of a gas fired hot water tank depending on the manufacturer and size of tank.

17.0 Reference: Exhibit B-1, p. 9

Energy Choice – Developers

"Developers continue to be the decision makers for energy choice and their decisions are often driven by profit for the developer rather than the long term operating costs and benefits for the ultimate customer. Due to the robust housing market, rapid price increases in new housing stock and the reduced price advantage of natural gas, potential buyers are not making the energy choice a priority in their buying decision. They simply want to purchase an affordable property. As such it is in the best economic interest of a developer to install electricity for space and water heating rather than gas, as the developer cannot normally charge more for a new home with gas heating."

17.1 Please explain whether Terasen views the statement that "the developer cannot normally charge more for a new home with gas heating" as simply reflecting the fact that an eventual home-buyer does not have a qualitative preference between heating supplied by natural gas versus that supplied by electricity.

Response:

Customer research conducted for Terasen Gas in 2007, a copy of which is included in Attachment 17.1, suggests that consumers still do have a strong preference for natural gas over alternatives for all heating applications other than clothes drying. However, within the current housing market environment, consumers appear not to be making this preference a critical factor in their purchasing decision. The relative shortage of affordable housing for sale appears to be causing many consumers to ignore heating design during the initial purchase. This appears to be especially true with multi-family dwellings which are forming an increasing share of the overall new housing stock. As such the developer is incented to use the lowest capital cost heating appliances, to maximize their margin income, as they generally can not command a premium for more expensive heating applications. On higher end developments, or as housing price increases slow down, potential home buyers preferences concerning heating sources should appear, and developers might be able to charge slightly more for gas heating designs.

17.2 Does Terasen have information concerning the impact of gas service on property valuation? If so, please provide that information.

Response:

Customer studies conducted for Terasen Gas (refer to Attachment 17.2) have consistently shown a majority consumer preference for natural gas for heat, cooking and fireplaces. This is difficult to translate into property valuation separate from all of the other attributes of a property. However, in a survey of British Columbians conducted in

2004, subjects were asked to evaluate the importance of fuel used to heat the home in their purchasing decision. Of those who responded, less than 20% considered the heating fuel to be extremely important to their decision, though nearly 60% considered it to be very or extremely important. A further demographic breakdown suggested that heat fuel was of less importance to younger buyers compared to those over the age of 45. It also appeared to be more important to new home buyers compared to purchasers of resale properties. Operating costs and energy efficiency were the most cited reasons for placing a high importance on fuel for heating in the purchase decision.

As the costs associated with other critical decision factors (such as overall price, interest rates, and location availability) change over time so does the criticality placed on other factors including heating fuel.

17.3 What proportion of system extension charges are paid by developers--as opposed to those paid by resident-owners?

Response:

Based on the list of main extensions found in Schedule 5, developers paid 93% of the system extension charges with the balance being paid by resident-owners.

17.4 What proportion of total, annual customer connection charges are paid by developers?

Response:

The Companies' records show that approximately half of customer connection charges were paid by developers in 2006. However, this value understates the amount paid by developers as the application for connection is often done in the name of the homeowner if the home under construction is sold by the developer prior to the installation of natural gas service. This is done to avoid administrative work on the part of the developer and avoid account transfer costs on the part of the home owner.

17.5 Has Terasen conducted research to determine the natural gas connection cost at which a developer is indifferent between choosing gas services versus comparable electric services?

17.5.1 If so, please describe the nature of that research.

Response:

The Company has not completed any formal research to determine the natural gas connection cost at which a developer is indifferent between choosing gas or electric service. It should also be recognized that not all developers are the same, and developers who tend to build higher end or luxury units, or who are trying to minimize the environmental impact are more likely to place a higher value on natural gas. However, generally speaking, there are two costs the developer must consider when making a decision whether or not to connect to gas. These costs include the cost to connect to the Terasen Gas system and the capital cost of purchasing and installing appliances (such as furnaces, ducting, baseboards etc.). Since any developer must have electrical service in every building, some cost for connection to the electric grid is a given. However, this cost to connect to the electric grid could potentially be reduced if the load is reduced substantially through the use of alternate fuels such as natural gas. In discussions with developers, the Company understands that the point of economic indifference would occur where the cost of appliances (including installation) is equal between gas and electric, and the cost of connecting natural gas is either zero or equivalent to savings that can be obtained due to reduced requirements from the electric utility.

As noted in the response 16.1 an average heating electrical installation for an average home is approximately $3,500. Average high efficiency natural gas heating system is approximately $7,500. As the Company argued in the 2007 BC Hydro Rate Design proceeding, it believes that a surcharge of $2,000 should be required from customers who wish to use electricity for space heating as this amount represents the potential increase in ducting costs that a customer would incur to install a gas fired forced air system. In addition to this cost, as referenced in 16.1, the customer will also incur greater costs for the appliance as well as venting costs. Therefore the developer could incur up to $4,000 in increased costs to install a high efficient gas fired forced air system compared to an electric base board system. Because the developers must consider the cost of purchase and installation of energy appliances, and because it is more expensive to purchase and install gas appliances, developers would like to see a connection cost of $0.00 for all connections to help move them towards being indifferent between the two energy sources. The Company believes that a reduction in connection cost alone is not enough to persuade developers to use gas over electricity. As such the Company believes that in addition to the changes the Company is proposing with this Application and the changes it proposed with respect to the $2,000 surcharge for new electric space heating customers, other incentives such as furnace rebates etc. that reduce the capital and installation costs of gas appliances are required to make a developer truly economically indifferent to using gas or electric.

17.5.2 What is the gas service connection cost at which Terasen believes developers are indifferent between gas and electrical heating services?

Response:

Please refer to the response to Question 17.5.1.

18.0 Reference: Exhibit B-1, p. 9

The Application Fee

The Application Fee for new customers is intended to recover the administration costs associated with initiating service to a new customer and does not cover any of the capital costs. The current $85 application fee has been in place since prior to 1996. Since that time, the processes have been streamlined and costs to enroll customers into the system have remained relatively stable or have declined. At this time no change to this fee is proposed.

18.1 What is the present estimate of the cost to enrol a new customer?

Response:

Customer enrolment for Terasen Gas customers is a service performed by CustomerWorks LP, as part of the bundled suite of services that it provides. Other parts of this bundled service include billing, meter reading, customer contact (call centre operations) and credit and collections. As the agreement and contract with CustomerWorks LP is for a bundled service, the Company to unable to determine the specific cost to enroll an individual customer. However, as noted in response to 18.3, as enrollment costs are only a portion of the per customer total suite of costs charged to either TGI or TGVI, enrollment costs are less than they were in 1996.

18.2 What is the fee charged by other gas distribution companies in Canada?

Response:

Please refer to the table below:

Utility	Location	Application Fee
Pacific Northern Gas	British Columbia	The Ft. St. John and PNG West service areas have an application fee of $30. The Dawson Creek service area has a fixed charge of $150.
Atco Gas	Alberta	Basic charge of $100.
Altagas	Alberta	$35.
Union Gas	Ontario	It is Union's practice to not charge customers an application fee for new service if they commit to install a natural gas furnace or natural gas-powered appliance that operates as a main heat source (i.e. fireplace). If the customer does not plan to install a furnace but some other natural gas appliance(s), Union will usually run an economic analysis to ensure the gas load covers the cost of the gas service. In the event there is an economic shortfall, the customer requesting the gas service may receive a charge.
Enbridge Gas	Ontario	$25.
Gaz Metro	Quebec	There is no application fee.

18.3 How much does Terasen’s service provider charge for this service?

Response:

As noted in response to Question 18.1, the Company’s service provider provides a suite of services to the Company that cannot be segregated to arrive at the cost to enroll a new customer. For 2007, the TGI pays CustomerWorks $55.36, and TGVI pays CustomerWorks $43.07 per customer per year for the suite of services that include enrollment, billing, customer contact, meter reading and credit and collections.

19.0 Reference: Commission Order No. G-80-96

Customer Connection Charge

In Order No. G -80-96 the Commission recommended that tariffs for connection charges move toward recovery of the full cost of the service connection up to but not including the meter, and include incremental costs such as applicable SI costs. In addition, in developing new connection charges, the Commission recommended that the Utilities come forward with options for connection fees that send an appropriate signal about the net social costs of less efficient energy use.

19.1 Please comment on whether these recommendations are still valid.

Response:

With the publishing of the Energy Plan, the Company believes that "sending appropriate signals about the net social costs of less efficient energy use" is more relevant today than in 1996, specifically Policy Action #4 encourages utilities to explore rate designs that encourage efficiency. The Company believes that the changes to the connection fees and the proposal to include efficiency into the calculations of a main extension will send the appropriate market signals about the net social cost of less efficient energy use and the use of the right fuel.

The energy landscape and housing market has changed dramatically since 1996 and policies that were relevant at that time may not be appropriate in 2007. Due to these changes in the housing market, energy costs and energy options, the recommendations as per Commission Order No. G-80-96 may now have the unintended effect of sending market signals that discourage connection to the utility system. The Company does not believe that a customer be required to pay the full cost of the service connection "up to but not including the meter" via connection charges and contributions. The Company believes that if the customer's payment of rates is sufficient to recover the costs of connection, the customer should not also be required to pay a contribution or the full cost of the service connection..

Currently as noted in the application, there are instances where a customer is required to pay not only a SLIF but also a service line contribution even in cases where the main extension is positive without such a contribution. The Company believes that there is little distinction between a service line and a main extension as both are simply capital costs to attach to the system. For simplicity there is a different methodology to determine the economics of the attachment. However, the Company does not believe that connection charges (SLIF, New Customer Installation Charges and CIAOC) should recover the full cost of the service connection. Rather, the customer should pay for only those costs that by adding the customer, the Company would otherwise not recover in any other way. In the Company's opinion, the SLIF, which is traditionally considered a connection charge, should be eliminated as the mechanisms proposed for both the SLCA and the main extension test, will result in a customer paying a contribution if their attachment is uneconomic. It should not be required that a customer pay additional connection costs if their attachment is economic.

Requiring a customer to pay the full cost of the service connection, in addition to current connection charges such as the SLIF, when attaching the customer to the system would be economically beneficial to all current customers, sends the wrong market signal to potential customers. Rather, potential customers should only pay to attach when it would be otherwise uneconomic to attach the customer.

19.2 Would Terasen agree that an appropriate signal about the net social costs of less efficient energy use is best sent through the Rate Schedule rather than the connection fee?

Response:

No, the Company believes that market signals should be sent through as many different avenues as possible to ensure that the appropriate market reaction occurs. Market signals can be sent through connection charges, rates, and energy efficiency and conservation (including DSM) programs. If the appropriate signal was only sent through the Rate Schedule, customers who have yet to attach to the system and who do not understand rate structures may make a decision to not attach. Often the first contact a customer has with the Company is when a customer calls to request a new service. If the customer was to receive a market signal by way of connection charges they may be more likely to install a high efficient space or water heating system when making a decision to attach to the natural gas system.

This argument is consistent with the Company's final argument submission of the 2007 BC Hydro Rate Design Application (page 35, paragraph 94) where the Company supports a $2000 surcharge for electric heating service to send price signal to customers. Additionally the argument is consistent with the Company's response to BCUC IR 3 of the 2007 BC Hydro Rate Design wherein the Company states that the marginal source of electrical generation is from gas and is therefore a less efficient use of energy than using gas for heating applications. Together these two arguments support the use of price signals regarding efficient use of energy as part of a connection charge.

The Company also believes that customers should also receive market signals through rates and energy efficiency programs as this will further encourage the efficient use of energy.

20.0 Reference: TGI Tariff, p. S-1

Customer Connection Charge – Existing Installation

20.1 In the current TGI Tariff, a $25.00 fee is levied on applications involving existing installations. Does TGI intend to retain that fee as part of the Customer Connection Charges Review, given the proposed fees presented in the application?

Response:

Yes.

20.2 How much revenue has each of TGI and TGVI received from application fees for existing installations, for each of the last three years?

Response:

Total Application Fees

Year	2004	2005	2006
TGI	2,917,525	2,815,975	2,640,400
TGVI	-	-	232,020

Please note that prior to 2006 TGVI did not charge a $25 application fee for customer reconnection with the existing installations.

21.0 Reference: Exhibit B-1, p. 17; TGI Tariff, p. S-1

Customer Connection Charge – Duplex

"The results shown in Tables 4.2 and 4.3, for TGI and TGVI respectively, demonstrate that a maximum allowance of $1,535 dollars would recognize the costs differences and changes in consumption patterns being experienced at each utility."

21.1 The TGI Tariff specifies a Service Line Cost Allowance for duplexes of $1,985.00. Does Terasen intend to change this charge to $1,535, to be consistent with the proposal described above?

Response:

The SLCA for duplexes of $1,985 was approved by BCUC Order No. G-19-99 based on TGI's February 1, 1999 application. The $1,985 was based on two times the $1,100 SLCA less the $215 SLIF. Since a duplex involved attaching two accounts on a single service line the $1,985 was based on allowing twice the net service line investment as for a typical single family installation. For a single family dwelling, the maximum net service line investment was $885 ($1,100 SLCA less $215 SLIF). Thus for a duplex the SLCA of $1,985 less the $215 SLIF implied a maximum net service line investment of $1,770 or 2 x $885.

It was an oversight that updating the SLCA for duplexes was not addressed in the Application. TGI and TGVI propose that the same logic be applied as that approved in the February 1, 1999 Application. If the proposal to eliminate the SLIF is approved, the SLCA for duplexes would become two times $1,535 or $3,070. If the $215 SLIF is not eliminated the SLCA for duplexes would become $3,285.

22.0 Reference: TGI Tariff, p. 10-1

Customer Connection Charge – Large Customer Rates

In the TGI Tariff, the company specifies that it

> "…will perform an economic test for Rate 3 and larger Customers and for any customers connecting to a Service Header including Vertical Subdivisions, and when the Net Present Value of the test is negative, will charge the Customer a contribution sufficient to eliminate the negative NPV. The economic test will be discounted cash flow test, similar to the economic test for Main Extensions set out in Section 12."

22.1 Please confirm that the current application will not affect the connection charges applicable to Rate 3 or larger customers.

Response:

Not confirmed. The current application will affect the connection charges applicable to Rate Schedule 3 or larger customers to the extent that the MX Test and the thresholds proposed are different than those currently in place.

23.0 Reference: Exhibit B-1, p. 9

Energy Choice - Developers

"Developers continue to be the decision makers for energy choice and their decisions are often driven by profit for the developer rather than the long term operating costs and benefits for the ultimate customer."

23.1 In light of the substantial influence of developers on choice of water and space heating, does Terasen expect that a tariff adjustment will be able to overcome the "principal-agent problem," as far as the new construction market is concerned?

Response:

Terasen Gas does not believe that by themselves the adjustments sought through this application will be sufficient to swing the economic decision for all developers in favour of natural gas. It will have a positive impact on those developments where the financial costs of including natural gas are only marginally greater than the potential benefits anticipated. Adoption of the proposals in this application should also help to break communication barriers with some developers who resist the up front charges on principle. The largest impact will likely come through the complete alignment of policies and programs that properly signal the efficient and responsible use of natural gas in heating applications. The overall supply to demand ratio in the housing market and the time consumers take to research before purchasing will also have a significant impact on how knowledgeable and discriminating the ultimate customers become, and their willingness to pay a premium to the developers to purchase homes with superior energy design features.

Additionally, the Company has also proposed, as part of the 2007 BC Hydro Rate Design proceeding that there be a $2000 fee charged to customers wishing to attach to the BC Hydro system if they use electricity for space heating. The Company will be submitting an Energy Efficiency and Conservation application in Q4 of 2007 that will in part influence the use of natural gas high efficiency heating equipment. Please also refer to the response to Question 23.2.

23.2 During 2007, what steps has Terasen taken to encourage developers to choose natural gas over electricity?

Response:

Terasen Gas' approach is to work with developers where possible to influence the heating and ventilation decisions at the design stage. To this end we have sales representatives dedicated to particular developers and the engineering and architectural companies that work with them. These representatives work with the developers and their contractors to provide expertise and advice with respect to energy choices and identify the opportunities and lifestyle advantages associated with natural gas for the various heat related applications.

In 2007 these efforts were aided through some increased flexibility in Terasen Gas' approach. For strata or condo-style multi-family construction, individual unit measurement has been one of the critical hurdles identified by developers. Terasen Gas has been working to minimize the cost of individually metering natural gas by minimizing the floor space required, and placing a bank of meters into a utility closet no bigger than that normally required for electric meters. In 2007, Terasen Gas worked to further reduce the up front capital cost impacts for developers where economically feasible by putting meters in individual cupboards adjacent to the suites.

In 2007, Terasen Gas also applied for and received approval for a pilot program that will allow for natural gas burned in a central boiler for heating a multi-unit complex to be allocated and billed based on measurements through hydronic thermal meters. This provides developers with even greater flexibility.

While working with developers to share knowledge about the consumer advantages associated with natural gas, Terasen Gas has also engaged in what might be considered joint marketing on several occasions. Terasen Gas will provide marketing materials and signs to be used at open houses or in marketing materials to enhance the salability of homes utilizing natural gas. Terasen Gas representatives also participate in open house activities or ground breaking activities for projects that promote the efficient use of natural gas.

Terasen Gas also uses incentive programs combined with program-specific communication campaigns to help inform or persuade the developers to select natural gas. These programs, whenever possible, involve a team approach with funding and support from Terasen, BC Hydro, government agencies, and industry groups. In 2007, Terasen Gas offered builders and developers the opportunity to participate in our Residential New Construction Heating Program (for the Lower Mainland and Interior) and our Think Grand Program (for Vancouver Island) which promoted the efficient use of natural gas by offering an incentive of $500 and $1,000 respectively to builders that installed Energy Star heating systems along with natural gas water heaters. These programs ended March 31 2007, however while they were available, the Ministry of Energy Mines and Petroleum Resources (MEMPR) contributed $250 of the incentive amount for both the Residential New Construction Heating Program and Think Grand, and BC Hydro contributed $250 of the incentive amount for Think Grand. During the life

of the programs, MEMPR also contributed financially to the non-incentive program costs, including the development and production of marketing collateral for both programs, while BC Hydro contributed financially to non-incentive program costs for Think Grand. Terasen Gas also participated in BC Hydro's PowerSmart New Home Program by offering incentives for Builders and Developers to choose Energy Star Furnaces and Boilers combined with natural gas water heaters and incentives for natural gas ranges and dryers. Some of the program collateral developed by BC Hydro contained the following verbiage: "Builders and developers who choose natural gas for projects and developments are eligible for financial incentives. It is important to match the energy source to its best use. Natural gas is ideal for space and water heating."

24.0 Reference: Exhibit B-1, Appendix "C", Tables 78, 79

Energy Choice – Appliance Costs

In the Willis Energy Services Ltd., "Energy Market Competitive Assessment," Tables 78 and 79, respectively, show cost figures for gas water heaters and electric water heaters.

24.1 Assuming the representativeness of the quoted price figures, does Terasen expect that the adoption of the proposed customer charges will mitigate the impact of the cost differentials sufficiently to create a 'level playing field' with the electrical alternative?

Response:

No, the proposed customer charges will help the Company move towards a "level playing field" with the electrical alternative, but changes to the charges alone will not create a level playing field. The Company believes that additional programs such as energy efficiency and conservation programs (including DSM), a change in the housing market, changes to the cost to attach to the electrical system, changes to the rates charged for electricity consumption, and the cost of gas are other factors that will help create a level playing field. The Company sees this application as one step towards creating a level playing field. The Company will be submitting an Energy Efficiency and Conservation Application in the 4th quarter of 2007 which will propose changes to the current Demand Side Management programs. The Company has also been active in the BC Hydro rate design to ensure that the appropriate price signals and rate structures are in place to encourage the right fuel and the right time and the right place. The Company is also continually pursuing marketing activities with developers and customers to encourage the use of gas. Together, these actions should help move gas toward a level playing field.

Please also refer to the response to Question 23.1.

25.0 Reference: Exhibit B-1, p. 2

Customer Care – Implementation

"The overall objective of these proposed changes is to send appropriate signals to new customers when connecting to the natural gas system, while ensuring that they pay their fair share of incremental costs and that there are no undue impacts to existing customers."

25.1 If the Application is approved, the elimination of the SLIF and the increase to the SLCA will reduce the access cost to new customers. What does Terasen anticipate will be the reaction of recently-subscribed customers who, after paying the charges, discover that subsequent applicants will not have to pay?

Response:

It is reasonable to assume that some customers who have recently installed gas to their premise may be unhappy that the connection charges have changed potentially to their disfavor. However, the Company experienced this situation when TGVI switched its connection methodology in 2006. In that case the Company was able to mitigate some impact by communicating to customers as soon as a Commission decision was reached. In addition, the Company developed communication materials and call centre scripting to address the potential problem. As a result there was not a significant amount of dissatisfaction with the change. Further, developers will likely be encouraged by the changes as any future projects will be positively affected.

25.2 What is Terasen's plan for managing potential complaints from those customers?

Response:

Please refer to the response to Question 25.1.

26.0 Reference: Exhibit B-1, p. 27

Energy Choice – Valuation in MX Test

"Increasing the volume amount for high efficient appliances, within the MX test, increases the likelihood that the MX test will be positive. Increasing volume used to derive the SLCA will result in a higher SLCA. Using larger consumption values for high efficient appliances should therefore send more appropriate market signals to customers wanting to use natural gas for space and water heating and help provide a context to educate consumers on the importance of high efficiency appliance use, and again is therefore consistent with the Energy Plan."

26.1 Please explain how Terasen will verify that a customer actually installs high-efficient appliances.

Response:

When a customer calls the Company, or applies by filling out the appropriate form, the Company requests information on the appliances that will be used in the new attachment. The internal process will need to be changed so that the customer will be required to identify the efficiency of the appliance that is to be installed. This formal request is documented and kept on record. The Company is not advocating a verification process for all new customer connections to determine if customers actually install the appliances they committed to installing as part of a connection application. Verification of appliance attachments could be a very time consuming process requiring additional staff at a cost to all customers. The Company does not believe the potential costs to verify appliances are a prudent expenditure for the magnitude of the volume associated with the appliances in question.

26.2 What other ways did Terasen consider for modifying the MX test to incorporate increased efficiency characteristics of the installed appliances?

Response:

The Company investigated the potential of using the avoided cost of electricity as an alternative methodology for determining an efficiency incentive. In the case of space heating, on average the difference in consumption between a mid and a high efficient appliance is approximately 9 GJ (or 2501 Kwh) per year. Based on the future incremental cost of electricity in BC Hydro's 2006 call for power of $0.088/Kwh, the per year credit a customer could receive for use in the main extension test for a high efficient furnace would be $220.09 per year. However, the Company believes that this amount would have too large an impact on the main extension test.

Instead the Company proposed a methodology of applying an efficiency usage credit thereby increasing the volumes used to calculate revenues to send the appropriate market signal to encourage energy conservation and efficient use of resources. In the Companies' proposal, for TGI, the proposed increase in volume for space and water heating amounts to an increase in volume of 8 GJ. Using current TGI rates, this results in increasing the revenues in the main extension test by $22.18 per year. The Company believes that this level of efficiency allowance is appropriate and will not have a material impact on revenue requirements.

26.3 Why is adjustment to the consumption figures deemed the most appropriate method?

Response:

Please refer to the response to Question 26.2.

27.0 Reference: Exhibit B-1, pp. 12, 14; BCUC Utility System Extension Test Guidelines

Cost Recovery – Inflation, Cost Causation

"The 1996 results are summarized in Table 4.1. The cost of a main used in the test was based on TGI's then average cost of $516 per new customer service… The costs of all new service line connections completed in the period from January to September in 1996 resulted in an actual average cost of $659." (Exhibit B-1, p. 12)

"As provided in Schedule 2 of Appendix 3, in 2006 TGI's average direct cost of new main installation per customer service was $620… Schedule 3 in Appendix 3 provides a summary of all 2006 service line costs for Rate 1 and Rate 2 Customers and shows that the average cost per service line prior to the consideration of any contributions was $1,161." (Exhibit B-1, p. 14)

Based on the quoted figures, between 1996 and 2006, there has been some degree of inflation of the average costs for both main extensions and service lines. For main extensions, it appears that the costs have increased at about 1.9%, per year; for service lines, the rate of inflation has been roughly 5.8% per year.

"The Commission recommends that evaluation of system extensions be based on a discounted cash flow evaluation method that includes, to the extent feasible, all incremental costs and benefits associated with a particular system extension over a time period long enough to consider the full impact of the extension. The Commission also recommends that, as a general principle, the costs of system extensions be allocated to those customers who cause them." (BCUC, Utility System Extension Test Guidelines, p. 31)

27.1 Given the apparent rate of cost inflation for service line installations, please explain:

27.1.1 How the proposed scheme is consistent with the above-quoted BCUC SET Guideline, which specifies that the costs of extensions should be allocated to the customers who cause them;

Response:

The manner in which main extension (MX) evaluations are carried out provides reasonable assurance that the costs of system extensions are allocated to the customers that cause them. The MX evaluation for any particular extension includes cost estimates for both the mains and service lines specific to that project. The cost estimating models are updated on a regular basis based on recent actual experience so cost inflation for mains and service lines is captured in those updates. The treatment of cost inflation pertaining to mains and service

lines in the MX evaluation methodology is therefore consistent with referenced BCUC SET Guideline.

27.1.2 How the proposed scheme will protect existing customers from the cost inflation associated with accommodating additional customers.

Response:

As discussed in the previous response an MX evaluation includes cost estimates for both the mains and service lines specific to a particular project. The cost estimating models are updated on a regular basis based on recent actual experience so cost inflation and other trends affecting mains and service lines is captured in those updates.

The cost inflation referenced in the question preamble (i.e.1.9% per year on average for mains and 5.8% per year on average for service lines) has therefore been captured implicitly in the MX evaluations over time. Also, the fact that the aggregated profitability index of the sample of TGI main extensions is 2.30 and the sample of TGVI main extensions is 1.83 (Exhibit B-1, Attachment 3, Schedule 5) suggests that there is reasonable latitude for actual main and service line costs to vary from forecast and still have the new MX customers more than paying for the costs attributable to them.

28.0 Reference: BCUC Utility System Extension Test Guidelines, p. 9

Consistency Between Utilities

Section 3.0 of the BCUC Utility System Extension Test Guidelines specifies that "…consistency within and among Utilities in the analysis of system extensions is desirable in that it reduces the potential for discrimination among current and prospective customers with regard to the availability of and charges for energy service."

28.1 If this application is approved, other BCUC-regulated utilities may apply to amend their system extension tests, proposing changes similar to those by Terasen. If so, would Terasen support BCUC adopting its proposed approach as the new standard for all utility system extension tests in BC? Please explain why or why not.

Response:

The changes Terasen Gas proposes to make to its system extension test are largely limited to changing test inputs. As such, the new system extension test remains consistent with the BCUC SET Guidelines from 1996 and those guidelines remain reasonable.

While it is desirable for utilities to follow a common standard for system extension tests in B.C., this test needs to be sufficiently flexible to accommodate different rate structures, costs, and resources for each utility. This flexibility will allow each utility to better address changes in the competitive landscape, as well as to better support the goals set out in the 2007 BC Energy Plan, especially as they relate to improvements in efficient energy use.

29.0 Reference: Exhibit B-1, p. 29

Revenue and Rate Impacts

"The Companies believe that these changes will be positive for both new and current customers. Current customers will benefit because the system and extension tests and policies will not discourage attachment to the system for customers who consider conservation and efficiency. New customers benefit because they will not be penalized due to the selection of gas for heating or for more efficient appliance and building design."

29.1 What is the expected revenue impact (annualised) of the proposed changes to the system extension and customer connection charges? (Please base the response on actual data from 2006, assuming that the proposed charges had been in effect for all of that year.)

Response:

Hypothetically, using the 2006 data provided in the Application, if the changes proposed had been in effect for all of 2006 the estimated revenue impact would be as follows:

TGI

For TGI the total increase to plant in service would have been $3,475,000 due to the proposed changes to the system extension and customer connection charges. ($2,370,000 from SLIF and $1,105,000 from changes to SLCA). The increase to the 2006 mid year rate base and the revenue requirement would have been $1,737,500 and $121,317, accordingly. Detailed calculations are provided in Table 29.1 below.

TGVI

Under the proposed changes there would have been a $1,175,000 increase to plant in service ($650,000 resulting from eliminating SLIF and $525,000 from change in SLCA.). This would have caused an increase to the 2006 mid year rate base of $587,500 and resulted in an additional $39,049 in revenue requirement. Detailed calculations are provided in Table 29.1.

Please also refer to the response to Question 6.1.

Table 29.1

TGI

Incremental Revenue Requirement

Return on Rate Base	$129,191
Depreciation	0
Tax	(7,873)
Incremental Revenue Requirement	$121,317

Assumptions

Total CIAC Service Line Fees	$ 2,370,000		
SLCA Change	$ 1,105,000		
Tax Rate	33.00%		
CCA Class 1	4.00%		
Capital Structure	Cost	Weighting	
Short-term Debt	4.00%	7.82%	
Long-term Debt	7.07%	57.18%	
Equity	8.80%	35.00%	
		100.00%	

Incremental Rate Base

Plant Additions	$3,475,000
Plant Depreciation	-
Plant Closing	3,475,000
Mid Year Adjustment	(1,737,500)
Mid Year Incremental Rate Base	$1,737,500

Return on Base

Debt Interest	$75,676
Equity Return	53,515
Total	$129,191

CCA

Opening	$0
Additions	3,475,000
CCA @ 1/2 year	(69,500)
Closing	$3,405,500

Tax

Equity Return	$53,515
Add: Depreciation	0
Less: CCA	(69,500)
Return after Tax	(15,985)
Gross up to Before Tax (1-Tax Rate)	(23,858)
Income Tax	($7,873)

TGVI

Incremental Revenue Requirement

Return on Rate Base	$39,628
Depreciation	0
Tax	(579)
Incremental Revenue Requirement	$39,049

Assumptions

Total CIAC Service Line Fees	$650,000	
SLCA Change	$525,000	
Tax Rate	33.00%	
CCA Class 1	4.00%	

Capital Structure	Cost	Weighting
Short-term Debt	4.86%	2.88%
Long-term Debt	4.91%	57.12%
Equity	9.50%	40.00%
		100.00%

Incremental Rate Base

Plant Additions	$1,175,000
Plant Depreciation	-
Plant Closing	1,175,000
Mid Year Adjustment	(587,500)
Mid Year Incremental Rate Base	$587,500

Return on Base

Debt Interest	$17,303
Equity Return	22,325
Total	$39,628

CCA

Opening	$0
Additions	1,175,000
CCA @ 1/2 year	(23,500)
Closing	$1,151,500

Tax

Equity Return	$22,325
Add: Depreciation	0
Less: CCA	(23,500)
Return after Tax	(1,175)
Gross up to Before Tax (1-Tax Rate)	(1,754)
Income Tax	($579)

Please see response to BCUC IR No. 1, Questions 2.5 and 2.6 as well, which bases revenue requirement on 2006 actuals as filed in the 2006 Annual Report versus the responses provided in Questions 29.1 and 29.2 which uses the data set as provided in the Application. The data set and Annual Report numbers differ due to timing differences between fiscal recognition of revenue, and physical completion and data entry of service line information.

29.2 What percentage increase in Terasen's rates would be required (annualised) to recover the reduced connection and extension revenues? (Please base the response on actual data from 2006, assuming that the proposed charges had been in effect for all of that year.)

Response:

Hypothetically, using the 2006 data provided in the Application, if the changes proposed had been in effect for all of 2006 the rate impacts are estimated as follows:

TGI

Given the 2006 total sales volumes of 112,775,000, GJ the revenue requirement increase of $121,317 would have resulted in approximately $0.0001 (0.01 cents) per GJ increase in rates.

TGVI

Under the current rate setting methodology an increase of $39,049 in 2006 revenue requirement would have no impact on TGVI's core market rates, however there would be an increase of approximately $0.003 (0.3cents) per GJ to the allocated unit cost (less than 0.02%) resulting in a reduction to revenue surplus of approximately $40,000 (based on 2006 core market volumes of 11,310,343 GJ).

Please see response to BCUC IR No. 1, Questions 2.5 and 2.6 as well, which bases revenue requirement on 2006 actuals as filed in the 2006 Annual Report versus the responses provided in Questions 29.1 and 29.2 which uses the data set as provided in the Application. The data set and Annual Report numbers differ due to timing differences between fiscal recognition of revenue, and physical completion and data entry of service line information.

30.0 Reference: Exhibit B-1, p. 9

Energy Choice – Valuation as Social Cost

"It is the belief of the Company that in order for BC Hydro to achieve its conservation and electricity self sufficiency goals of the Energy Plan it should not be attaching space or water heating load. The cumulative effect of these changes in the market place is that customers and developers are making sub-optimal decisions both from a cost and a societal perspective (as presented through the BC Government's Energy Plan)."

30.1 Does Terasen have a recommendation as to how to quantify the social cost of an inappropriate choice of energy? If so, how should it be quantified?

Response:

What "social cost" means is particularly subjective, driven by prevailing scientific, economic and political wisdom. The BC Government's Energy Plan sets out a policy direction based upon the provincial government's current perception of each of these factors. That policy direction includes achieving electricity self-sufficiency for the province through conservation and environmentally conscious load additions. If the desired policy or societal objectives are rendered more achievable by one energy choice relative to the alternatives, then that energy choice is appropriate and positive. If not, then the opposite is true. Terasen does not have a recommendation with respect to the issue.

31.0 Reference: Exhibit B-1, pp. 17, 22

Consistency Between Utilities

"Although TGVI and TGI currently have different rate structures and consumption patterns, applying the same SLCA across both service areas would have the benefit of being easier to administer and to explain to customers and developers. From the customer's perspective, it would also provide similar price signals and provide equal opportunity to new customers regardless of location." (Exhibit B-1, p. 17)

"The Companies believe that a consistent approach across both TGI and TGVI would be preferential as it would remove unnecessary complexity from the MX test." (Exhibit B-1, p. 22)

31.1 Since TGI and TGVI serve two distinctly different service areas,

31.1.1 Please list and quantify any common costs shared by the two utilities, for 2006.

Response:

In 2004, the Commission approved the existing Shared Services Management Agreement (Order G-112-04) between TGI and TGVI. The following services are covered under the Agreement: President, Finance & Regulatory, Operation Governance & Human Resources, Gas Supply & Transmission, Business & IT Services, Distribution, and Marketing. Of the total shared services cost of $46.6 million, $5.5 million is allocated to TGVI and $42.1 million is allocated to TGI.

The Company assumes that the intent of this information request is to determine if there are any distribution costs related to the mains extension activities which are shared by the two utilities. There are no other costs shared between TGI and TGVI not covered under the shared services agreement. Costs related to individual main extensions are determined on a case-by-case basis and directly assigned to each customer and thus to each utility.

31.1.2 Please explain why the cost structures of each individual utility should not be directly reflected in the extension and connection charges.

Response:

As approved by Commission Order No. G-126-05 in Section 13 of the TGVI Negotiated Settlement (the "Negotiated Settlement") it states "It is agreed that TGVI will adopt the TGI MX test, with appropriate revisions to the inputs, commencing January 1, 2006." TGVI adopted the TGI test methodology at that

time, adjusting inputs to reflect the different cost structure of TGVI. The current proposal by the Companies continues to take into consideration the differing cost structures of the individual utilities.

As part of the Negotiated Settlement Section 13, it states that "TGVI also proposed to adopt TGI customer connection policies commencing in 2006. This proposal is accepted." TGVI therefore changed the SLCA to match that of TGI which is currently $1,100 for an individual premise, although that does not take into consideration TGVI's individual cost structure.

In this application, the Company believes that both utilities should use the same methodology when it does not lead to greater complication or difficulty. For the purpose of the main extension test, the parameters within the test are specific to each utility. As part of this Application the Company proposes the continuation of the current methodology, updated as appropriate, and including different threshold levels.

The Company believes it is in the interest of both utilities customers to ensure that the test in simple. As such, having a common SLCA will result in less customer confusion than if the SLCA's were different.

31.1.3 Please further explain why it would be beneficial to customers to have identical SLCA for the two utilities? Please include how the adoption of a common SLCA does not result in TGI customers subsidising TGVI customers.

Response:

Please refer to the response to Question 31.1.2. As the two utilities are separate legal and regulatory entities, its not possible for a common SLCA to result in the subsidization of TGVI by TGI. Revenues from rates, CIAOC's, and capital installations are accounted for on a company specific basis and as such there is no cross subsidization.

31.1.4 Please explain why removing "unnecessary complexity" is desirable given that the calculations are internal to the company?

Response:

Please also refer to the responses to Questions 31.1.2 and 31.1.3. From an internal standpoint, reducing complexity is desirable because it will reduce administrative burden and costs and likely result in fewer administrative errors. Further, simple and less complex processes and calculations tend to be more cost effective to implement and manage which in turn benefits customers by reducing administrative costs and subsequently rates.

From an external standpoint, it is desirable to have a simple test and process such that the customer can easily understand the impact on them when deciding to attach to the system. The more complex the process or test the less likely the customer will understand the effect on them and the less likely they will attach to the system.

32.0 Reference: Exhibit B-1, p. 23 and Appendix 3, Schedule 3

Cost Recovery - Customer Contributions

"…the SLIF is an incremental cost to customers to connect to the natural gas system where the MX test would not otherwise require a capital contribution. Elimination of the SLIF would reduce the cost to these customers and still produce positive benefits for existing customers. Elimination of this cost sends the right price signal to these customers."(Exhibit B-1, p. 23)

In Appendix 3, Schedule 3, the actual costs of service line installations for TGI and TGVI are shown as $1,161 and $1,573, respectively. (Exhibit B-1, Appendix 3, Schedule 3)

32.1 Please explain how the elimination of SLIF, which is related to the direct costs associated with building a service line, sends the correct price signal to customers, given the readily-identifiable costs associated with building new service lines.

Response:

When the SLIF was first introduced in 1997, it was intended to ensure that new customers more fully contribute to the cost of installing a service line. Given that most customers requesting the installation of a new service would have their connection still provide an economic benefit if they did not pay the SLIF, the SLIF acts to force new customers to over contribute to the recovery of costs. This over recovery runs counter to the purpose of the SLIF as set out in Commission Order G-104-96 from October 1996. For these customers the SLIF represents an additional cost that they should not be expected to bear. As such it sends an incorrect price signal and becomes a harmful barrier for customers who are determining what the best form of energy use is.

32.2 To what extent will the elimination of SLIF increase the risk of non-economic connections (i.e., stranded assets)? Please state the response in terms of the number of customers out of 100 new services who would be expected not to meet the minimum revenue NPV.

Response:

The MX test takes the effect of low volume attachments into account for new main extensions so the required customer contributions would incorporate any shortfall from the effect of low volumes. The risk of non-economic connections exists only for service installations to an existing main. Some customers will be added that are not economic connections, while others will make a contribution in excess of the minimum requirement. Given that on average new customers connected to the system provide an economic contribution in excess of the minimum required, the number of customers added who are not expected to meet the minimum economic requirements are expected to be small.

33.0 Reference: Exhibit B-1, Appendix 3, Schedule 2

Cost Recovery - Customer Contributions

33.1 Schedule 2 presents the averages of new mains costs per service for each of TGI and TGVI. Please provide a table of average annual delivery margins, by utility and rate class, using actual data from 2006.

Response:

2006 TGI

Rate Class	Revenues (1)	Cost of Gas (2)	Total DM (3)=(1)-(2)	Volumes (4)	DM per GJ (5)=(3)/(4)
Rate1	$ 931,153,590	$ 638,985,714	$ 292,167,876	69,997,080	$ 4.174
Rate2	$ 284,972,627	$ 210,896,858	$ 74,075,769	22,942,367	$ 3.229
Rate3	$ 179,500,556	$ 140,944,205	$ 38,556,351	15,636,508	$ 2.466
Rate4	$ 1,687,058	$ 1,441,893	$ 245,165	179,027	$ 1.369
Rate5	$ 41,200,191	$ 33,603,176	$ 7,597,015	3,831,933	$ 1.983
Rate6	$ 1,626,607	$ 1,159,618	$ 466,990	137,540	$ 3.395
Rate7	$ 522,099	$ 435,190	$ 86,909	50,501	$ 1.721
Rate22	$ 9,784,246	$ -	$ 9,784,246	12,299,644	$ 0.795
Rate23	$ 13,910,584	$ -	$ 13,910,584	5,515,987	$ 2.522
Rate25	$ 23,610,402	$ -	$ 23,610,402	14,043,897	$ 1.681
Rate27	$ 5,982,662	$ -	$ 5,982,662	5,266,658	$ 1.136

Please note that the above data is based on 2006 normalized actuals for TGI. Normalization for weather is carried out on Rates 1, 2, 3 & 23. Fort Nelson is excluded from the above analysis.

2006 TGVI

Rate Class	Revenues (1)	Cost of Gas (2)	Total DM (3)=(1)-(2)	Volumes (4)	DM per GJ (5)=(3)/(4)
RGS	$ 69,625,745	$ 38,286,253	$ 31,339,492	4,544,713	$ 6.90
AGS	$ 11,247,678	$ 9,032,487	$ 2,215,191	1,072,188	$ 2.07
SCS1	$ 5,020,878	$ 2,504,374	$ 2,516,504	297,278	$ 8.47
SCS2	$ 8,373,846	$ 4,643,485	$ 3,730,361	551,198	$ 6.77
LCS1	$ 15,254,600	$ 11,092,123	$ 4,162,477	1,316,674	$ 3.16
LCS2	$ 13,627,602	$ 10,467,895	$ 3,159,707	1,242,576	$ 2.54
LCS3	$ 24,591,025	$ 19,457,940	$ 5,133,085	2,309,726	$ 2.22
HLF	$ 2,485,838	$ 2,296,891	$ 188,947	272,649	$ 0.69
ILF	$ 1,450,747	$ 1,341,333	$ 109,414	159,221	$ 0.69
CRxx	$ 376,627	$ 371,682	$ 4,944	44,120	$ 0.11

Please note that the above data is based on 2006 actuals for TGVI

34.0 Reference: Terasen's Argument in BC Hydro's 2007 Rate Design Application Proceeding

At paragraph 83 of Terasen's Argument in the 2007 Rate Design Application Proceeding, Terasen submits that:

> "BC Hydro's proposed allowance is based on a 20-year estimate of the distribution demand-related revenue to be collected from the customer. However, this revenue consists of two components: revenue collected from the customer to pay for annual distribution O&M expenses and revenue collected to pay for capital expenditures. Each year, BC Hydro incurs costs due to operating and maintaining the distribution system. These costs are paid for through rates. It does not make sense that new customers are provided an allowance, which is above and beyond the revenue collected to pay for capital expenditures. If BC Hydro wants to include all distribution related revenue in the allowance calculation, then the costs should include, not only the capital cost of the extension, but also the projected 20-year annual distribution O&M expenses. The preferable approach is for the allowance to be based only on the revenue collected to pay for capital expenditures, consistent with the SET allowance methodology proposed by EES."

34.1 Please calculate the corresponding investment level for TGI and TGVI using their nominal WACC and the service lives used for depreciation purposes.

Response:

Paragraph 83 of the Terasen Utilities' Argument in the BC Hydro 2007 Rate Design Application (RDA) proceeding was dealing with a flaw in BC Hydro's proposed methodology for distribution system extensions. Making the adjustment to BC Hydro's approach as noted in Paragraph 83 would make it more consistent with approaches commonly employed in the electric industry. The Companies are not aware of this methodology being used in the natural gas industry.

The Companies do not believe that calculation of a corresponding investment level using the BC Hydro proposal in its 2007 RDA proceeding would yield a meaningful result if applied to TGI or TGVI. The BC Hydro system extension proposals were made in the context of its own policies, revenue requirements, rate structures and cost allocation approaches. BC Hydro's system extension proposal was also strongly influenced by its views of how it must treat the Heritage Contract resources under the current and previous BC Energy Plans. There are numerous differences between the Companies' rate design and cost allocation approaches and those of BC Hydro. An example of a significant difference lies in the respective allocations of distribution costs in cost of service analysis. BC Hydro's proposed system extension allowances are based on a 20-year PV of Distribution Demand-Related costs and Distribution costs have been assumed to be 75% demand-related and 25% customer-related. In TGI's most recent cost of service study the demand/customer split of Distribution costs is approximately 33% demand-related / 67% customer-related. A detailed comparison of TGI's and

TGVI's cost of service studies with BC Hydro's cost of service study would need to be made to determine what would constitute a reasonable comparable analysis.

The current and proposed MX tests of TGI and TGVI are fully consistent with the BCUC System Extension Guidelines and involve a detailed economic analysis of each main extension. BC Hydro's proposed system extension approach is commendable in its simplicity but it is not a rigorous economic test as it does not consider all the costs and revenues associated with a particular system extension. If TGI and TGVI were to adopt an approach of the sort proposed by BC Hydro the possibility of attaching uneconomic customers would be increased.

Attachment 5.1

ASSET ACCOUNTING

POLICY & PROCEDURES MANUAL

PREPARED BY:
ASSET ACCOUNTING

EFFECTIVE: 2002

INDEX

INTRODUCTION

1.1 Contents of the Manual

Chapter 1: Introduction

Overview of contents, purpose and audience

Chapter 2: Capitalization Policy

Outlines the minimum capitalization level and policy issues by category

Chapter 3: Capital Expenditures Control

Describes the Approval Levels and the policies related to controlling capital expenditures

Chapter 4: Plant In Service and Retirements

Outlines the policies related to custody, care, transfers and retirements of capital assets

Chapter 5: Depreciation

Describes the depreciation process for various types of assets

Appendices A: Glossary

Important terms and their definitions used in this manual

Appendices B: References

Includes the courses on which these accounting principles are based

1.2 Purpose of the Manual

This manual has been prepared to provide guidelines for accounting and field personnel, and to document accounting standards at Terasen Gas. Use this manual to:

- determine which expenditures can be capitalized and which should be expensed
- learn about capitalization policies related to plant additions, transfers and retirements; including the application of overhead, allowance for funds used during construction and depreciation
- ensure that capitalized expenditures are appropriately authorized, recorded and controlled
- describe the administration in caring for and maintaining custody and control over the Company's capital assets
- identify the accounting classification of gas plant in service, work in progress and other gas plant
- provide a glossary of definitions to specialized the technical capital accounting terms
- follow prescribed procedures to help you with the process of capital expenditure control and to maintain adherence to capitalization policies

1.3 Audience for the Manual

This manual should be read and complied with by all Company personnel who are involved in the construction, acquisition, maintenance, removal and disposal of capital assets.

1.4 Adherence to Regulatory Standards

This manual is filed with the British Columbia Utilities Commission (BCUC) to ensure that our plant capitalization policies are consistent with the Commission's regulatory standards.

1.5 Stand-alone Manual

This is a Stand-alone Manual, but integral to the Company's Administrative Instruction manual, referenced under FIN 350, Finance – Plant Accounting.

CAPITALIZATION POLICY

2.1 Introduction

This chapter covers the capitalization policies related to the capital additions acquired or constructed, defining capital versus maintenance expenditures, the basis of capital costs, and the classification for certain types of capital expenditures.

Matching Costs

Terasen Gas policy is to distribute expenditures as equitably as possible among present and future customers by matching capitalized costs to the accounting period in which associated benefits accrue. This is accomplished in accordance with the Company's depreciation/amortization practices, which are subject to BCUC regulations.

Capitalization

All costs associated with the acquisition and construction of capital assets are capitalized.

Capital Asset

Expenditures are classified as a capital asset following these criteria:

- the expenditure must provide, or contribute, benefits to Terasen Gas for a service life greater than one year
- the expenditure must result in, or contribute toward, acquisition of an economic resource or asset over which Terasen Gas has a legally enforceable claim to a service potential, right or specific benefit. Terasen Gas must also control the asset
- the expenditure must be expected to result in, or contribute toward, a benefit which leads with a reasonable degree of certainty to recover through potential sales of service or products, or which is required to meet safety or governmental regulations
- the expenditure must meet the minimum capitalization level requirements

2.2 Minimum Capitalization Level

Minimum Level

For direct costs incurred in acquiring or constructing the addition or replacement of a PRU which falls into one of the categories, is capitalized if the cost of the PRU exceed the specified limits:

	Jan 1/98 $	97 & prior $
Tools and equipment	1,000	500
Furniture and equipment	1,000	500

Purchased computer software/hardware	1,000	500
Other general plant equipment	1,000	500
In-house developed computer software and/or based on assessment of individual projects	10,000	10,000

Concept of PRUs

The concept of Property Retirement Units (PRUs) is defined in the Company's PRU Catalogue, and repeated in this Manual under Appendices A – Glossary. The PRU Catalogue is an integral part of the Capitalization Policy.

2.3 Capital Versus Maintenance

PRU Additions

The PRU outlines/describes the lowest level of expenditure for capitalization purposes for a unit of property in the asset subledger.

Maintenance

Items smaller than a component outlined/described in the PRU or an item whose acquisition cost is lower than the minimum capitalization level is charged to maintenance.

Expenditure on Existing PRUs

Expenditure on existing PRUs in service are capitalized if the expense results in:

- a replacement of the entire PRU or
- a substantial improvement or betterment of the PRU

Classification of Expenses

Expenditures during ownership of capital assets are classified as:

- maintenance and repairs
- improvements and additions
- rehabilitation/major renewals
- replacements and retirements

these expenditures are defined in further detail below to set them apart and to distinguish the cost as capital or a maintenance charge.

2.3.1 Maintenance and Repairs

Concept

Maintenance costs are expenditures made to keep the asset in good condition (preventive); while repair costs are made to put the asset back into good working condition (curative).

Does not Affect

Maintenance and repair costs are not expected to prolong the normal life of an asset (PRU), or materially add to its service value. As no additional benefits are anticipated, the costs of maintenance and repairs are charged to maintenance in the current accounting period.

2.3.2 Improvements and Additions

Substantial Betterments

Improvements or substantial betterments refer to capital expenditures on existing PRUs which:

- materially add to the service value of the PRU(s); or
- materially extend the normal service life of the PRU(s)

Increase in Service Value

The service value of a PRU may be increased through expansion and extension where there is an increase in the physical size of an asset. For example, a new wing is added to a building or more equipment is added to an existing capital asset.

Increase in Service Life

The normal service life of a PRU is increased through substitution where there is an increase in the quality of an asset. For example, paving a gravel parking lot increases the quality of an existing asset.

Consult Financial Performance Accounting

When in doubt about each case in Section 2.3, consult Asset Accounting to assist you in deciding the appropriate accounting treatment.

Significant cost and long life do not by themselves decide that a replacement cost can be capitalized; e.g. the cost to replace a roof with the same kind of materials is accounted for a maintenance expense.

2.3.3 Rehabilitation/Major Renewals

To Restore

Expenditures to restore or improve buildings or equipment purchased in a rundown condition (e.g. second-hand plant), with the intention of rebuilding, can be charged to capital assets as part of the cost of acquisition, provided that;

- the costs of renewals, which means the costs of material (other than excluding second-hand parts remaining in the rebuilt PRU), plus the cost of labour used in the rebuilding process, exceeds fifty percent (50%) of the replacement cost of a new plant unit of the same kind and class
- the costs of dismantling and/or repairing old parts reused, are excluded and charged to expense

- the rebuilt plant unit (PRU) is accounted for as a capital addition, and the old plant unit PRU is accounted for as retired from service

2.3.4 Replacements and Retirements

Complete PRU

Replacement of a complete PRU:

- the original cost of the old asset (PRU) is retired and the cost of the new item is capitalized

Part of PRU is Maintenance

Replacements of parts and (less than a PRU):

- the costs of replacing parts and components of a PRU is accounted for as maintenance expense. Replacements of parts and components here means to restore the PRU to its original condition, and keep it in efficient operating condition

Extensive Replacement

Extensive replacements of part (less than a PRU) could be considered as capital improvement/substantial betterment.

The cost incurred to replace components or part of a PRU, which according to government or agency regulation creates a health or safety hazard, does not automatically qualify for capitalization. Such projects must meet the 'substantial betterment' criteria on an individual PRU, project/location basis.

In each case, please consult Asset Accounting.

2.4 Basis of Cost

At Cost

Expenditure for capital assets are recorded at the historic cost to Terasen Gas. Cost includes direct expenditures related to the acquisition/construction as well as a proportionate allocation of overhead and, where applicable, allowance for funds used during construction charges.

Construction by Terasen Gas

- If the capital asset is constructed for or by Terasen Gas, the construction costs including labour, material and supplies, contract work, special machine and heavy work equipment service, insurance, damages, privileges, a proportionate allocation for overhead, and where applicable, allowance for funds used during construction.
- When a project necessitates the purchase of PRU equipment items such as office equipment, heavy work equipment, transportation equipment to be used exclusively for the project, the cost of such equipment is, for the

duration of the project, charged to construction, subject to approval by Asset Accounting.

Acquisition from Other Company

Where Terasen Gas purchases capital assets from another company, the difference between the purchase price paid by Terasen Gas and the original cost of the capital asset, less the accumulated depreciation/amortization, must be accounted for as non-utility plant. This is defined under capital code description account G/L 490-780 – "Gas Plant Not in Rate Base", and Section 2.11 of this Chapter.

Surplus-to-Project Material

- When a project is completed, surplus inventory items, considered re-usable, are returned to stores by crediting the project at the prevailing inventory unit cost.
- Non-inventory items that can be identified:
  - for future project use, scheduled to begin with two years are taken into Central Stores by crediting the project at fair market value; or
  - as office, heavy work or transportation equipment which were initially purchased exclusively for project use and now considered re-usable as general plant equipment, are transferred from WIP account to plant-in-service at fair market value, provided it meets the minimum capitalization level. If it is not considered re-usable as general plant equipment, it must be disposed of through re-sale and the proceeds credited to the project.

2.5 Capitalized Overhead

Cost Classification

Costs which cannot be directly identified with individual construction projects are collected by a cost centre and classified as operating /maintenance expense or capitalized overhead.

Allocation Predetermined

Overhead will be capitalized on the basis of predetermined rates established by Finance and reviewed annually, to ensure that the apportionment of Operating and Maintenance expense to capitalized overhead is reasonable and consistent.

Capitalization rates will be calculated annually by Finance, based initially on budgeted costs with revision at year end, to actual costs where the change is considered to be material.

Certain administrative/common costs are capitalized at fixed maximum rates, which do not vary with construction levels and will not be recalculated annually.

Distributed to Plant

The resultant overheads capitalized are charged monthly to account 10098 (Overhead Charged to Construction).

Quarterly/Annual Review

On a quarterly basis, actual costs are substituted in the calculation of capitalization rates to monitor the impact of actual construction activity.

At the end of the year, if there are substantial changes from budget in construction activity, which results in a significant change in overheads capitalized, the actual rates as calculated are used to recalculate the overheads capitalized. Account 10098 will be adjusted accordingly.

Plant Not Applicable

Overhead is NOT applied to:

- removal/dismantling costs
- corporate capital additions

2.6 Allowance for Funds Used During Construction (AFUDC)

Policy

AFUDC is capitalized on projects under construction whose costs are greater than $50,000 each and which are expected to take three (3) or more months to construct. AFUDC is the cost of capital that is the cost of borrowed funds and a reasonable rate on other funds such as equity, used for the purpose of construction.

Rate Determined

The AFUDC rate is the return on rate base for Terasen Gas as approved by BCUC.

AFUDC Applied

AFUDC is applied to both specific and certain recurring plant expenditures based on previous month-to-date total direct and overhead costs, less contributions in aid of construction received, if any.

AFUDC Begins

AFUDC will commence on the date the project is approved for and ends when the project is placed into service. One-half the rate is applied to eligible projects which start/completed up to the 15th of the month, and the full rate thereafter.

Preliminary Charges

Related preliminary engineering and/or research and development expenditures, accumulated to date of construction are eligible for AFUDC from date of construction.

Adjustment

AFUDC applied to specific projects, may be subject to recalculation or reversal, if the AFUDC criteria is not met or the AFUDC rate is adjusted.

AFUDC Not Applied

AFUDC is not applied on expenditures in the following capital asset classifications:

- capital assets in service
- capital assets held for future use
- capital assets held for resale
- research, development and preliminary engineering
- deferred projects
- projects with budgeted costs less than $50,000
- projects which are expected to be completed in less than three (3) months

2.7 Contribution In Aid of Construction

Source of

Consists of contributions or grants in cash, service or property from governments or government agencies, corporations, individuals and others for contributions in aid of construction and other purposes.

Refundable Contribution

Customers' Advance for Construction, G/L Account 25501 is reviewed at least annually by Finance, and any balance remaining by customer according to agreement or rule, shall be reclassified to contribution in aid of construction.

Accounted for

The gross costs of the capital asset constructed is charged to the appropriate Gas Plant in Service account with a contra 21101 account to offset, the contribution in aid of construction.

From Billable Work

Recoverable costs, from billable work capitalized as capital additions, are accounted for as a contribution in aid of construction.

2.8 Classification of Capital Expenditures

Reason for

Certain types of expenditures warrants explanations in respect of capitalization policy, because of their function purpose and unique characteristics they are:

- computer software
- land
- leased property
- leasehold improvements
- pipeline – relocations and replacements
- preliminary project development costs
- spare parts
- training, displays and documentation materials
- intangible plant
- NGV facilities
- gas plant held for future use
- gas plant not in rate base
- deferred projects
- abandoned projects
- property taxes

Each of these are described below.

2.8.1 Computer Software

Purchased

Purchased computer software is capitalized according to the minimum capitalization level; See Capitalization Policy, Minimum Capitalization Level, Section 2.2.

In-House

The cost of in-house developed software will be considered for capitalization in accordance with the Capitalization Policy, Minimum Capitalization Level, Section 2.2.

- or based on an assessment of the individual project, it will include the cost of designing programs and implementing the system

Note: 1. Implementation costs will normally include acceptance testing and the development of training materials.

2. Additionally, data conversion and user training costs will also be included as an implementation cost in developing major systems which significantly impact the company's operating and/or business practices and procedures, e.g. projects such as IBIS (SAP).

Enhancements

Subsequent enhancements are capitalized if:

- it meets the Improvement and Additions Criteria referred to under Section 2.3.2, and
- it meets the same minimum capitalization level set for in-house developed software

2.8.2 Land

Temporary Accounts

The cost of land is capitalized to plant and classified in one of the following accounts until it is placed in service:

- gas plant held for future use – when purchased with no immediate use
- work-in-progress – when purchased directly for, or transferred in from gas plant held

Cost Excluded

The costs of clearing, grading, leveling and surveying both before and after the construction are to be included in the cost of constructing the plant facilities and, therefore, are not to be included in the cost of the land.

Not-In-Service, Resale

Land that is not-in-service or removed from in-service for resale, is classified as Gas Plant Not In Rate Base; until sold.

2.8.3 Leased Property

Capitalization Criteria

Leases are capitalized if the terms of the lease transfer substantially all of the benefits and risks of ownership related to the property from the lessor to Terasen Gas (lessee). There are no restrictions on the term of capitalized leases.

Transfer of Ownership

Ownership passes to Terasen Gas at the inception of the lease provided one or more of the following conditions are present:

Time of Transfer

- the terms of the lease provide that ownership of the leased property passes to Terasen Gas by the end of the lease term, or the lease provides for a bargain purchase option minimum $500 per PRU

Receive Economic Benefits

- the lease term is of such a duration that Terasen Gas will receive substantially all the economic benefits expected to be derived from the use of the leased property over its useful life (when lease term exceeds 75% of useful life)

Returns Assured

- the lessor would be assured of recovering the investment in the leased property and of earning a return on the investment as a result of the lease agreement

Leases Less Than $10,000

- for leases with payments over the term totaling less than $10,000 and where the asset is acquired at the end of the agreement or on buyout, the asset is recorded at the time of transfer of title to Terasen Gas

Financial Information System (FIS) Lease,
Vehicle Lease Agreement (VLA)

- in compliance with BCUC's Decision, August 5, 1992, these leases are not regarded as capital leases; and for "Legal" Balance Sheet purposes are recorded in Plant not in Rate Base by recording the net changes in the value of the leases between capital assets, accumulated depreciation, and the lease liability accounts
- for financial and budget purposes, the leases are accounted for in the O&M accounts
- costs incurred to enhance the FIS are capitalized in rate base, subject to the criteria referred to under Section 2.8.1

Proper Documentation

In all cases, documentation to substantiate ownership must be prepared and copies to Asset Accounting when ownership passes to Terasen Gas.

2.8.4 Leasehold Improvements

Criteria

A leasehold improvement exists when Terasen Gas leases property and incurs costs to make the property suitable for its use; e.g. offices, warehouses.

Capitalized When

Leasehold improvements are capitalized to the extent that:

- they exceed the owner's allowance by $500; and
- they provide benefits to Terasen Gas; and
- the term of the lease is in excess of 12 months

Types of Expenditures

Leasehold improvements

- office renovations to walls, floors and ceilings
- items permanently affixed to the structure
- non-salvageable, e.g. communication cables

Amortized

Leasehold improvements are amortized over the life of the lease and retired from plant in service when the facility is vacated.

2.8.5 Pipeline Relocations and Replacements

Pipe Relocations

Where a transmission or distribution pipeline of 20 or more continuous meters (65 feet) in length is relocated, that section changed is considered capital. The new line is a capital addition and charged to the appropriate capital asset. Where such a relocation results from action by a governmental authority, it will be accounted for in a similar manner.

Pipe Replacements

Where a transmission or distribution pipeline of 20 or more continuous meters (65 feet) in length is replaced for any reason, the original cost of the section removed is treated as a retirement and the total cost of opening and back filling the trench, as well as the installed cost of the new pipe is capitalized.

Pipe Removed

A retirement entry is to be made for pipeline removed and/or abandoned due to a relocation or replacement. The costs of removing the retired pipe from the trench are accounted for as removal/dismantling costs.

Service Line Pipe

The costs of extending or shortening an existing service line is defined as an alteration and therefore capitalized. No retirement entry is made until the entire service line is removed or abandoned. Note however, that changes in as-built length must be updated accordingly.

Reconditioning

The costs of reconditioning pipeline not removed are charged to maintenance.

2.8.6 Preliminary Project Development Costs

Definition and Purpose

Includes expenditures for preliminary surveys, plans, investigation, etc., made for the purpose of determining the feasibility of specific plant projects for gas services. These costs are to be specifically identified in the budget.

Significant Amounts

Preliminary project development costs in excess of $25,000 per project, will initially be charged to a specific Internal Order, approved in accordance

with the appropriate authorization level. Each preliminary project is valid for 12 months from the date the Internal Order is issued.

Deferred Charges

Such costs will be deferred as Preliminary Survey and Investigation Charges (G/L 17210) where the results of the study determines that:

- technical feasibility is established
- future benefit is reasonably assured

These expenditures will remain in G/L 17210 until management approval to proceed or not is established.

Capitalization Determined

Once approval is granted to proceed with construction, the related preliminary charges accumulated in G/L 17210 will form part of the total CAR costs.

Expensed

A preliminary engineering project

- costing less than $25,000 is charged to current operations
- in excess to $25,000 for which no decision or result is obtained AFTER the allowable 12 months has expired, and for which no further costs will be incurred, the project will be reviewed by the Executive VP, Finance, who will determine the appropriate action to be taken

2.8.7 Spare Parts

Charged to Maintenance

Terasen Gas maintains an inventory of spare parts for its gas utility system. Spare parts generally are items comprised of less than a PRU and are, therefore, charged to inventory when purchased and expensed to maintenance when issued.

Types of Parts

Some spare parts, however constitute Retirement PRUs such as:

- spare modules for gas meters
- spare telemetry circuit boards

and are capitalized upon purchase and depreciated over the same estimated service life as the PRU to which they are related.

Asset Accounting will determine whether a spare part constitutes a PRU. Requests should be addressed to Financial Performance Accounting before purchasing the item.

2.8.8 Training, Display and Documentation Materials

Expensed

In compliance with the BCUC Decision of August 5, 1992, the costs incurred in acquiring or constructing Training, Display and Documentation Materials are expensed as incurred.

2.8.9 NGV Facilities

Currently the installed cost of NGV facilities are classified in three (3) categories:
- NGV Compressor Station G/L
- Vehicle Refuelling Appliance (VRA) G/L
- Cylinders' Leased G/L

NGV Compressor Station

Includes the packaged NGV fuel system installed at gas service stations for public use and, those installed in industrial sales customer's premises either for their own as well as public use.

Vehicle Refuelling Appliance (VRA)

Includes the cost of a VRA home compressor and its installation from downstream the second meter set. For depreciation purposes the cost of the appliance and the installation must be reported separately.

Cylinders Leased

Includes the installed cost of cylinders leased to customers. This lease program was discontinued at December 31, 1991 and substituted by the NGV Customer Support Program in 1992.

Existing Customers are obligated to meet the 18-month lease agreement. Thereafter, it is their choice to either request a pay-out or return the cylinders to Terasen Gas. The cylinders are salvaged to inventory at market value for resale purposes.

The cost of refurbishing the cylinder is chargeable to the removal/dismantling Work Order, and the cost of reinspecting, testing and sealing is an ongoing O&M expense.

2.9 Intangible Assets

Non-Physical

Expenditure which results in the acquisition of intangible (non-physical) assets, are capitalized provided that:

Provision

- the privileges obtained runs in perpetuity or for a specified term of more than one year; or

- the expenditure is necessary or valuable in the operation of the company and
- the expenditure are in excess of $10,000

Type of Expenditures

Types of tangible asset expenditures are:

- franchises and consents paid to governmental authorities
- patents, licenses, rights and privileges

2.10 Gas Plant Held for Future Use

How to Maintain

The costs of acquiring or constructing plant items for future use are capitalized and classified as Gas Plant Held for Future Use. This account should be maintained in such detail as though the plant were in service.

Qualification Criteria

In order to qualify as Gas Plant Held for Future Use, the plant item must be:

- a physical asset, at a minimum of $500 each
- not in-service or part of unfinished construction
- intended for a specific potential use within 20 years

Held for Resale

If the project is terminated and no other future use is planned, the physical plant items are held for resale at the lower of cost or market value and the gain or loss included in the other income accounts.

2.11 Gas Plant Not in Rate Base

Established By Regulation

Terasen Gas may acquire or construct plant items which are useful and beneficial to the company, but, according to BCUC regulations, are not to be included in the rate base. Such costs are capitalized but classified as Gas Plan NOT in Rate Base.

Detailed Records

Terasen Gas will maintain subsidiary records in which Gas Plant Not in Rate Base is subdivided according to the plant facility to which it applied and to each group of plant accounts.

Type of Expenditures

Gas Plant Not in Rate Base may include the following Capital expenditures:

- BCUC disallowances on cost capitalized in prior years
- corporate art
- premium costs paid on acquisition of other gas utilities, whose plant costs are to be involved in rate base

Disposition

The disposition of Gas Plant Not in Rate Base is reflected on the Income Statement as other income or other income deductions. Refer to Chapter 4, Gas Plant In Service, Section 4.4.3, for policy on premium cost retirements.

2.12 Deferred Projects

Criteria

A project is deferred if the scheduled in-service or turn-on date has been delayed by management decisions and the work is halted for more than one year.

Write-Offs

Appropriate write-offs may be made at the time of the deferral and in subsequent reviews where:

- specific obsolescence of some costs is identified; or
- changes in technology or environmental considerations may progressively diminish the usefulness and degree of certainty of recovery

Treatment of Assets Retained

Assets retained at the site may have to be mothballed. Costs of mothballing and maintenance costs during the deferral period as well as demothballing costs are all charged against operations when incurred, since no betterment of the asset has occurred.

AFUDC

Allowance for Funds Used During Construction is discontinued if a project has been deferred. AFUDC continues to be charged to a project if:

- it has been delayed less than 2 years; and
- work has not been physically stopped for more than one year but just been "slowed down" or "stretched out"

Unfinished Construction

Deferred projects will be included in unfinished construction for statement purposes unless significant enough to warrant separate disclosure.

Reactivated

A deferred project will be reclassified as an active project when:

- construction activity resumes; or
- management commitment to proceed with the project is reinstated and engineering work resumes; and provided that,
- a re-evaluation of the estimated project costs is made, and if necessary, a revised CAR is processed

2.13 Abandoned Projects

Written-Off

A capital project is considered abandoned when it is decided never to reactivate it again. The costs incurred to date, exclusive of AFUDC and physical assets remaining, are written-off as charges to operations, or if significant, to other income deductions.

Accounting For Physical Assets

Physical assets relating to abandoned projects are either:

- disposed of by resale
- returned to inventory
- transferred to other projects at market value, except where no market value exists in which case original costs will be used; or
- written-off if they have no alternative use or market value

2.14 Property Taxes

Paid on Assets

Terasen Gas pays property taxes, grants or percentage amount in lieu of general taxes on its assessable capital assets while they are in-service or held for future use.

Capitalized When

Taxes on capital assets under construction or on capital assets that are not yet ready for service are capitalized and charged to the appropriate work order or capital account.

Reporting Quantity Data

Operations managers will be responsible to report as required the quantive data by capital district for Recurring Plant to Financial Performance Accounting. This data is used to compute the assessable capital assets for property tax purposes.

Reporting Capital Data

Financial Performance Accounting is responsible to accumulate and report capital additions and retirements of assessable capital assets to the Taxation department.

CAPITAL EXPENDITURE CONTROL

3.1 Introduction

This chapter covers the policies related to controlling capital expenditures during the capital acquisition or construction stage.

3.2 Authorization Of Capital Expenditures

Specific Approval Levels

Terasen Gas has established specific authority levels for approving Capital and Operating Expenditures as defined in the Company's Policies and Procedures Manual, under Administrative Instruction, Section ADMIN450.

Budgeted vs. Non-Budgeted Items

These levels cover both budgeted and non-budgeted items. Approval authority for budgeted items may be delegated to immediate subordinates. Delegation is not allowed for non-budgeted items.

Types of Cost Monitoring Objects

The following types of objects are used to ensure that Capital expenditures are controlled:

- Internal Orders (I/O)
- Projects and Work Breakdown Structures (WBS)

Recurring and Specific Plant

The use of these objects warrants explanation with respect to the Capitalization Policy, because the capitalization of costs are classified between Recurring and Specific Plant; and variation in level of control is recognized. See Exhibits 3.2A and 3.2B (filed at the end of Chapter 3) which graphically portray the functional relationship of controlling capital expenditures between Recurring and Specific Plant.

Field Operations Responsibility

Recurring Plant expenditures as defined in the appendices, are budgeted for and monitored by Operations.

3.3 Internal Orders (I/O)

Definition

Internal Orders are temporary cost objects used to track one-time events or recurring programs.

Types of Capital Internal Orders

- WMS jobs

- Capital purchases
- Capital for small project work (< $50,000)(non-AFUDC)

Internal Order Creation

It is the responsibility of each operating department to create internal orders to capture and monitor costs. Costs can be planned in the internal order for comparison between actual and plan. It is important that all mandatory field are completed accurately and detailed descriptions are maintained so proper settlement rules can be completed.

Settlement Rule

The settlement rule specifies which asset will receive the costs collected in the internal order. Once the asset receives the costs when the asset is in service. Financial Performance Accounting will enter settlement rules in the orders based on the information entered in the master data of the internal order record.

Internal Order Status

There are four different statuses for an internal order, each allows for different processes to occur. In the created status planning and settlement rule maintenance is allowed. In the released status additional planning, settlement rule maintenance, actual cost posting and settlement to AUC is allowed. When the status is changed to technically complete (TECO) settlement rule maintenance, actual cost posting and final settlement is allowed. The order status is moved to close when all costs are processed and costs are moved to the final asset.

Work Management System (WMS)

The WMS is a separate computerized system designed to measure the performance of construction and maintenance work. Currently WMS is used for all work activity pertaining to recurring plant. WMS is interfaced with SAP for the creation of internal orders, posting of

Additional Information

For additional information regarding the use of internal orders, please refer to the Budget Guidelines.

3.4 Projects and Work Breakdown Structures (WBS)

Definition

Projects and WBS Elements are temporary cost objects used to track one-time events or specific programs.

Project and WBS Creation

It is the responsibility of each project manager to create project definitions and WBS elements to capture and monitor costs. Costs can be

planned in the WBS element for comparison between actual and plan. It is important that all mandatory field are completed accurately and detailed descriptions are maintained so proper settlement rules can be completed.

Settlement Rule

The settlement rule specifies which asset will receive the costs collected in the WBS element. Once the asset receives the costs when the asset is in service. Financial Performance Accounting will enter settlement rules in the project based on the information entered in the master data of the project record.

Project and WBS Status

There are four different statuses for a project or WBS element, each allows for different processes to occur. In the created status planning and settlement rule maintenance is allowed. In the released status additional planning, settlement rule maintenance, actual cost posting and settlement to AUC is allowed. When the status is changed to technically complete (TECO) settlement rule maintenance, actual cost posting and final settlement is allowed. The order status is moved to close when all costs are processed and costs are moved to the final asset.

Additional Information

For additional information regarding the use of internal orders, please refer to the Budget Guidelines.

PLANT IN SERVICE & RETIREMENT

4.1 Introduction

This chapter covers the policies related to custody, care, transfers, removal and or abandoning, and final disposal of capital assets within/from gas plant in service.

4.2 Capital Assets: Care, Custody and Control

Manager Responsible For

As part of their responsibility for the utilization, care and safekeeping of Terasen Gas capital assets under their control, managers shall ensure that:

- all transfers, removals from service are fully reported to them
- adequate internal controls are maintained
- all status change documents are forwarded to Asset Accounting

Accountable For

Managers are also accountable for:

- physical verification of asset against Asset Accounting records
- periodically re-evaluating the cost of retaining them

Asset Accounting Responsibility

Asset Accounting shall ensure that the accounting records correctly report additions, transfers, retirement, and changes of status, based on the information provided by the responsible managers.

General Ledger Capital Accounts

Accounts are setup on the Code of Accounts Manual, Section 4, "Capital" and 4.1, "Capital Code Descriptions" to capture the current year's capital additions, retirements, related removal costs and salvage proceeds. These accounts correspond to the BCUC chart of accounts and are cleared annually to the GL100 and GL105 control accounts. See Exhibit 4.2, "Capital Account Structure" located at the end of this chapter.

Subsidiary Plant Records

These accounts are the secondary segment of the GMS code block structure and are designed to classify the gas plant in service assets acquired or constructed and physically placed into service. These sub-accounts are primarily maintained by Asset Accounting and serve as subsidiary records to the GL100 and GL105 accounts.

PRU Catalogue

Asset Accounting maintains an inventory record of capital assets by Property Retirement Units (PRUs), as defined in the Property Retirement Unit Catalogue. The PRU Catalogue is an integral part of the Capitalization

Policy. A PRU defines the lowest level of expenditure for capitalization and control.

Primary Sources

The primary sources of data for an accurate record of capital assets are, Fixed Asset Transfer (FAT) and Plant Retirement Requests (PRRs) documents. Each of these are discussed below.

4.3 Fixed Asset Transfers (FAT)

Change in Custody Only

Transfer of capital assets is confined to movements and changes in custody of one or more PRUs, which will continue to be used for the original or equivalent purpose.

Applies to

- General Plant or "portable type" PRUs when such units are physically transferred to another plant facility location in a different Capital District or Region
- Plant under construction (WIP), where existing PRUs are removed from one plant facility location and immediately re-installed, subject to cleaning or refurbishing, at a new project site under construction

Original Cost and Depreciation

The original cost, estimated if not known, of the PRU and, where applicable, the accumulated depreciation value is transferred. The accumulated depreciation applies where the transfer affects divisional boundaries.

Temporary Record of Movements

For PRU items such as tools/instruments borrowed or loaned out to other cost centres for a continuous period, exceeding 3 months, a temporary transfer (FAT) document is prepared. One for the issue and another one for the Return. On both forms show in bold letters "Temporary Transfer".

Asset Transfer Document

The Asset Transfer form is prepared by the sending Cost Centre at the time the PRU is transferred, and must show the complete PRU description, make/type, serial number, year of acquisition, present and new locations, appropriate approvals and acknowledgement by the receiving cost centre.

4.4 Retirements

Service Value

The service value or, where applicable, a reasonable estimate, is credited to the appropriate capital account with the offset entry to the accumulated depreciation account, for the PRU retired.

Items Less Than a PRU

- When plant, comprising less than a PRU, is removed and not replaced or improved upon in accordance with Section 2.3.2 "Improvements and Additions", no retirement entry will be made to the capital accounts at that time. It's value will be retired upon the retirement of the PRU with which it is associated (e.g. pipe fitting to a section of line pipe, or pipeline less than 20 meters of continuous length)
- A retirement will be made where the PRU is rebuilt in excess of 50% of the replacement cost of a new plant unit of the same kind and class, see Section 2.3.3 "Rehabilitation/Major Renewals"

4.4.1 Specific Plant Retirement

Specific plant retirement occurs when:

Occurrences

- a complete PRU is physically removed or abandoned from plant in service
- an existing PRU is replaced
- improvements, substantial betterments, rehabilitations or major renewals are made to an existing PRUs concurrently with partial removal or abandonments to these PRUs. See Chapter 2, Sections 2.3.2 and 2.3.3

Documentation

- To maintain efficiency in processing documents on asset retirements/disposals, a separate form is used appropriate to the type of asset retirement. Refer to the Procedure Section of this manual.
- In the absence of specific retirement/disposal procedures, a Plant Retirement Request (PRR) is to be used.

GWO

A General Work Order (GWO) for each Specific Plant project is used to capture the cost of dismantling/removing and to capture salvage materials, if any.

4.4.2 Recurring Plant Retirement

Recurring plant retirement occurs when:

Occurrences

Mains (47500)	a continuous length of 20 meters or more is removed or abandoned;
Services (47300)	a service line is deactivated to a stub service or, a complete service line is removed or abandoned;

Meter Sets (47810) a residential or commercial meter set is removed due to discontinuance of gas, increase or decrease loads between classes

BWO

Blanket Work Orders (BWOs) are used to capture the cost of dismantling, removing or abandoning Recurring Plant, and to record salvage/proceeds. Where such costs exceeds $5,000 for mains and $10,000 for all other jobs, a GWO is used per job.

Quantity Reporting

No Plant Retirement (PRR) is required to retire Recurring Plant. In its place, monthly plant unit reports for mains and services retired are generated by Work Management System (WMS). For meter sets, monthly reports are prepared by field accounting.

4.4.3 Retirement Accounting

By Financial Performance Accounting

Financial Performance Accounting Department makes all retirement accounting entries.

Unit Cost Tables

Retirement Unit Cost tables are computed annually for Recurring Plant, and used to establish retirement values based on quantity supplied by operations.

Original costs, estimate if not known, are used to retire Specific Plant PRUs.

Premium Cost Coastal

Retirement of Coastal PRUs included in the 1988 acquisition utility plant values (Rate Base) will require an additional retirement equivalent to the premium, taxes, capital losses and acquisition costs associated with such plant. Financial Performance Accounting will generate these entries.

4.4.4 Extra Ordinary Retirements

Causes Not Anticipated

Extra ordinary retirements result from causes not reasonable assumed to have been anticipated or contemplated in prior depreciation/amortization provisions.

Types of

Such causes include:

- unusual casualties (fire, storm, flood, etc.)
- sudden and complete obsolescence

- unexpected and permanent shutdown of an entire operating assembly or plant

Substantial Losses

These types of retirements may result in substantial losses which may unduly deplete the accumulated depreciation accounts. Therefore, Financial Performance Accounting should be consulted to assess the accounting entry in such cases. Significant losses, therefore, may be charged to income at the discretion of the V.P. Corporate Controller.

4.5 Removal Dismantling Costs

Associated With Retirements

Removal or dismantling costs are associated with asset retirements. It includes labour, material, contract services and other direct expenditures related to demolishing, dismantling, tearing down or otherwise removing PRUs from plant in service.

Refurbishing Costs

Costs incurred to refurbish "used" inventory or non-inventory materials recovered from gas plant in service is chargeable to the removal/dismantling project to which it relates; unless the refurbishment results in a rebuilt plant unit refer to Section 2.3.3 of this Manual.

Overhead

Overhead is NOT applied to removal/dismantling costs. Such costs are not considered significantly large in contrast to capital additions.

Charged To Work Orders

The cost incurred to remove or dismantle Recurring Plant will be charged to the appropriate blanket work order (BWO), whereas for Specific Plant, the removal/dismantling costs is charged to a general work order (WO) for each retirement project.

4.6 Salvage/Proceeds Values

Credited to Work Order

Salvage or proceeds is the value of material recovered from capital retired and is credited to a blanket work order (BWO) for Recurring Plant, and a general work order (GWO) for Specific Plant.

Types of Salvage

Salvage value can be realized through:

- disposal by sale – salvage value is equal to the selling price

- recovery of large items to stock – reusable materials consisting of large individual items, usually a PRU, are salvaged at its original costs, estimated if not known
- recovery of small items to stock – reusable material consisting of relative small items, usually pipe fittings, is salvaged to stock at the prevailing inventory unit cost

Repair To Salvage Items

The cost incurred for repairing or refurbishing salvage items to its reusable condition, is part of the removal and dismantling process of asset retirement. When such repairs are done concurrent with the dismantling process, it can be charged to the appropriate dismantling/removal work order; otherwise, a new work order must be raised.

Insurance Claims

The value of insurance claim settlements received should be accounted for as follows:

- Property Retirement Unit (PRU) – as a salvage credit to the retirement of the PRU
- Non-Capital – the insurance proceeds will be credited to the account(s) chargeable with the expenditure necessary to restore the damaged plant

4.7 Gains and Losses on Disposal

Depreciable Assets

Generally, no gain or loss is realized when depreciable capital assets are retired or disposed of. Salvage proceeds realized whether through resale or recovery to inventory is credited to the accumulated depreciation reserve. For buildings, however, BCUC has ruled to record the gain or loss to a deferred account and amortize it over five (5) years.

Non-Depreciable Assets

When non-depreciable capital assets are disposed of, the gain or loss realized is accounted for under the appropriate income/expense accounts. For Land, however, BCUC has ruled to record the gain or loss to a deferred account and amortize it over five (5) years.

4.8 Inactive Plant

Classification

Assets retained but not longer considered actively engaged in gas utility operations are classified as Inactive Plant, and should either be:

- reclassified to gas plant held for future use
- disposed through resale
- removed/dismantled and scrapped

Distribution Services

Distribution Services which have been used, but have become inactive shall be retired from plant in service immediately if there is no prospect for re-use; in any event, they shall be retired by the end of the second year following the time the service became inactive, unless re-used in the interim.

4.9 Fixed Assets Held For Resale

Initial Recording

Such assets are normally maintained in the capital account to which asset was initially recorded.

Intent To Dispose

If however, the intent to dispose of the asset by re-sale has been determined with no established date, and the asset is considered "inactive", then Financial Performance Accounting may reclassify the asset to a separate capital sub-account, "Fixed Assets Held For Re-sale".

4.10 Retention of Capital Records

Asset Accounting source records are maintained in several file management systems and will be reviewed annually.

Source Documents

All source records shall be retained on premise for two fiscal years.

Microfilm Documents

- Source documents such as journal vouchers, completed PAR and work order files, and, where applicable, computerized capital reports will be microfilmed following the two year retention period.
- Financial Performance Accounting annual working papers and capital unitization records will be retained indefinitely, and when desirable, will be microfilmed.

Off Premise Storage

- Source documents which cannot be microfilmed will be stored at an off-premise storage facility and retained there for six (6) years.

DEPRECIATION

5.1 Introduction

This Chapter covers the accounting policies concerning the computation of depreciation and the accounting treatment for special depreciable items of capital.

Matching Cost Concept

Capital expenditures are distributed as equitably as possible between present and future customers by matching these costs to the accounting period in which the associated benefits accrue. This is accomplished by the depreciation/amortization practices used by the Company.

5.2 Depreciation Versus Amortization

Allocation to Operating Expense

Both terms relate to allocating the cost of depreciable capital to operating expense except that:

- depreciation extends over the actual service life of the asset, where as
- amortization is limited to the contractual term of the asset

5.3 General Requirements

Basis of Depreciation

The basis is to allocate the cost of the depreciable asset, the removal/dismantling cost less salvage proceeds, over the estimated service life of an asset in a systematic and rational manner.

Timing

Depreciation is provided on a straight-line basis, and computed in conformity with the "group system", i.e. a group of individual assets (PRUs) classified under the same capital account.

Method

Depreciation under the straight-line service-life method is computed by applying the annual percentage to the cost of depreciable capital as recorded in the capital account at the beginning of the fiscal year, divided by twelve for the monthly recording.

Rate

A separate rate for each group of capital sub-account is used in computing depreciation.

Composite Rate

The rate so established may by itself be a composite rate due to the classes and types of assets in the capital sub-accounts.

Approval

The various rates are approved by regulatory authorities, e.g. BCUC.

The Service Life

The service life is the period of time between the installation or acquisition of the asset and its retirement for accounting purposes.

Impact of Depreciation Under Group System

The "group system" contemplates that some part of the investment in a group of assets will probably be recovered through salvage realizations, and that probably there will be variations in the service lives of assets constituting the group, even among assets of the same class. The depreciation provision determined for the group is a weighted average of the various individual provisions reflecting the individual expectancies of life and salvage for each PRU in the group.

When the retirement or disposal of any individual asset in a group occurs under circumstances reasonably provided through accumulated depreciation, it may be assumed such provision for depreciation has been made.

Thus, whether the period of service life is shorter or longer than the average service life, accumulated depreciation attributable to an asset at the time of retirement under such circumstances, is equal to the cost, except for that portion recoverable through salvage proceeds.

Also, assets remaining in use after reaching the average life expectancy are not regarded as fully depreciated until actual retirement.

Maintain Depreciation Records

It is not the intention of this group classification to require the Company to keep records of the accumulated depreciation of each PRU.

For the purposes of analysis, however, the Company shall maintain subsidiary records in which accumulated depreciation is sub-divided according to each group of Gas Plant Accounts.

5.4 Accounting For Special Depreciable Items

5.4.1 Premium Cost Coastal

Premium Costs, taxes, capital losses, and acquisition costs associated with Coastal PRUs included in the 1988 acquisition utility plant (Rate Base), will be depreciated at a rate comparable to the associated capital account included in rate base.

5.4.2 Contribution in Aid of Construction

Contribution credits in the G/L 21101 account are amortized over the average service lives of the capital assets to which they relate.

5.4.3 Capital Leases Ownership vs. Term of Lease

If the capital lease contains terms that allow ownership of the leased asset to pass to Terasen Gas,, the capitalized value of that lease would be depreciated over the economic life of the asset; owtherwise, the depreciation period is the term of the lease.

Note: Re: Vehicle Lease Agreement (VLA)
Financial Information System (FIS) Lease

In accordance with Section 2.8.3, "Leased Property", Finance records are to reflect depreciation on VLA and FIS leases in the total operating lease payments; and for "legal" balance sheet purposes, Financial Performance Accounting records are to reflect the changes in the lease obligations.

5.4.4 Leasehold Improvements

Leasehold improvements are amortized over the life of the lease (must be greater than 12 months), and retired from plant in service when occupancy is vacated.

5.4.5 Obsolete and Surplus Stock (Used)

The value of obsolete and/or surplus stock removed from inventory which can be identified as used items, shall be charged to accumulated depreciation as an adjustment to previous salvaged-credits realized.

5.5 Non-Depreciable Capital

Depreciation/amortization is not charged on:

- land and land rights
- work in progress
- inactive plant, unless by regulated agreement
- plant held for future use
- plant not in service

5.6 Disposal

When non-depreciable capital is disposed of through resale, the original cost of the asset is credited to the applicable capital account, and any substantial gain or loss is

recorded, except for Land, as an extra ordinary item in the income statement. If this amount is not significant, it is reported as income or income deductions.

When depreciable capital is disposed of through resale the original cost of the asset is credited to the applicable capital account and charged to its corresponding accumulated depreciation account. The net salvage proceeds, if any is credited to the related accumulated depreciation account, except for office/operations centre buildings.

For Land and office/operations centre buildings, however BCUC has ruled to record the gain or loss to a deferred account and amortize it over five (5) years.

GLOSSARY

Abandonment	To cease an existing plant unit from further gas operations by means of permanent disconnection and to leave it on site with the intent of never to use it again.
Accumulated Amortization	Is the balance of amortization reserve for plant in service at date of the balance sheet.
Accumulated Depreciation	Is the balance of depreciation reserve for plant in service at date of the balance sheet.
AFUDC	Allowance for Funds Used During Construction (AFUDC), is the cost of interest expense on long term debt and the return on equity funds which is capitalized during construction. AFUDC is determined in a similar manner as IDC except that the cost of equity (capital) is added to finance on eligible construction projects.
Amortization	Is the current year's allocated portion of the service value of plant in service expensed to operating, where the PRU is amortized over a contractual term, such as leasehold.
Blanket Work Order (BWO)	Is a Work Order raised annually on an as-required-basis for classifiable plant, property and equipment purchased, constructed, installed or retired on a recurring or on-going basis. Certain BWO's are raised under a dollar limit established by Finance.
Capital Authorization Requests (CAR)	Is a corporate document utilized to outline a proposed specific project related to capital expenditures which requires appropriate authorization and approval prior to the commencement of the project.
Capital Expenditure	An expenditure on an asset which significantly increases capacity or service capability A set of codes developed to facilitate project management and expenditure control by dividing a project into logical and manageable physical components.
Contribution in Aid of Construction	Consists of grants in cash, services or property received from others for contributions in aid of construction and other purposes.
Corporate Plant Additions	Relates primarily to the cost of general plant. PRUs additions are: a) located at Head Office, eg. office furniture and equipment or leasehold improvements

b) used simultaneously as an operating tool by all cost centres; eg. mainframe and on-line software

Deferred Projects Projects which are deferred if the scheduled in-service or turn-on date has been delayed or postponed by management decision.

Depreciation Is the current year's allocation portion of the service value of plant in service expensed to operating, where the PRU is depreciated over its estimated service-life.

Direct Expenditures Is an identifiable capital cost for an item of plant or project, such as labour, contract and specified materials.

Dismantling Refers to the act of tearing down or removing plant units in a gradual process, resulting in the retirement of a plant unit.

Fixed Asset Non-current (ie. with a life longer than one year) assets used in the operations of Terasen Gas. They consist of property, plant and equipment, that are ready for their intended uses or still in the process of construction.

General Work Order (GWO) Is an individual Work Order established for receivables, contribution, recurring plant over the designated amounts, and for specific plant projects.

Inactive Stock Is defined as regular inventory stock material having no recorded activity in the previous twenty-four (24) months.

In-Service Date The date that a project, or portion of a project, is determined by the Project Manager as being put or devoted to service.

Improvements & Alteration Cost Refers to expenditures on existing PRU(s) which materially add to the service value, or materially extend the normal service life of the PRU(s).

Major Repairs & Renewal Costs Expenditures incurred and capitalized, (excluding cost of repairing old parts re-used) to restore or improve property, plant and equipment purchased in a rundown condition, eg. second-hand plant.

Minimum Capitalization Level Is the lowest dollar limit levied on items to qualify as a PRU for capitalization purposes.

Net Book Value Original purchase cost or service value less the cumulative total of annual depreciation provision.

Non-Depreciable Plant Assets whether in-service or not on which no depreciation is taken.

Original/Historical Cost	Original purchase or construction cost of an asset.
Overhead	General and administrative expenses proportioned between capital and operating expenditures. Capital overhead is applied on a preset basis to the asset accounts to which they relate.
Pipe Relocation	Occurs where the retired pipe is abandoned or removed, and a new pipe is installed in a new trench.
Pipe Replacement	Occurs where the retire line pipe is replaced with other pipe in the same location.
Plant Addition Request (PAR)	Is a document used by Financial Performance Accounting for accounting purposes to control sections of work in CARS, where required.
Plant Retirement Request (PRR)	Is a corporate document utilized to outline specific plant PRUs which are to be retired from gas plant in service.
Preliminary Project	A project in its preliminary development state, prior to management's commitment to proceed with the project.
Project	A set of activities with a specific scope, objective, financial plan and schedule, which has been defined a project by the project initiator.
Property Retirement Units (PRU)	Is an identifiable item or group of items of plant which are so associated on an operational or functional basis that they are logically considered to form a complete unit or assembly. It is the lowest level of expenditure for capitalization purposes. Plant Units may be synonymous with PRUs or may be a further sub-unit of the PRU.
Rate Base	The net book value (NBV) of certain assets, used and are useful in service to determine the allowable return in the fixing of gas rate levels.
Recurring Plant	Related to capital expenditures that are incurred on an on-going and annual recurring basis such as distribution mains, services, residential and commercial meter sets.
Removal	Refers to the actual removal of a PRU or portion thereof from its location, recover salvage proceeds if any, and the remainder of the PRU is junked or disposed of as scrap material.

Repairs & Maintenance	Are expenditures incurred to keep the PRU in good operating condition and/or to restore the asset to its original condition.
Replacement PRU	A PRU is removed (retired) and replaced (capitalized) with a PRU of equal or greater status.
Replacement Parts	Expendable components or parts comprising less than a PRU, used to restore the PRU to its original condition.
Retirement Entry	Is a common term used in Financial Performance Accounting for removing from plant-in-service accounts the service value of PRU(s) abandoned, removed, scrapped or resold.
Retirement Plant	Is synonymous with physically abandoning or removing PRUs out from plant in service.
Service Life	Period of time between the in-service date and the retirement date of an asset.
Service Value	Is the plant ledger value of a PRU carried in the Plant-in-Service records at the date of the balance sheet.
Spare Parts, Capital	Certain parts or items which constitutes as PRUs and carried in Plant-in-Service accounts as standby components.
Specific Plant	Capital projects or assets directly purchased and identified in terms of their physical characteristics, function, location, cost, planning and construction period. Normally relate to capital other than Recurring Plant, and which are included for in the Capital Budget, such as: - engineering/transmission projects - land and buildings - gate and regulated stations - industrial meter sales stations - general plant items
Work Costing and Reporting System (WCRS)	Is a financial accounting system used to accumulate, monitor and control capital and billable expenditures by means of Blanket (BWO) and General (GWO) work orders.
Work Management System (WMS)	Is a separate computerized system designed to measure the performance of construction and maintenance work by means of using actual quantitative data, such as Labour hours, at predetermined standard unit cost rates.

REFERENCES

Two Types of References

Namely:
- CICA Handbook
- BCUC Uniform System of Accounts for Gas Utilities

are available to provide further information and interpretation in the accounting for plant, property and equipment.

CICA Handbook

The handbook provides additional references to accounting guidelines and accounting recommendations to be followed by Canadian oil and gas companies.

References of Particular Interest To Our Industry

- Accounting Guideline, October 1990: Full Cost Accounting in the oil and gas industry
- Capital Assets, Specific Item Section 3060, October 1990

BCUC Uniform System of Accounts

The capitalization policy information described in Chapters 2, 4 and 5 of this Manual is primarily based on the accounting standards established by BCUC in the "Uniform Classification of Accounts" manual.

Reference contained in the BCUC manual which relate to the Terasen Gas Plant Accounting Policy Manual are:
- the design of Terasen Gas new code block is based on BCUC, eg. Primary Plant Accounts GL400 to GL499 – See Section 4 of the "Code of Accounts Manual" for Terasen Gas
- Capital Code Descriptions, listed in Section 4.1 of the Code of Accounts manual is primarily based on the Canadian Gas Association (CGA) version of the account description, dated May 1984. The CGA version in turn corresponds to most parts of the BCUC manual dated December 1961
- Specific items described under the capitalization policy in Chapters 2, 4 and 5, are referenced to BCUC:
  - Section 6 Plant Acquired and Constructed
  - Section 7 Plant Additions
  - Section 8 Plant Retirement
  - Section 9 Maintenance
  - Section 6 Depreciation

Property Retirement Unit (PRU) Catalogue

The PRU Catalogue is a stand-alone manual but is an integral part of the Capitalization Policy.

Attachment 5.2

CUS 07-08 SPECIFICATION
12 January 2006 **CUSTOMER PREMISE WORK**
Account Services

Main Extensions

Terasen Gas

Replaces: DES 04-03-08 [OI PLN 100-3] dated 14 September 1998.

Overview

This specification outlines Terasen Gas requirements for initiating, processing, and obtaining approval for the construction of main extensions to the Terasen Gas lower mainland and interior distribution systems in accordance with the **Terasen Gas Tariff** *General Terms and Conditions*, Section 12.

Audience

Install Coordination Centre staff, marketing staff, and administrators involved in the main extension process.

References

- ADM 04-01 *Authorization Levels*
- CUS 07-05 *Charges for Service Line Work*
- DES 04-02-01 *New Loads and Changes in Existing Loads*
- DES 04-02-10 *Charges for Service Line Work*
- GEN 01-03 *Technical Definitions (Terminology)*
- Form 1754 *Main Extension Approval Summary*
- MX Training Materials
- **Terasen Gas Tariff** *General Terms and Conditions*

Policy

Terasen Gas will make extensions to its gas distribution system according to development requirements, in a manner that is consistent with this standard and the **Terasen Gas Tariff**. All main extensions will be the property of Terasen Gas.

Definitions

Annual Consumption GJ/Unit

Annual consumption is the number of gigajoules consumed per premises, based on the building type, end use application, insulation, and normal degree-day conditions.

Contributing Customer

A contributing customer is a customer connecting to a main who must pay a contribution toward the cost of the main extension.

Contribution

A contribution is the portion of the capital cost a customer must pay to offset the revenue deficiency of the main extension.

Direct Cost

The direct cost is the cost of an installation including labour (with concessions and benefits), vehicles, equipment, material, and contractors, excluding overhead and GST.

Discounted Cash Flow (DCF)

The DCF is a stream of costs or revenues over time, discounted to give the present value.

Double Main

A double main is an installation with mains on each side of a street. This eliminates road crossings for services.

Extension

An extension is an extension of a Terasen Gas distribution or transmission main, including additional pressure regulating facilities and headers.

GST

GST is the Goods and Services Tax.

Header

A header is common gas distribution piping on private property serving three or more customers.

Main Extension (MX) Test

The MX Test is used to determine the forecast Net Present Value of a main extension. It is explained in detail in this standard.

MX Test Program

The MX Test program is a computer program used to calculate the MX Test results.

Net Present Value (NPV)

The NPV is the result of the MX Test comparing projected revenues and costs of a proposed main extension on a discounted cash flow basis.

A positive NPV indicates that the present value of the projected revenues exceeds the present value of the costs. A negative NPV indicates a revenue deficiency or shortfall.

Revenue Deficiency

A revenue deficiency or shortfall is the amount of additional revenue needed to achieve a zero NPV in the DCF analysis used in the MX Test.

Service Line

A service line is the portion of the gas distribution system extending from the main to the meter set inlet.

SAP

Terasen Gas business application software that includes main extension planning and work management tools.

Single Main

A single main is a main that runs on one side of a street, with services to customers on both sides of the street.

System Improvements (SIs)

SIs are system reinforcements made to ensure that adequate system capacity is available to meet customer requirements at a minimum system pressure approved by System Planning. The treatment of SIs in MX evaluations is discussed in more detail below.

Vertical Subdivisions

A vertical subdivision is a multi-storey building that has individually metered units and a common service line connecting banks of meters typically located on each floor.

Initiating a Main Extension

When Terasen Gas determines that a main extension is needed to meet system development requirements, the Install Coordinator will initiate the main extension by completing the appropriate screens on SAP.

Planning and Design

The Install Coordination Centre is responsible for:

- Initiating jobs on SAP.
- Ensuring that a SAP job number is used on all correspondence and files.
- Determining the annual number of customers projected to connect to a main extension within five years of construction.
- Determining the annual consumption for each customer (see **Annual Consumption**).
- Designing the pipe layout, size, length, and other facility requirements.
- Estimating direct costs for the main and associated facilities.
- Running the MX Test and recording the results on **Form 1754** *Main Extension Approval Summary* (see **Main Extension Test**).
- Informing the Commercial Sales and Marketing Manager or the Commercial Account Representative about any main extension applications to other than Rate 1, 2, or 3 customers (estimated load over 5000 GJ/yr). The Commercial Sales and Marketing Manager or Commercial Account Representative will arrange for any required contracts and for the Sales and Administration Business Analyst to run the MX Test program.
- Informing Engineering and Transmission Operations about any applications requiring extensions to IP and TP pipelines.
- Providing a plan of all existing facilities connecting to IP or TP mains and facilities.
- Ensuring that enough gas service applications and contributions have been secured before advancing a project to the construction stage.
- Providing a Load Information Memo (LIM) to System Planning for analysis of the main extension.
    - See **DES 04-02-01** *New Loads and Changes in Existing Loads*

- Informing the Right of Way group about any infringements on Terasen Gas pipeline rights of way, and ensuring that the required documentation is in place prior to construction.
- Informing the Lands group if a right of way is required.
- Issuing the required documentation and construction drawings to the field.
- Ensuring that any required internal and external approvals are obtained.
- Ordering construction materials.

Costs

Direct cost estimates for main extensions will be determined for the MX Test based on the following guidelines.

- The direct cost estimate will include the size of the main and/or service header, and associated facilities required to serve the customers projected to connect to the distribution system within five years of construction.
  - The System Planning Manager may elect to install a larger main to allow for future growth. The customer will not be responsible for any additional costs associated with installing the larger main.
- A double main will be installed if it is the least cost alternative, or if it is required by local governments.
  - The least cost alternative will be determined by comparing the cost estimate of double mains plus the service lines, to the cost estimate of a single main plus service lines.
  - The cost of the double main will be included in the SAP direct cost estimate.
- Costs such as river crossings, bridges, surveying, land transaction costs, bedrock blasting, right of way clearing, and environmental impact investigations will be included in the direct cost estimate.
- The install coordinator will provide project specific service line direct cost estimates for all customers in the MX Test program.
- The install coordinator will provide specific meter set direct cost estimates for Rate 3 customers in the MX Test program.

- Meter set costs for Rate 1 and 2 customers will be automatically selected by the MX Test program, based on the annual projected load.

- SI costs will be included in the evaluation of an main extension based on the following.
  - Average SI costs are automatically calculated based on each customer's annual projected load in the MX Test program for Rate 1, 2, 3, and 23 customers.
  - Average SI costs, adjusted to the customer's projected load factor, will be included in the MX Test program for firm customers (Rate 5, 25, and 22 customers).
  - Project specific SI costs will be included in the direct cost estimate for interruptible and seasonal customers (customers in Rates 4, 7, 27, and 22).
- Incremental operating, maintenance, and overhead costs are automatically calculated in the MX Test program based on each customer's rate class and annual projected load, and the direct cost estimate of the main, service lines, meter sets and other MX components described above.

Annual Consumption

Rates 1 and 2

The install coordinator will forecast the annual consumption (GJ/unit) for Rate 1 and 2 customers by running the MX Test program. The consumption section of the MX Test program estimates a customer's annual gas consumption based on:

- Type of premise
- Building characteristics
- Normalized area weather conditions
- Appliances connected (e.g., domestic water heater, furnace, dryer, range)

Rates Other Than 1 and 2

The Install Coordinator will forecast the annual consumption (GJ/unit) for customers other than Rate 1 and 2 on an individual basis, using criteria such as heat loss calculations, equipment ratings, and consumption data for comparable existing customers.

Main Extension Test (MX Test)

The MX Test is a discounted cash flow analysis of the projected revenue and costs associated with the main extension. The total revenues and costs for the main extension project are calculated over a 20-year period, based on the number of customers projected to connect to the main extension within five years of construction, and their forecast annual consumption. The main extension will be deemed to be economic, and may be constructed without contributions, if the results of the MX Test indicate a zero or greater net present value, provided the required approvals are obtained.

The MX Test will be applied to new applications for service requiring new gas mains, as well as for service header and vertical subdivision applications. In vertical subdivision applications, the SAP direct cost estimate of the underground pipe, plus the building piping and associated equipment, will be used as the SAP direct cost estimate of the main. Similarly, in service header applications, the SAP direct cost estimate of the service header will be used as the SAP direct costs estimate of the main.

- See **DES 04-02-10** *Charges for Service Line Work*

The following data is required to run the MX Test for Rate 1, 2, 3, or 23 customers:

- SAP job number
- Direct cost of the main
- Direct cost of the service header
- Direct cost of the service lines
- Direct cost of the meter manifolds with three or more meters for Rate 1 customers
- Direct cost of meter manifolds with two or more meters for other than Rate 1 customers
- Direct cost of common pressure regulating assemblies for vertical subdivisions
- Whether the meter manifolds have common regulators or individual regulators

- Number of customers projected to be added annually within five years of construction
- Each customer's rate schedule
- Each customer's projected annual consumption (GJ/yr.)
- Meter set direct costs for Rate 3 or 23 customers.

If the MX Test indicates a revenue deficiency, the customers will need to pay a contribution equal to the revenue deficiency in order for the project to proceed.

- See the Contributions section of this document.

The Sales and Marketing Manager will arrange for the MX Test to be run for customers on rates other than Rate 1, 2, 3, or 23.

Approvals

The Install Centre Manager has the authority to give final approval to main extension applications if:

- The install coordinator (IC1) has reviewed the application and signed the main extension authorization form.
- The total mains and facilities installation direct costs do not exceed $100,000.
- The appropriate approvals from other departments are received.
- Jobs with total mains and facilities installation direct costs exceeding $50,000 require sign off by the Install Centre Manager.
- Jobs with total mains and facilities installation direct costs less than $50,000 will be reviewed using exception reporting, and individual main extension authorization forms do not require sign off by the Install Centre Manager

The Manager, Operations Centre has the authority to give final approval to main extension applications if:

- The Install Centre Manager has reviewed the application.
- The total mains and facilities installation direct costs do not exceed $250,000

- The appropriate approvals from other departments are received.

The VP, Distribution has the authority to give final approval to main extension applications if:

- The Manager, Operations Centre has reviewed the application.
- The total mains and facilities installation direct costs do not exceed $500,000, in accordance with the capital approval levels identified in **ADM 04-01** *Authorization Levels*.
- The appropriate approvals from other departments are received.

Main extension applications not eligible for approval by the VP, Distribution will require the approval of the President, Gas Segment, up to $2,000,000 in accordance with the capital approval levels identified in **ADM 04-01** *Authorization Levels*.

Main extensions requiring connection to the Terasen Gas transmission system (excluding service lines from IP pipelines) require the approval of the Manager, Transmission Operations.

Main extensions that may infringe on an existing Terasen Gas transmission pipeline right of way require the approval of the Manager, Property Services.

Main extensions that require system improvements or oversizing to accommodate future load growth, or involving pipe sizes of 88 mm or larger, require the approval of the System Capacity Planning Manager and the Distribution Assets and Improvements Manager.

Main extensions that require alteration to, or the construction of, a new pressure reducing facility, require the approval of the Distribution Assets and Improvements Manager.

Those providing approvals of main extensions must sign **Form 1754** *Main Extension Approval Summary*.

Variances

Asset Managers are responsible for ensuring that the main extension is installed as designed and approved. If any changes are necessary, the

Asset Manager, in conjunction with the Install Coordinator, must alter the design and obtain the necessary approval before construction.

Upon completing the main extension, a job detail summary report will be produced to identify the actual and estimated costs. Any significant variances will be explained by the Asset Manager. The report and any explanations will be kept in the project work order file.

Contributions

When the results of the MX Test indicate an NPV less than zero, Terasen Gas will collect a contribution in the amount required to eliminate the negative NPV from the customers initially connecting to the main extension.

Contributions will not be adjusted based on updated or actual revenues and/or costs unless approved by the appropriate Marketing manager (Manager, New Construction and Residential Growth or Manager, Commercial and Industrial).

Quotations to customers for main extensions must be given in writing. These quotations are normally valid for 60 days. The Install Centre Manager must approve any extensions to the 60 day period.

Construction may only begin after:

- The required contributions are collected from customers initially connecting to the main.
  or
- Agreement is obtained to have the contribution funded through regional taxation.
  or
- A sufficient number of customers agree to pay the contribution by signing the Terasen Gas Main Extension Contribution Agreement (to be implemented).
  and
- All required permits and approvals are obtained.

The Install Centre Manager may waive contributions of less than $100 per customer connecting to the main extension.

Contribution Amounts

The amount that each contributing customer will pay will be determined in a fair and reasonable manner. If all contributing customers are on Rates 1 and 2, then each customer will pay an equal contribution amount. If one or more customers are other than Rate 1 or 2, then the following guidelines will be used to determine the amount of the contribution for each customer:

1. The MX Test will be run in three ways:
   - With Rate 1 and 2 customers only (Result A)
   - With customers other than Rate 1 and 2 customers (Result B)
   - With all customers (Result C)
2. If either Result A or Result B is non-contributory, then that group will not pay a contribution.
3. No group will pay a contribution larger than its stand-alone contribution (i.e. Result A or Result B).
4. If Result C is less than Result A + Result B, then the total contribution (Result C) will be apportioned to the other two groups in the same proportion as Results A and B, unless guideline 2 or 3 is in effect.
5. Within the Rate 1 and 2 groups, all customers pay the same contribution.
   - If there is more than one customer in the non-Rate 1 or 2 groups, the contribution will be apportioned within that group using techniques similar to those described above.

Situations that cannot be resolved using the above guidelines will be referred to the Marketing Planning Manager.

- See **Terasen Gas Tariff** *General Terms and Conditions* Section 12.6 "Contributions in Aid of Construction"

Refunds

All Rate 1 and 2 customers connecting to a contributory main extension during its first five years of existence will pay the same net contribution at the end of the five year period. This equity will be achieved through a series of contributions and refunds.

The initial customer's contributions and refunds will be calculated as described in the contributions section of this document. Subsequent or infill customers will be identified as having applied to connect to a contributory main extension.

Contributory main extensions and service headers will be marked on plate maps. The plate map will have all main extensions labelled with a unique number, and contributory main extensions will have a suffix of "$YR" ("YR" is the year of the MX Test used).

- See **Terasen Gas Tariff** *General Terms and Conditions* Section 12.8 "Refund of Contributions"

MX Refund Database

The contribution amount for each contributory main extension will be tracked in the MX Refund Database. The Marketing Pricing Analyst (administrator) will administer the database. The install coordinators will have read-only access to the database, through the public folders on the Terasen Gas electronic mail system. The install coordinator will complete the MX contribution database input form, and forward it to the administrator for each customer addition to an existing or new contributory main extension.

The administrator will notify the Financial Accounting Clerk to issue refunds and will update the database.

Refund Process Example

The refund process is illustrated by the following example:

Table 1: Refund Process

Total contribution required 12 initial customers each pay	$12,000 $1,000	(12,000 / 12 customers)
Four additional first year customers pay First year reconciliation: each of the 12 initial customers refunded	750 250	($12,000/ 16 customers) [(4 X $750)/ 12 customers]
Four second year customers each pay Second year reconciliation: each of the 16 customers refunded	600 150	($12,000/ 20 customers) [(4 X $600)/ 16 customers]
Four third year customers each pay Third year reconciliation: each of the 20 customers refunded	500 100	($12,000/ 24 customers) [(4 X $500)/ 20 customers]

The process continues for five years. Final refunds are issued at the end of five years.

For main extensions with other than Rate 1 or 2 customers, refunds will be prorated amongst the rate classes, on the basis of their original contributions.

Refund Guidelines

The following guidelines will be used when refunds are due:

- Individual refunds greater than $100 will be paid at the time of the review.
- Individual refunds less than $100 will be held until a subsequent review, when they become greater than $100, or until the end of the five-year contributory period.
- No interest will be paid on contributions that are subsequently refunded.
- If, after reasonable efforts, and five years have passed since the main was constructed, Terasen Gas cannot locate a customer eligible for a refund, the customer will be deemed to have forfeited the refund, and it will be credited to the other customers who contributed toward the main extension.

See **Terasen Gas Tariff** *General Terms and Conditions* Section 12.7 "Contributions Paid by Connecting Customers", and Section 12.8 "Refunds of Contributions"

Extensions to Contributory Extensions

When a new main extension is connected to an existing contributory extension, during the first five years of its existence, the customers on the new main may pay a contribution toward the existing extension. The amount of the contribution will typically be a portion of the total contribution for the existing main extension, assigned to the new main extension based on expected use, point of connection and other factors. In addition, customers on the new extension will pay any contribution required for the new extension.

The install coordinator will notify the Customer Care Manager of any applications for extensions to contributory extensions. The Customer Care Manager will determine amount of the contribution for applications for extensions to contributory extensions.

GST

The GST must be added to any contributions collected from the customer. It must be noted separately in any correspondence (including receipts), making reference to the Terasen Gas GST Registration Number (R100431592). When charged or collected, the GST should be coded to Account 251-018.

Records

Form 1754 *Main Extension Approval Summary* must be completed and signed as indicated in **Planning and Design** and **Approvals**. The completed forms are to be forwarded to and retained in the Install Centre.

Title: Simple Economic Test

Role:

- **IC1, IC2, Process Support Analyst**

Purpose:

- The Simple Economic Test is done at a Lead level or early stages of planning and is intended to allow Terasen Employees to evaluate the potential profitability of a proposed main extension without having to enter all the data that is required for a full Detailed Cost/Consumption estimation. The Simple Economic test is based on the length of main, number of meters, number of risers, customer load/meter size and customer type. The Simple Economic Test will **not** be used for calculating Final Customer Contributions.

Prerequisite:

- **A Project/Scenario is created for a New Main Install**
- **A service product must be added to the project/scenario**
- **Customer Attachments are added to the project/scenario**

<table>
<tr><th>Step</th><th>Action / Desk Level Procedure</th><th>Details / Notes / Context</th></tr>
<tr><td>1.</td><td>Create a Project or Scenario
From the main screen select  Navigation Bar
At the ____ tab click ____
<table>
<tr><th>If</th><th>Then</th></tr>
<tr><td>customer attachments are to be added in the first year only</td><td>Create a Project</td></tr>
<tr><td>customer attachments are to be added in the next 5 years</td><td>Create a Scenario</td></tr>
</table>
see KB desklevel – Project – Add New</td><td>The ____ button can be used to choose a New Project or New Scenario, but the default is a New Project.</td></tr>
<tr><td>2.</td><td>At the ____ tab enter the Site Address information
see KB desklevel - Site Tab</td><td></td></tr>
<tr><td>3.</td><td>Add Customer Information
see KB desklevel – Customer Find, Edit, Add, Remove</td><td>-</td></tr>
</table>

4. **Enter the Service Product Details for the new main:**

- At the [ ] tab select [ ]

Select Main Install – Main New product

- In the **Add Service Products** window enter the following details:

Field	Action / Description
Product Line:	Select **Main Install** from the drop down menu.
Sub Product:	Select **Main New** from the drop down.
Description:	Enter the main description – optional

On the Add Service Products screen on the [ ] tab enter the following details

Field	Action / Description
Length (m):	Enter the **length** in meters.
Pipe Size:	Select one of the following pipe sizes from the drop down: **26, 42, 60, 88, 114, 168, 219, 323**
Material:	Select one of the following Material types from the drop down: **PE, Steel**

- Click [ ] to add service product to project

KB – Add Service Product by Type

- Once you select add the information will be added to the Project Generated screen

5. **Enter the Service Product Details for the attachments**

In the **Add Service Products** window enter the following details:

Field	Action / Description
Product Line:	Select **Attachment** from the drop down menu.
Sub Product:	Select the appropriate sub product from the drop down.
Description:	Enter a description

- An Attachment must be entered for each premise
- Number of attachments is assumed to be the same as the number of risers as well as the number of meters.

	Install Year:	Enter the year the attachment is to be installed	
	On the [ ] tab enter the following details:		
	From Main/Header **Branch Service**	Select one of the radio buttons as appropriate.	▪ Select ”From Main/Header” if the service will be served from the main. ▪ Select “Branch Service” if the service will be served from an existing service.
	Conversion **Use Existing Stub**	Select one of the check boxes as appropriate.	
	Del. Pres. (kPa)::	Select one of the following pressure types from the drop down: **1.75, 2.7, 14, 35, OTH**	
	Load (BTU)	Field cannot be populated from this screen.	
	Inside Length (m):	The length from the property line to the meter	
	Outside Length (m):	The length from the main to the property line	
	# of Risers:	Value defaults to 1. Increase the value to the number of risers as required.	
	# of Premises:	Value defaults to 1. Increase the value to the number of premises as required.	
	Meters per Riser:	Field cannot be populated from this screen.	
6.	**At the [ ] tab enter the premise information** ▪ see KB desklevel - **Premise – Add New**		▪ The **Create Premise** window opens displaying a message “X premises will be added”, based on the info from the Attachment tab of the service product. Four additional tabs are presented for data entry: ▪ Addresses ▪ Appliances ▪ Expected End Use ▪ Building

		NOTE: Follow the order of the steps to allow data to default properly.
7.	**At the Project Generated screen select the** [ ] ▪ Under Simple Economic Test click [ ] **END**	▪ Refer to KB: **Economic Test Tab** for an explanation of the screen. ▪ A contribution is required if the Economic Test has a value greater than other than zero.

Send page title and updates to: mailto:doandesssupport@terasengas.com

Link to ICC Page
Link to Topics Page

Attachment 5.3

BC Gas Utility Ltd.
1111 West Georgia Street
Vancouver, British Columbia
Canada V6E 4M4

Tel (604) 443-6607
Fax (604) 443-6789

David M. Masuhara
Vice President
Legal & Regulatory Affairs
and Secretary

BC Gas

October 3, 1996

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

Attention: R.J. Pellatt
Commission Secretary

Dear Sirs:

RE: Service Line Cost Allowance

Please find enclosed BC Gas' application regarding the proposed Service Line Cost Allowance.

A copy of the attached material will be provided to all registered intervenors in BC Gas' 1996 Rate Design Application.

Yours very truly,

BC GAS UTILITY LTD.

for David M. Masuhara

PROPOSED SERVICE LINE COST ALLOWANCE

Backsround

The cost of installing a new service line can vary from customer to customer, usually because of the length of pipe required, the terrain, or the landscaping of the property. Since the basic charge and delivery rates are the same for all customers, it follows that some customers with very high service line costs may not be covering the costs to serve them. Alternatively, some customers may be over-contributing to the cost of their service line in cases where the service line capital costs are very low,

While the Main Extension Test addresses customers being served off of new mains or main extensions, service lines for in-fill customers (i.e. customers connecting to existing mains) are not subject to the Main Extension Test. The incremental cost of serving in-fill customers includes incremental operating and maintenance expenses (O&M) and capital expenditures, It is not administratively practical to apply a comprehensive Main Extension type of test for the thousands of in-fill customers **BC** Gas connects each year. However, **BC** Gas believes that the economic viability of in-fill customers can be reasonably assured without incurring the cost of administering a full economic test, if the projected revenues can be expected to match a given level of expenditure.

BC Gas currently charges an Application for Service fee of $85 which is intended to recover the administrative costs of opening a new customer account. In addition, a customer may be charged for excess service line length, and miscellaneous costs such as frost charges. The current connection policy provides each new customer a maximum 20 metre service line (measured from the customer's property line to the termination of the service line at the meter set) before excess length

charges of $11/metre apply. Currently every new residential or commercial customer is entitled to this provision regardless of the actual cost to install the service line. BC Gas proposes to retain the $85 fee, but to replace the excess length charge, and other miscellaneous charges, with a Service Line Cost Allowance. BC Gas also plans to implement a finance plan for contributions.

The purpose of the Service Line Cost Allowance is to reduce the costs borne by BC Gas for connecting customers with extraordinary installation costs. The proposed Service Line Cost Allowance would require customers whose service line capital costs are significantly higher than average to contribute to the cost of the service line connection.

The Service Line Cost Allowance has been proposed instead of a large Connection Fee, because large up-front connection fees act as a barrier to entry for some decision-makers wishing to connect to the natural gas system. In view of the fact that all customers must have electricity, an up-front connection fee for electricity will have little impact on the number of new electricity customers. In deciding whether or not to install electric space and water heating, the electric connection fee will be viewed as a sunk cost. However, BC Gas is concerned that a connection fee for natural gas will dissuade some customers from choosing natural gas for their space and water heating needs because natural gas is an optional energy source. This barrier is particularly troublesome in multi-family complexes where the builder, who pays the connection fee, does not benefit from the lower cost of using gas in the future. This issue was discussed during the **1995** Utility System Extension Proceedings at Volume 1 pages **101** to 103. **A** Service Line Cost Allowance does not produce the same barrier and, is therefore the preferred option.

The current service line policy does not adequately address the factors which result in the under-recovery of costs from some customers and over-recovery from others. Under-recovery occurs when excessive installation costs are encountered in the first ***20*** metre portion and when costs are greater than $11/metre for the portion beyond ***20*** metres. Over-recovery occurs when lower than average costs are incurred in the initial ***20*** metres and when the cost of the portion beyond the ***20*** metres is less than $11/metre. BC Gas believes its SLCA proposal remedies these problems to a large extent,

BC Gas has considered a'numberof factors in establishing the SLCA including;

1) ensuring that the allowance is fair and equitable for customers across the **BC** Gas service area;

2) ensuring the administration requirements and associated costs of the SLCA are no greater than the existing ***20*** metre policy;

3) ensuring the SLCA can be easily explained to and understood by new customers applying for service; and

4) setting the SLCA amount at an appropriate level so that new customer additions do not put undue upward pressure on rates.

With these considerations in mind, BC Gas has reviewed the customer connection costs determined in the 1996 Long Run Incremental Cost (LRIC) Study and analyzed the Company's recent costs of new service line installations to establish an SLCA amount.

The LRIC provides estimates of the future expected long run incremental cost of service lines which provides directional information for establishing the level of the SLCA. Evaluation of recent service line installation costs provides an indication of the impact on new customers of setting the SLCA at varying levels.

Table 3 on page 7 of the LRIC (BC Gas' 1996 Rate Design Application Volume 2, Tab 1) indicates that the expected future service line costs for most Rate 1 & 2 customers will be $539. It should be noted that the LRIC figure recognizes that a significant number of BC Gas' customer additions in any year are through multiple gas meters connected to a single service line. Multiple meters on a single service line are common for commercial establishments and multi-family complexes. The average cost for a service line serving a single meter is likely greater than $539.

SLCA Amount

A target average service line cost was calculated using the 1996 Mains Extension Test, modified to include System Improvements, and with the term reduced to 20 years. The cost of main per customer was set at the LRIC estimated cost of $539. Setting the NPV of the modified test to zero, the returning average service line cost was $475. Based on 1996 service line installations through August 1, the SLCA should be set at $1,100 to achieve the $475 average cost. BC Gas proposes that the initial SLCA be set at $1,100 for Rate 1 and Rate 2 customers, subject to a review after the first year of implementation.

Conclusion

BC Gas is of the view that the proposed SLCA significantly improves upon the current service line connection policy and will ensure that high cost service installations will not be subsidized by other rate payers, The proposed approach avoids establishing a market barrier to natural gas as would result from a high up-front connection fee. In addition, the SLCA will not result in increased administrative costs. Finally, BC Gas believes the SLCA will be simple to understand and implement and will have greater customer acceptance than a connection fee. BC Gas believes its proposal achieves the goals intended by the Commission's System Extension Test Guidelines while avoiding some of the potential negative consequences of a connection fee. BC Gas proposes to monitor the effectiveness of the SLCA in achieving the goals of the Commission's guidelines and will apply to make modifications if required.

Attachment 5.4

BC Gas Utility Ltd.
1111 West Georgia Street
Vancouver, British Columbia
Canada V6E 4M4

Tel (604) 443-6607
Fax (604) 443-6904
email dmasuhara@bcgas.com

David M. Masuhara
Vice President
Legal, Regulatory & Logistics
and Secretary

BCGas®

November 8, 2001

British Columbia Utilities Commission
6th Floor, 900 Howe Street
Vancouver, B.C.
V6Z 2N3

Attention: Mr. Robert Pellatt
Commission Secretary

Dear Sir,

RE: 2000 BC Gas Main Extension Review

Enclosed is a copy of the 2000 BC Gas Main Extension Review. This report provides construction cost variance data on the 330 main extensions built in 2000, as well as fist year customer connection variance date for the 326 main extensions analyzed in the 1999 review.

If you have any questions with this review, please contact Ms. Susana Prpic of our Marketing Planning Group at 604-592-7631.

Yours very truly,

D.M. Masuhara

Attachment
DMM:CA/BCUC/SP-MX

2000 BC Gas Main Extension Review

November 2001

Prepared for: The British Columbia Utilities Commission

Prepared by: The BC Gas Utility Marketing Planning Group

Executive Summary

In September 1998, the BC Utilities Commission directed BC Gas to implement the Main Extension Review Process filed by BC Gas in August 1998. The first report was filed in August 1999 and the second in October 2000. This Third Year Report provides construction cost variance data on the 330 main extensions built in 2000. The report also contains first year customer connection variances for the 326 mains in the 1999 Main Extension Review.

Summarised below are the projected versus actual construction costs for 2000 and the comparative figures for 1998 and 1999:

- On average, BC Gas underestimated (actual costs exceed projected costs) the cost of building a contributory main extension by 12% (an average $1,274 variance on an average estimated job cost of $11,028).

1998 – 2000 Contributory Main Extensions

	Average Estimated Job Cost	Average Variance	Variance as a % of Average Estimated Job Cost
2000	$11,028	$1,274	12%
1999	17,315	2,603	15%
1998	8,552	545	6%

- On average, BC Gas underestimated the cost of building a non-contributory low NPV (<$1,000) main extension by 1% (an average $50 variance on an average estimated job cost of $4,123).

1998 – 2000 Non-contributory Main Extensions
NPV< $1,000

	Average Estimated Job Cost	Average Variance	Variance as a % of Average Estimated Job Cost
2000	$4,123	$50	1%
1999	1,560	215	12%
1998	2,966	370	12%

- On average, BC Gas underestimated the cost of building a non-contributory high NPV (≥$1,000) main extension by 10% (an average $1,041 variance on an average estimated job cost of $1,041).

1998 – 2000 Non-contributory Main Extensions
NPV≥ $1,000

	Average Estimated Job Cost	Average Variance	Variance as a % of Average Estimated Job Cost
2000	$10,858	$1,041	10%
1999	7,403	54	1%
1998	4,679	385	8%

In comparing the cost variances of the three types of main extensions in 2000, the following similarities were noted:

- Approximately one half of main extension projects were underestimated in 2000. In 1999 one-quarter of all main extensions were underestimated.
- As in 1999, main extension project costs that were underestimated had greater variances than those that were overestimated (projected costs exceed actual costs); and
- For contributory and low NPV mains, the variance distributions are similar (there were more underestimated than overestimated mains). In contrast, the number of overestimated mains was greater than the number of underestimated mains for high NPV mains.

Most variances were a result of unexpected site conditions and late design changes.

Construction costs are only one component of the MX Test - contributions in aid of construction are also dependent on customer addition forecasts, consumption forecasts and MX Test parameters. The results of the Five Year Review incorporating an analysis and update of both the revenue and cost components of the MX Test will yield a more complete picture of MX Test accuracy.

Table of Contents

1.0 Introduction and Background

In September 1998, the BC Utilities Commission directed BC Gas to implement the Main Extension Review Process filed by BC Gas in August 1998 and the second in October 2000. This Third Year Report provides construction cost variance data on the 330 main extensions built in 2000 and the first year customer connection variances for the 326 main extensions analysed in the 1999 Main Extension

1.1 Purpose of the Main Extension Test

It is in the interest of ratepayers that BC Gas connect customers to main extensions that are economic to build (i.e., main extensions where the present value of the revenues gained from customers exceeds the present value of the construction costs). The MX Test is used to assess potential system extensions to either ensure that they are economic (and therefore non-contributory), or to calculate the required contribution in aid of construction to make the extension economic. The use of accurate projections in the MX Test allows BC Gas to minimize contribution requirements when extending gas service, while avoiding cross-subsidization from existing ratepayers.

2.0 Third Year (2000) Review Format

This report contains a comparison of estimated versus actual 2000 main extension construction costs and a one-year follow-up on customer connections to 1999 main extensions.
Section 3 addresses 2000 actual versus estimated construction costs and is divided into three segments:

1. Contributory main extensions;
2. Non-contributory main extensions with a net present value (NPV) < $1,000 per customer; and,
3. Non-contributory main extensions with a NPV ≥ $1,000 per customer.

The following information is provided for each segment:

- Construction costs (estimated, actual and variance);
- Projected one year and five year customer additions; and,
- Brief explanations of significant variances.

Section 4 addresses 1999 actual versus estimated first year customer connections and is divided into three segments:

- Customer Additions - 1999 Contributory Main Extensions;
- Customer Additions - 1999 Non-contributory Main Extensions (NPV < $1,000); and,
- Customer Additions - 1999 Non-contributory Main Extensions (NPV ≥ $1,000).

3.0 Summary of Results for 2000 Main Extensions

3.1 Contributory Main Extensions

Contributory main extensions require a monetary contribution from the customers connecting to the main extension.

3.1.1 Construction Costs

A total of 65 contributory main extensions were reviewed. Most of these main extensions (60%) were constructed in the Interior. In 1999, 75% of the contributory main extensions were constructed in the Interior. Below are the main findings:

- On average, BC Gas underestimated the cost of building a contributory main extension by 12% (an average $1,274 variance on an average estimated job cost of $11,028). In 1999, contributory main construction costs were overestimated by 6%, on average, (an average $2,603 variance on an average estimated job cost of $17,315). The decrease in the average estimated job cost between 1999 and 2000 is the result of one large project that occurred in 1999. Please refer to *Appendix 1: Table 1 - 2000 Contributory Main Extensions* for details.

- Almost half (49%) of contributory main extension cost variances fell within the +/- 30% range. Please refer to *Graph 1* on the next page.

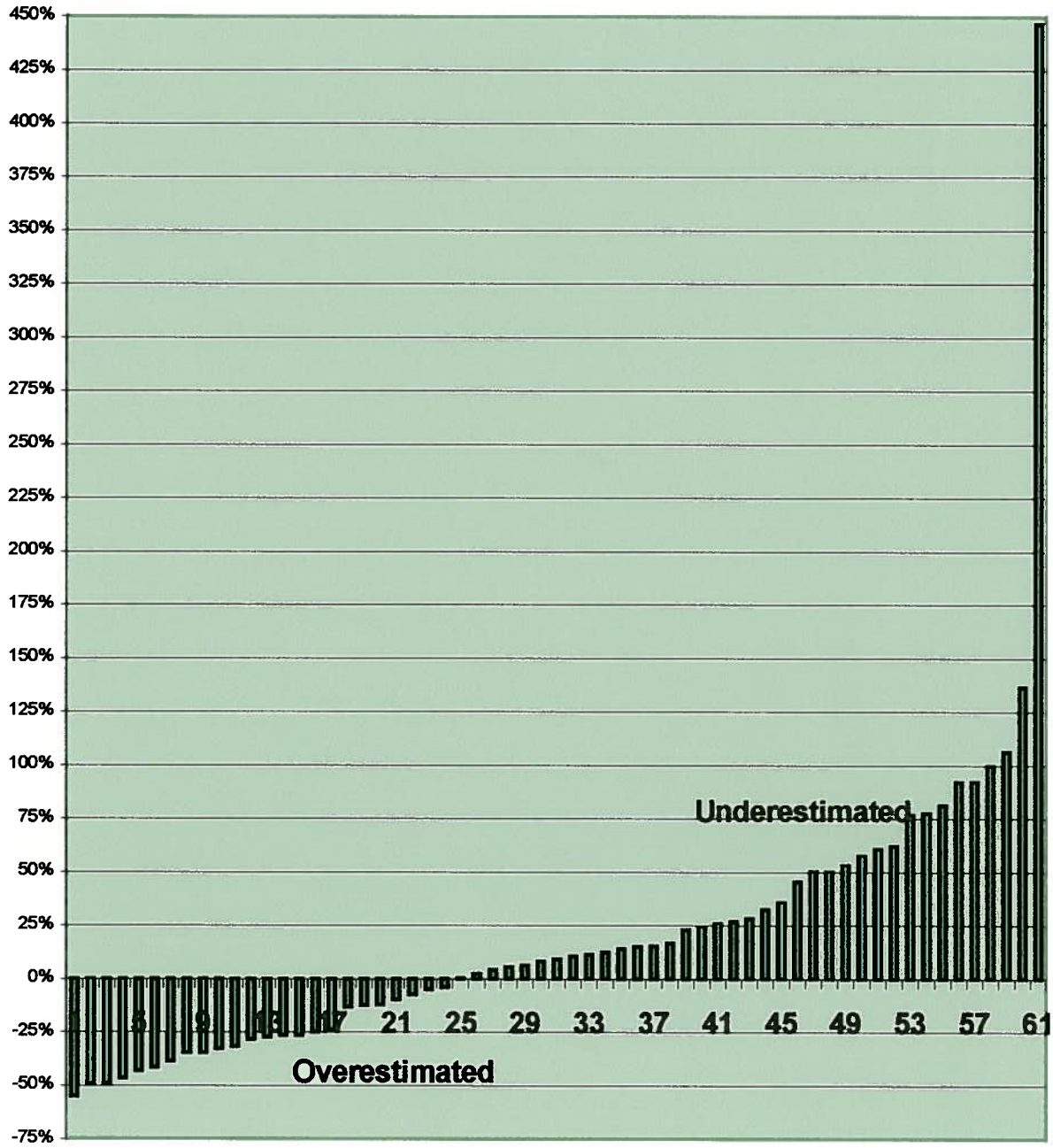
- Variances for projects that were underestimated tended to be larger percentage-wise, but smaller in absolute terms than projects that were overestimated.

- No Gas-by-Tax mains were constructed in 2000. One Gas-by-Tax main was constructed in 1999 (see Item 53 in *Table 1, 1999 Contributory Main Extensions, 1999Main Extension Review*).

3.1.2 Projected One and Five Year Customer Additions

For contributory main extensions, on average, there were two customers projected at the end of the first year, and seven by the end of the fifth year. Note, however, that 71% of these main extensions were initially for a single customer. For more information, please refer to *Appendix 1: Table 1.*

Graph 1
2000 Contributory Main Extensions
Variance of Actual Costs as a Percentage of Estimate
(n=65)



3.2 Non-contributory Main Extensions (NPV < $1,000 per customer)

3.2.1 Construction Costs

A total of 91 non-contributory main extensions with a Net Present Value (NPV) of less than $1,000 were reviewed. Most of these main extensions (70%) were constructed in the Interior. In 1999, 83% of the low NPV main extensions constructed were in the Interior. Below are the main findings:

- On average, BC Gas underestimated the cost of building a low NPV main extension by 1% (an average $50 variance on an average estimated job cost of $4,123). Please refer to *Appendix 1: Table 2 -2000 Non-contributory Main Extensions NPV<$1,000.*

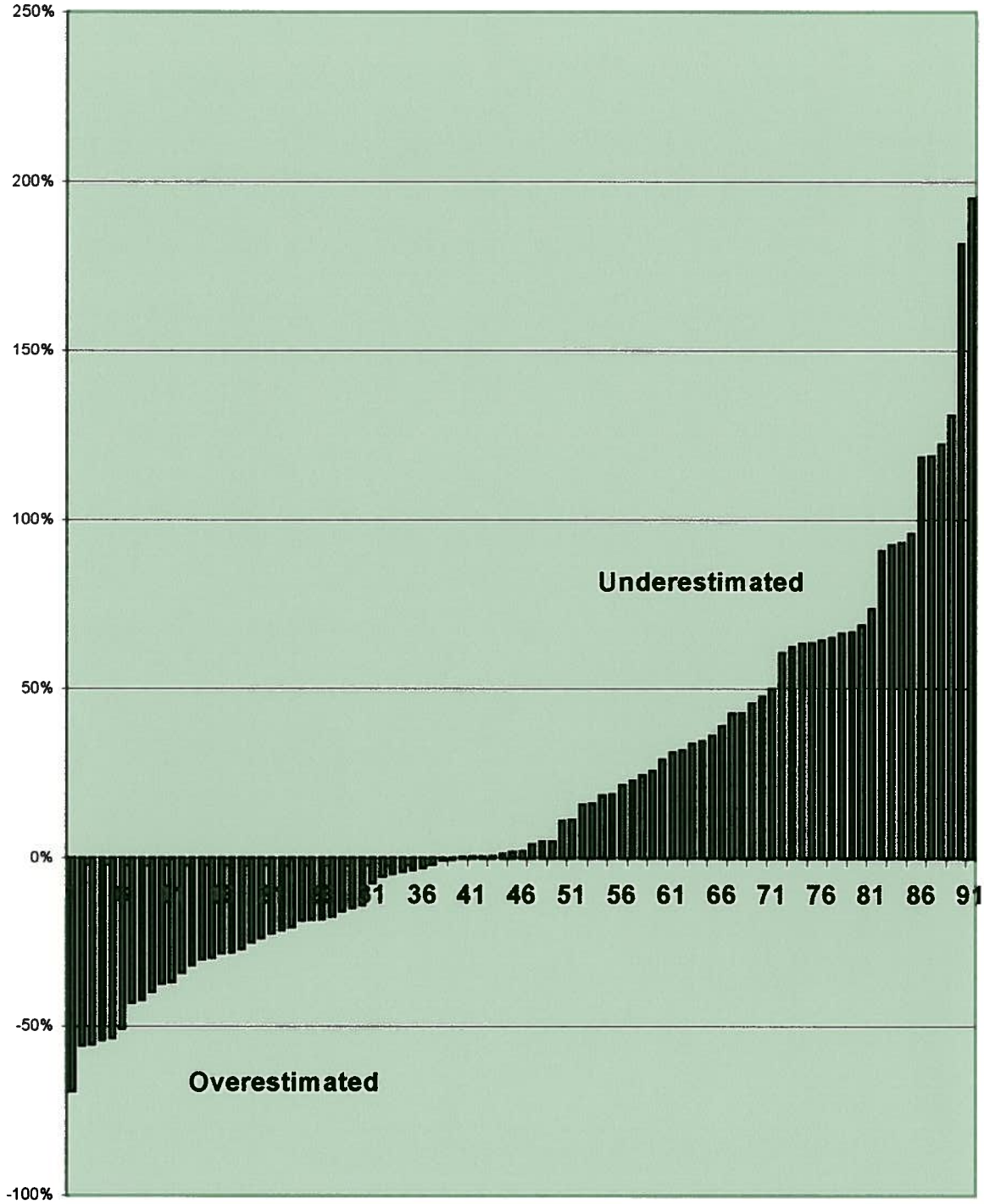
- Just over half (52%) of low NPV non-contributory main extension cost variances fell within +/- 30% range. Please refer to *Graph 2* on the next page.

For low NPV mains, projects that were underestimated tended to have larger variances percentage-wise and in absolute terms than mains that were underestimated.

3.2.2 Projected One and Five Year Customer Additions

On average, two customers were projected at the end of the first year, and three by the end of the fifth year for low NPV main extensions. The majority of main extensions (71%) were initially for a single customer. For further detail, please refer to *Appendix 1: Table 2.*

Graph 2
2001 Non-contributory Main Extensions
Variance of Actual Costs as a Percentage of Estimate
(n=90)



3.3 Non-contributory Main Extensions (NPV ≥ $1,000 per customer)

3.3.1 Construction Costs

A total of 182 non-contributory main extensions with a NPV equal to, or greater than, $1,000 were reviewed. The majority of these main extensions (63%) were constructed in the Coastal region. In 1999, 68% of high NPV main extensions were constructed in the Coastal region. Below are the major findings:

- On average, BC Gas underestimated the cost of building a high NPV main extension by 10% (an average $1,041 variance on an average estimated job cost of $10,858). Please refer to *Appendix 1: Table 3 - 2000 Non-contributory Main Extensions NPV ≥ $1,000.*

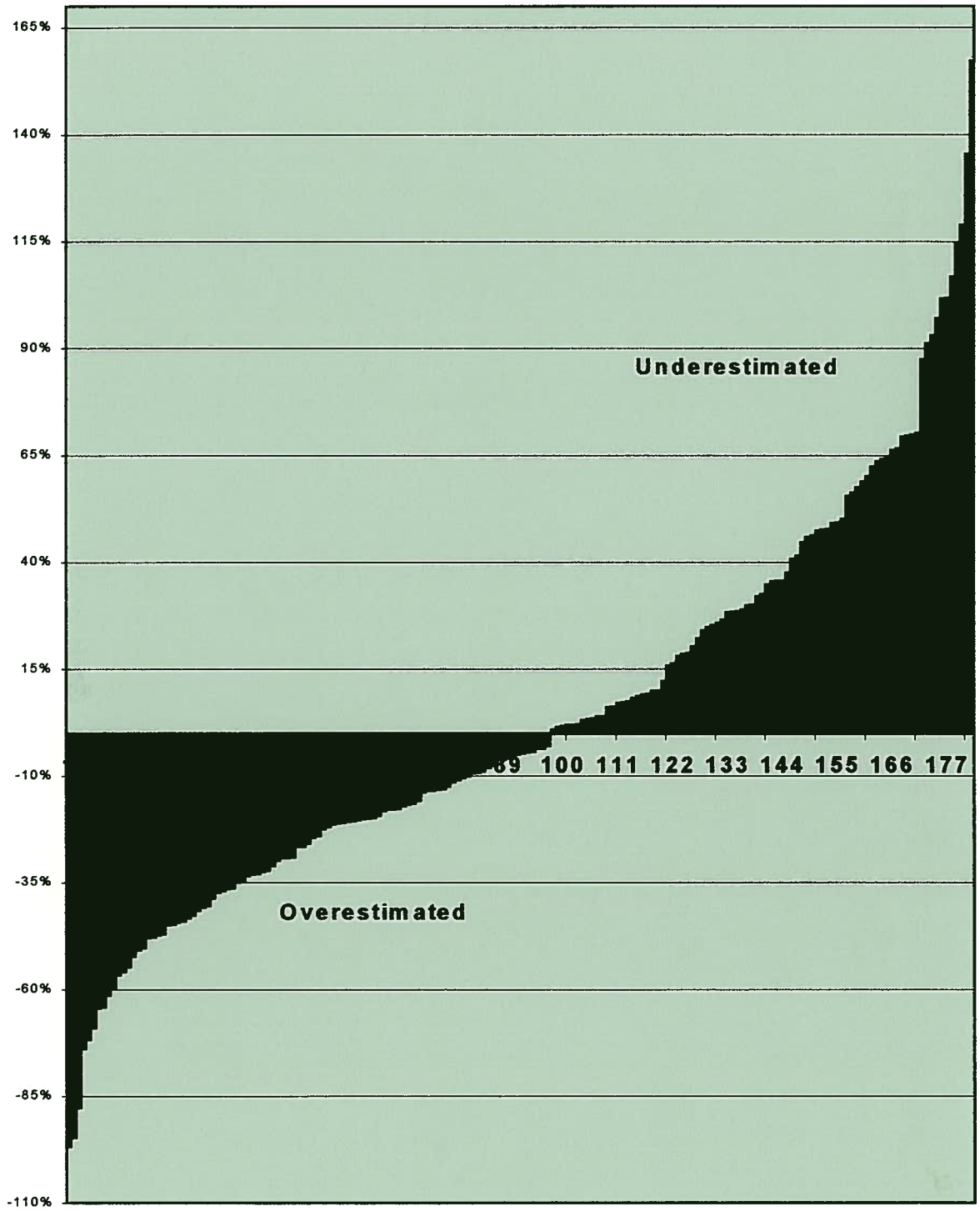
- Just over half (53%) of non-contributory main extensions cost variances fell within the +/- 30% range. Please refer to *Graph 3* on the next page.

- High NPV projects that underestimated costs tended to have larger variances percentage-wise and in absolute terms than projects that were overestimated.

3.3.2 Projected One and Five Year Customer Additions

High NPV main extensions, on average, projected eight customer additions at the end of the first year and fifteen at the end of the fifth year. One-third (32%) of main extensions were initially for a single customer. For further information, please refer to *Appendix 1: Table 3.*

Graph 3
2000 Non-contributory Main Extensions
NPV ≥ $1,000
(n=182)



3.4 Actual versus Estimated Costs – Variance Explanations

When actual construction costs were lower than estimated, the most common reasons were data entry problems and unforeseen circumstances (weather, soil conditions, and late design changes). This held true for all types of main extensions.

When actual costs were greater than estimated costs, the two main reasons were changes in the resources used (e.g. contractor vs. BC Gas crew) and unforeseen circumstances (weather or soil conditions).

The percentage of main extension estimates that were within +/- 30% of the actual costs was significantly higher for contributory main extensions (64%) than for low NPV (52%) and high NPV (54%) non-contributory main extensions. Since contributory main extensions require contributions in aid of construction from customers, they are developed with a higher level of accuracy than non-contributory main extensions.

4.0 First Year Customer Additions for Sample 1999 Main Extensions

4.1 Customer Additions – Sample 1999 Contributory Main Extensions

The sample of 1999 contributory main extensions contains 55 mains. Below are the major findings:

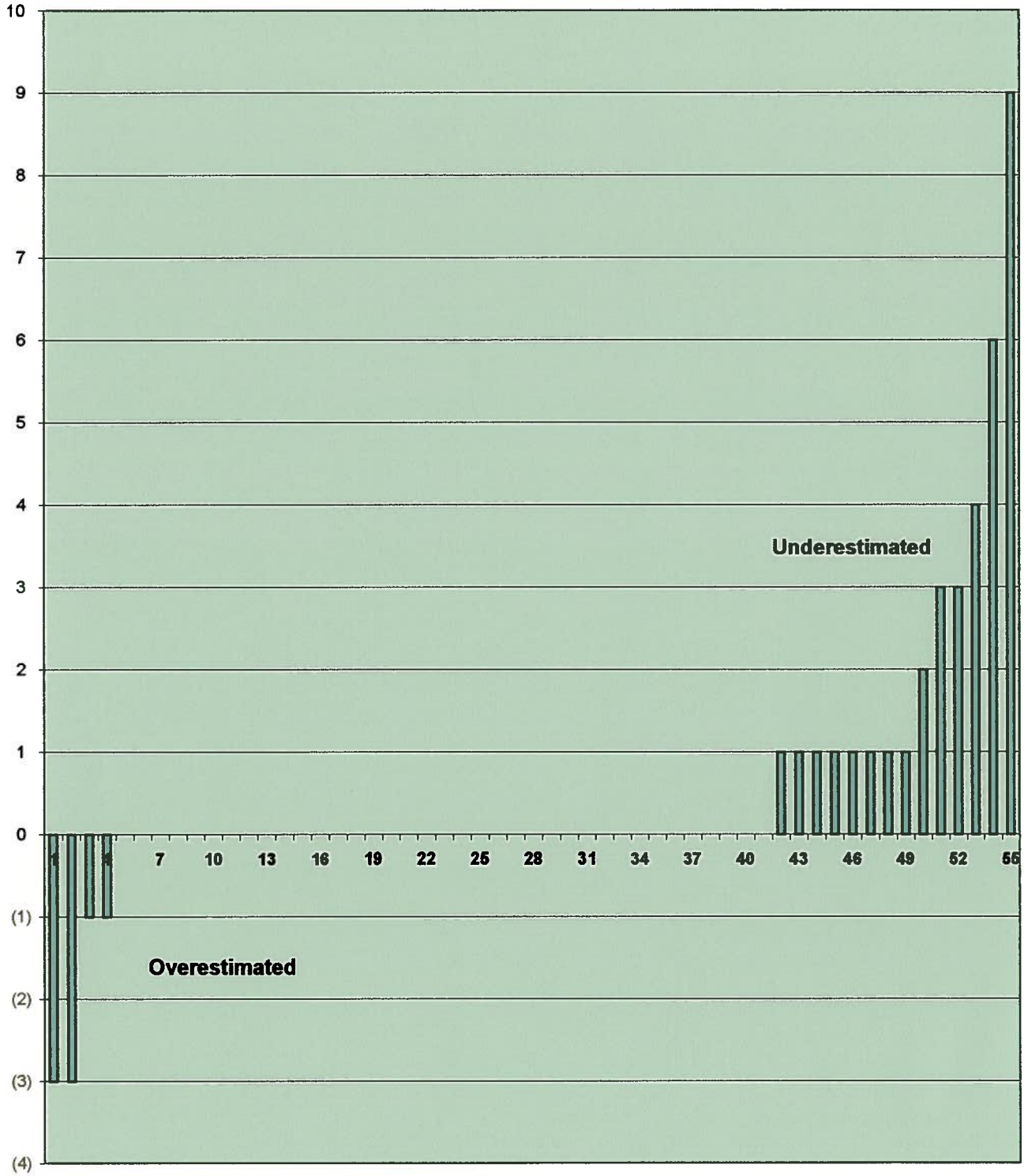
- First year customer additions were correctly predicted for 67% of contributory main extensions (note that 69% of estimated first year customer additions for 1999 contributory main extensions were for a single customer). Please refer to *Appendix 1: Table 4 - 1999 Contributory Main Extensions First Year Customer Additions.*

- Thirty three percent of 1999 contributory main extensions exhibited customer addition variances: 7% were overestimated and 26% were underestimated. Please refer to *Graph 4* on the next page. Thirty nine percent of contributory mains showed variances, in 1998.

- On average, the actual first year customer additions equalled projected additions.

- One large project accounted for one third of the customer addition variance.

Graph 4
Sample 1999 Contributory Main Extensions
First Year Customer Addition Variances
(n=55)



4.2 Customer Additions – Sample 1999 Non-contributory Main Extensions (NPV < $1,000)

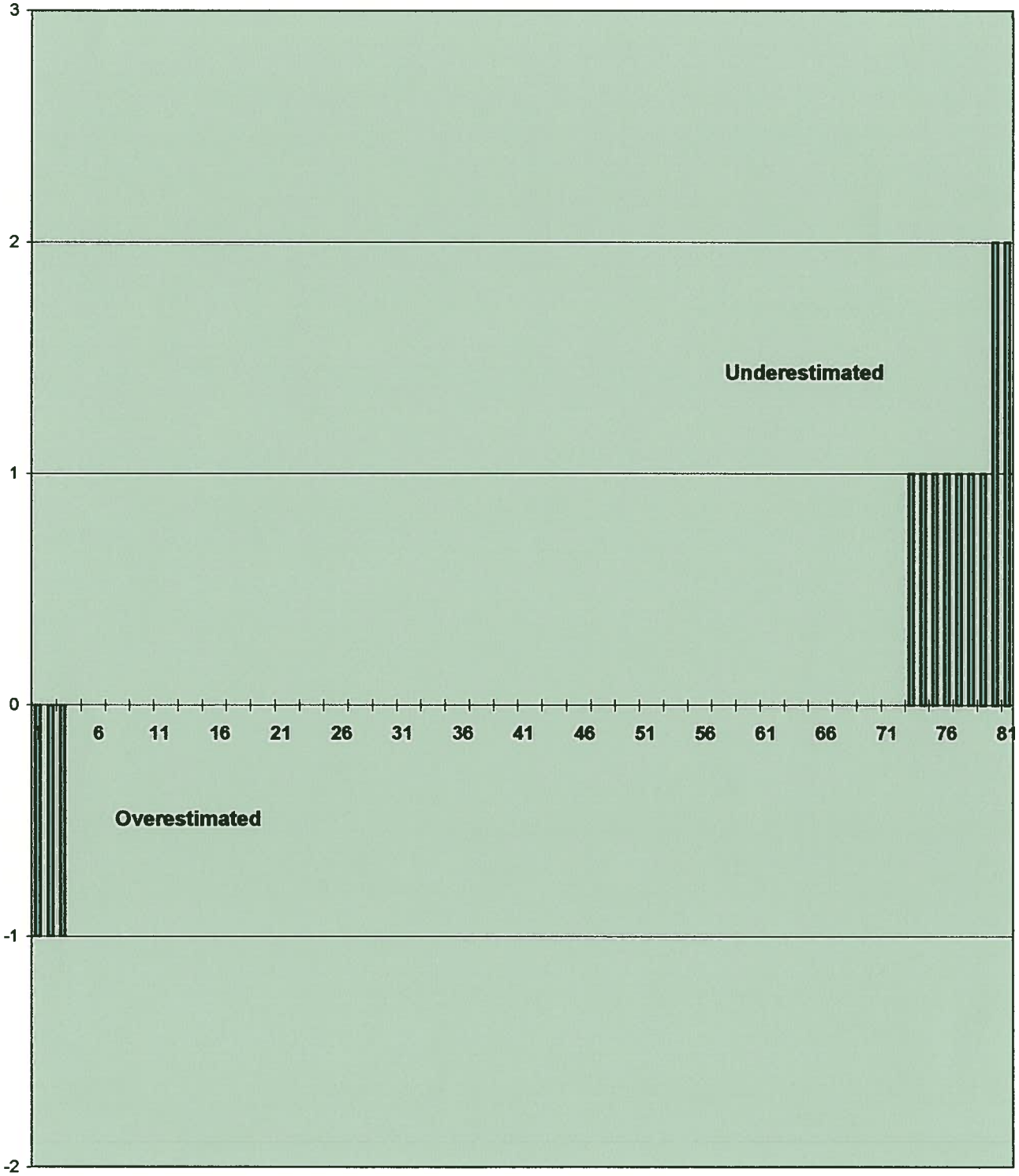
The sample of 1999 non-contributory main extensions with a Net Present Value (NPV) of less than $1,000 contains 81 mains. Please refer to *Appendix 1: Table 5 - 1999 Non-contributory Main Extensions First Year Customer Additions Variance for NPV < $1,000.* The major findings are as follows:

- Estimates of first year customer additions were correct for 85% of low NPV non-contributory main extensions (note that 85% of estimated first year customer additions for 1999 non-contributory main extensions for NPV <$1,000 were for a single customer). Please refer to *Graph 5* on the next page.

- On average, the actual first year customer additions equalled projected additions.

- Of the 15% of low NPV non-contributory main extensions that showed variances: 4% were overestimated and 11% were underestimated. In 1998, forty eight percent of low NPV non-contributory mains showed variances.

Graph 5
Sample 1999 Non-contributory Main Extensions
First Year Customer Addition Variances for NPV < $1,000
(n=81)



4.3 Customer Additions – Sample 1999 Non-contributory Main Extensions (NPV ≥ $1,000)

The sample 1999 non-contributory main extensions with an NPV greater than or equal to $1,000 contains 130 mains. The main findings are below:

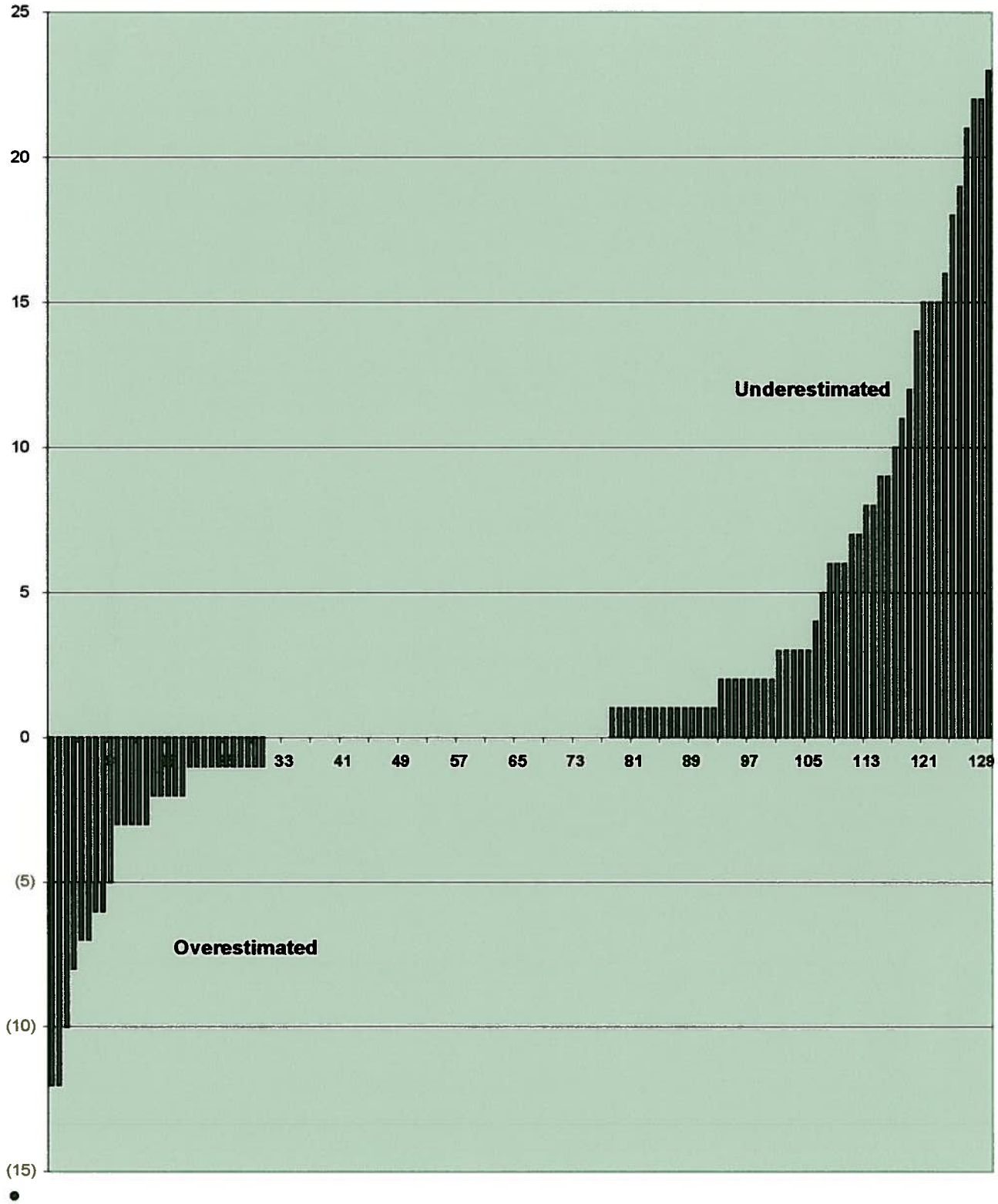
- First year customer additions were accurately predicted for 36% of high NPV non-contributory main extensions (note that 35% of estimated first year customer additions for high NPV main extensions were for a single customer). Please refer to *Appendix 1: Table 6 - 1999 Non-contributory Main Extensions NPV ≥ $1,000 First Year Customer Additions.*

- Of the 64% of high NPV non-contributory main extensions that showed a variance: 23% were overestimated and 41% were underestimated. Please refer to *Graph 6* on the next page. In 1998, fifty nine percent of high NPV non-contributory mains exhibited variances.

- On average, actual first year customer additions exceeded projected additions by two.

- The ten largest variances accounted for 76% of the total variance.

Graph 6
Sample 1999 Non-contributory Main Extensions
First Year Customer Additions Variances for NPV ≥ $1,000
(n=130)



4.4 Discussion of First Year Customer Additions for 1999 Main Extensions

In comparing the first year customer connection variances for 1999 main extensions, the following similarities were noted:

- Low NPV mains have the highest percentage of mains projecting a single customer connecting in the first year, while high NPV mains have the lowest.

- The accuracy of estimated first year connections is also related to each type of main extension. The estimate of first year connections was correct for 67% of contributory mains, 85% of low NPV mains and 36% high NPV mains.

- For all three types of mains, the number of customers connecting in the first year was underestimated. The total variance for high NPV mains was skewed by a dozen projects with large variances.

- The large variances for high NPV mains were due to rapid growth in new subdivisions.

5.0 Discussion

In comparing the three types of mains in the 2000 and 1999 main extension reviews, the following items were noted:

5.1 Construction Costs

- On average, main extensions were underestimated in 1999 and 2000.
- For both 1999 and 2000, projects that were underestimated had greater variances than projects that were overestimated.
- The variance distributions are similar for 1999 and 2000; both show no bias between estimating costs for the contributory and the two groups of non-contributory main extensions.

5.2 Customer Additions

- The projected average number of first year customers connecting to a contributory main fell from four in 1998 to three in 1999, but the number of contributory mains was the same in both years.
- The projected average number of first year customers connecting to a low NPV main fell from four in 1998 to one in 1999.
- The projected average number of first year customers to connecting a to a high NPV main fell from eight in 1998 to six in 1999, but the number of high NPV mains increased to 170 in 1999 from 22 in 1998.

Appendix 1 - Detailed Results

Table 1
2000 Contributory Main Extensions

Item	MX Test NPV	Projected 1st Year Customers	Projected 5th Year Customers	Actual Job Cost	Estimated Job Cost	Variance	Variance as a % of Estimate
1	(1,410)	2	2	1,662	4,454	(2,792)	-63%
2	(1,047)	1	2	1,299	3,262	(1,963)	-60%
3	(308)	1	1	550	1,368	(818)	-60%
4	(10,045)	10	18	12,921	29,758	(16,837)	-57%
5	(1)	1	2	929	2,062	(1,133)	-55%
6	(195)	1	1	847	1,677	(830)	-49%
7	(256)	1	1	3,798	7,460	(3,662)	-49%
8	(8,174)	2	2	6,735	12,611	(5,876)	-47%
9	(1,086)	2	3	1,876	3,298	(1,422)	-43%
10	(1,212)	1	2	2,125	3,635	(1,510)	-42%
11	(3,824)	1	1	2,484	4,060	(1,576)	-39%
12	(659)	1	1	1,121	1,721	(600)	-35%
13	(799)	2	2	1,950	2,986	(1,036)	-35%
14	(1,937)	1	1	1,221	1,819	(598)	-33%
15	(2,567)	1	1	1,313	1,924	(611)	-32%
16	(2,567)	1	1	1,400	1,951	(551)	-28%
17	(9,999)	2	5	7,778	10,700	(2,922)	-27%
18	(1,259)	1	1	1,898	2,583	(685)	-27%
19	(1,106)	1	1	1,067	1,449	(382)	-26%
20	(3,293)	1	1	2,820	3,745	(925)	-25%
21	(1,553)	2	2	2,260	2,967	(707)	-24%
22	(2,717)	1	1	2,901	3,335	(434)	-13%
23	(3,332)	3	4	6,224	7,119	(895)	-13%
24	(10,606)	2	2	7,654	8,694	(1,040)	-12%
25	(22)	2	2	802	889	(87)	-10%
26	(219)	1	2	1,616	1,745	(129)	-7%
27	(6,694)	2	7	11,225	11,815	(590)	-5%
28	(295)	1	1	1,082	1,126	(44)	-4%
29	(4,054)	1	1	4,216	4,208	8	0%
30	(6,425)	1	3	11,180	10,900	280	3%
31	(2,922)	3	8	7,432	7,128	304	4%
32	(3,328)	5	5	22,204	20,996	1,208	6%
33	(89)	1	2	1,959	1,845	114	6%
34	(2,137)	1	1	1,933	1,787	146	8%
35	(3,370)	1	1	12,650	11,590	1,060	9%
36	(298,337)	37	321	422,178	381,624	40,554	11%

Table 1 (Continued)
2000 Contributory Main Extensions

Item	MX Test NPV	Projected 1st Year Customers	Projected 5th Year Customers	Actual Job Cost	Estimated Job Cost	Variance	Variance as a % of Estimate
37	(1,607)	1	1	2,707	2,428	279	11%
38	(1,249)	1	1	1,893	1,683	210	12%
39	(1,950)	1	1	3,329	2,919	410	14%
40	(594)	1	1	2,225	1,931	294	15%
41	(2,514)	1	1	5,977	5,179	798	15%
42	(667)	1	1	953	816	137	17%
43	(2,747)	1	1	5,957	4,840	1,117	23%
44	(357)	1	2	2,817	2,264	553	24%
45	(2,030)	1	1	3,918	3,106	812	26%
46	(11,155)	3	3	13,481	10,616	2,865	27%
47	(87)	1	1	4,016	3,126	890	28%
48	(11,333)	3	3	23,109	17,435	5,674	33%
49	(1,249)	1	2	3,227	2,375	852	36%
50	(3,708)	1	1	6,567	4,513	2,054	46%
51	(1,582)	1	1	1,377	915	462	50%
52	(84)	1	1	1,090	724	366	51%
53	(1,993)	1	1	2,502	1,634	868	53%
54	(272)	1	1	2,584	1,639	945	58%
55	(3,702)	1	1	7,303	4,538	2,765	61%
56	(57)	2	2	5,638	3,473	2,165	62%
57	(701)	1	1	3,253	1,839	1,414	77%
58	(428)	1	1	2,768	1,558	1,210	78%
59	(2,237)	2	2	9,051	4,992	4,059	81%
60	(90)	1	1	2,526	1,315	1,211	92%
61	(9,643)	23	38	83,889	43,554	40,335	93%
62	(845)	1	1	3,492	1,748	1,744	100%
63	(37)	1	1	2,603	1,260	1,343	107%
64	(45)	1	1	3,239	1,369	1,870	137%
65	(1,887)	1	1	14,812	2,710	12,102	447%
	($462,694)	155	486	$799,613	$716,790	$82,823	12%
	Average	**2**	**7**	**$12,302**	**$11,028**	**$1,274**	**12%**

Table 2
2000 Non-contributory Main Extensions
NPV < $1,000

Item	MX Test NPV	Projected 1st Year Customers	Projected 5th Year Customers	Actual Job Cost	Estimated Job Cost	Variance	Variance as a % of Estimate
1	384	16	48	21,222	68,650	(47,428)	-69%
2	677	2	6	2,233	5,010	(2,777)	-55%
3	532	1	3	1,196	2,661	(1,465)	-55%
4	919	5	5	1,886	4,077	(2,191)	-54%
5	714	1	1	147	314	(167)	-53%
6	775	6	6	1,321	2,664	(1,343)	-50%
7	185	4	4	2,834	4,947	(2,113)	-43%
8	0	1	1	570	982	(412)	-42%
9	871	1	5	2,133	3,529	(1,396)	-40%
10	400	1	1	461	733	(272)	-37%
11	21	1	1	1,010	1,594	(584)	-37%
12	228	4	8	1,873	2,832	(959)	-34%
13	44	1	2	2,282	3,340	(1,058)	-32%
14	326	1	2	1,356	1,933	(577)	-30%
15	712	5	8	5,515	7,817	(2,302)	-29%
16	306	2	3	1,490	2,076	(586)	-28%
17	26	1	1	548	760	(212)	-28%
18	610	2	2	2,138	2,920	(782)	-27%
19	28	1	1	897	1,195	(298)	-25%
20	183	1	1	1,094	1,432	(338)	-24%
21	528	1	2	776	998	(222)	-22%
22	494	1	1	810	1,029	(219)	-21%
23	547	20	40	13,803	17,353	(3,550)	-20%
24	230	1	1	902	1,105	(203)	-18%
25	45	1	1	840	1,026	(186)	-18%
26	562	2	2	2,668	3,254	(586)	-18%
27	226	1	1	690	833	(143)	-17%
28	570	1	2	1,441	1,709	(268)	-16%
29	9	1	2	31,060	36,390	(5,330)	-15%
30	776	2	3	2,741	3,184	(443)	-14%
31	681	1	1	743	802	(59)	-7%
32	97	1	1	1,546	1,633	(87)	-5%
33	578	1	1	830	869	(39)	-4%
34	43	1	2	1,874	1,949	(75)	-4%
35	435	1	1	584	605	(21)	-3%
36	921	2	2	1,651	1,699	(48)	-3%

Table 2 (Continued)
2000 Non-contributory Main Extensions
NPV < $1,000

Item	MX Test NPV	Projected 1st Year Customers	Projected 5th Year Customers	Actual Job Cost	Estimated Job Cost	Variance	Variance as a % of Estimate
37	556	1	1	504	513	(9)	-2%
38	632	2	2	548	551	(3)	-1%
39	890	3	3	1,321	1,325	(4)	0%
40	465	1	2	3,230	3,228	2	0%
41	952	1	1	573	572	1	0%
42	566	7	20	11,925	11,887	38	0%
43	81	1	1	1,350	1,345	5	0%
44	314	1	1	721	713	8	1%
45	9	4	4	3,673	3,613	60	2%
46	145	1	1	1,528	1,501	27	2%
47	25	1	4	10,541	10,143	398	4%
48	0	1	1	428	409	19	5%
49	495	1	1	721	688	33	5%
50	628	2	3	2,322	2,096	226	11%
51	5	1	1	1,601	1,441	160	11%
52	50	1	2	972	840	132	16%
53	58	1	3	4,431	3,821	610	16%
54	158	1	1	1,421	1,200	221	18%
55	896	3	3	2,823	2,379	444	19%
56	121	1	1	5,398	4,443	955	21%
57	839	2	2	2,377	1,937	440	23%
58	737	1	1	1,058	851	207	24%
59	594	1	1	664	529	135	26%
60	842	3	3	4,701	3,642	1,059	29%
61	48	1	2	1,211	924	287	31%
62	941	1	2	30,298	22,988	7,310	32%
63	420	1	1	1,853	1,386	467	34%
64	88	1	1	2,143	1,594	549	34%
65	317	1	1	997	733	264	36%
66	907	1	1	8,637	6,219	2,418	39%
67	657	1	1	465	326	139	43%
68	33	1	1	577	404	173	43%
69	666	1	2	1,730	1,188	542	46%
70	55	2	4	11,657	7,889	3,768	48%
71	85	5	25	10,933	7,287	3,646	50%

Table 2 (Continued)
2000 Non-contributory Main Extensions
NPV < $1,000

Item	MX Test NPV	Projected 1st Year Customers	Projected 5th Year Customers	Actual Job Cost	Estimated Job Cost	Variance	Variance as a % of Estimate
72	887	1	1	474	295	179	61%
73	0	1	1	24,074	14,827	9,247	62%
74	514	1	2	3,600	2,203	1,397	63%
75	48	1	1	1,383	846	537	63%
76	467	2	2	41,398	25,190	16,208	64%
77	415	1	1	1,005	609	396	65%
78	168	1	1	1,209	727	482	66%
79	214	1	1	1,399	839	560	67%
80	72	1	1	756	448	308	69%
81	879	1	1	670	386	284	74%
82	940	5	10	2,229	1,169	1,060	91%
83	663	1	1	1,442	749	693	93%
84	832	1	1	3,840	1,988	1,852	93%
85	862	2	2	3,082	1,573	1,509	96%
86	373	1	1	3,647	1,669	1,978	119%
87	547	1	2	2,477	1,132	1,345	119%
88	373	1	1	31,195	14,026	17,169	122%
89	672	1	3	2,034	881	1,153	131%
90	694	1	1	839	298	541	182%
91	931	1	2	2,478	840	1,638	195%
	39,509	179	312	379,728	375,204	4,524	1%
	Average	**2**	**3**	**$4,173**	**$4,123**	**$50**	**1%**

Table 3

2000 Non-contributory Main Extensions
NPV ≥ $1,000

Item	MX Test NPV	Projected 1st Year Customers	Projected 5th Year Customers	Actual Job Cost	Estimated Job Cost	Variance	Variance as a % of Estimate
1	5,858	2	4	47	1,411	(1,364)	-97%
2	4,016	8	8	324	5,919	(5,595)	-95%
3	1,352	1	1	152	1,224	(1,072)	-88%
4	1,827	2	2	157	599	(442)	-74%
5	1,211	1	1	389	1,372	(983)	-72%
6	5,451	4	18	6,071	19,515	(13,444)	-69%
7	2,530	5	14	3,430	9,609	(6,179)	-64%
8	2,336	2	2	192	535	(343)	-64%
9	3,834	4	4	407	1,051	(644)	-61%
10	2,603	2	2	656	1,626	(970)	-60%
11	12,174	1	1	553	1,275	(722)	-57%
12	1,112	1	1	4,925	11,134	(6,209)	-56%
13	204,952	14	14	23,187	51,106	(27,919)	-55%
14	10,375	8	8	721	1,509	(788)	-52%
15	3,422	1	1	1,076	2,183	(1,107)	-51%
16	4,207	1	1	777	1,558	(781)	-50%
17	4,972	5	5	1,785	3,422	(1,637)	-48%
18	1,699	4	8	3,761	7,181	(3,420)	-48%
19	12,663	1	1	723	1,369	(646)	-47%
20	331,505	51	251	17,030	32,098	(15,068)	-47%
21	13,716	5	13	1,865	3,375	(1,510)	-45%
22	7,006	2	4	1,062	1,920	(858)	-45%
23	27,694	3	19	3,489	6,248	(2,759)	-44%
24	2,160	1	2	416	743	(327)	-44%
25	37,178	3	5	5,193	9,147	(3,954)	-43%
26	20,645	5	5	1,608	2,801	(1,193)	-43%
27	5,723	4	16	2,883	4,924	(2,041)	-41%
28	31,878	10	19	4,596	7,761	(3,165)	-41%
29	1,532	1	2	1,582	2,652	(1,070)	-40%
30	19,153	10	19	5,588	9,095	(3,507)	-39%
31	11,877	1	1	11,121	17,728	(6,607)	-37%
32	22,482	40	81	14,193	22,482	(8,289)	-37%
33	20,503	1	2	2,797	4,390	(1,593)	-36%
34	20,761	10	19	2,857	4,479	(1,622)	-36%
35	2,892	3	3	582	893	(311)	-35%
36	37,725	33	33	7,000	10,712	(3,712)	-35%
37	9,120	5	14	9,053	13,591	(4,538)	-33%

Table 3 (Continued)
2000 Non-contributory Main Extensions
NPV ≥ $1,000

Item	MX Test NPV	Projected 1st Year Customers	Projected 5th Year Customers	Actual Job Cost	Estimated Job Cost	Variance	Variance as a % of Estimate
38	9,437	2	8	1,387	2,068	(681)	-33%
39	10,294	4	12	3,007	4,478	(1,471)	-33%
40	27,759	5	22	2,747	4,061	(1,314)	-32%
41	9,399	2	8	1,779	2,621	(842)	-32%
42	13,981	3	15	5,262	7,626	(2,364)	-31%
43	24,239	1	1	4,473	6,364	(1,891)	-30%
44	27,440	5	14	12,311	17,367	(5,056)	-29%
45	2,194	1	2	470	663	(193)	-29%
46	45,970	20	46	10,260	14,444	(4,184)	-29%
47	5,374	3	7	4,458	6,069	(1,611)	-27%
48	23,227	1	1	1,487	2,022	(535)	-26%
49	4,854	6	12	4,073	5,483	(1,410)	-26%
50	1,050	2	2	1,471	1,946	(475)	-24%
51	7,214	3	8	2,164	2,847	(683)	-24%
52	1,359	1	1	235	303	(68)	-22%
53	462,909	1	1	6,675	8,534	(1,859)	-22%
54	12,564	8	16	4,733	6,010	(1,277)	-21%
55	5,183	4	4	1,612	2,041	(429)	-21%
56	$56,409	7	20	26,922	34,012	(7,090)	-21%
57	160,447	1	1	3,775	4,758	(983)	-21%
58	11,483	10	10	2,049	2,579	(530)	-21%
59	6,830	1	1	1,741	2,183	(442)	-20%
60	3,617	1	1	1,606	2,008	(402)	-20%
61	27,912	2	2	1,388	1,733	(345)	-20%
62	1,033	1	1	715	890	(175)	-20%
63	55,070	10	47	16,538	20,486	(3,948)	-19%
64	12,711	15	15	3,964	4,843	(879)	-18%
65	73,315	59	59	4,224	5,141	(917)	-18%
66	21,650	1	8	3,980	4,842	(862)	-18%
67	14,068	10	17	4,662	5,663	(1,001)	-18%
68	6,503	12	20	11,447	13,785	(2,338)	-17%
69	23,485	8	40	9,611	11,521	(1,910)	-17%
70	54,567	38	38	9,918	11,874	(1,956)	-16%
71	92,505	76	76	25,405	30,170	(4,765)	-16%
72	18,654	12	20	6,099	7,070	(971)	-14%
73	4,262	4	4	2,003	2,314	(311)	-13%

Table 3 (Continued)
2000 Non-contributory Main Extensions
NPV ≥ $1,000

Item	MX Test NPV	Projected 1st Year Customers	Projected 5th Year Customers	Actual Job Cost	Estimated Job Cost	Variance	Variance as a % of Estimate
74	1,158	3	3	986	1,139	(153)	-13%
75	3,613	2	6	1,523	1,755	(232)	-13%
76	1,376	1	1	7,074	8,129	(1,055)	-13%
77	3,044	2	6	963	1,099	(136)	-12%
78	19,000	15	25	7,103	8,019	(916)	-11%
79	10,258	4	12	4,697	5,268	(571)	-11%
80	7,114	11	11	5,267	5,883	(616)	-10%
81	7,041	6	6	1,696	1,885	(189)	-10%
82	12,068	6	19	5,291	5,835	(544)	-9%
83	15,035	14	14	3,947	4,347	(400)	-9%
84	9,947	10	10	4,581	5,028	(447)	-9%
85	22,262	1	1	64,985	70,666	(5,681)	-8%
86	59,970	8	20	26,475	28,624	(2,149)	-8%
87	1,974	1	4	6,130	6,537	(407)	-6%
88	2,479	3	3	1,089	1,160	(71)	-6%
89	1,527	1	1	209	222	(13)	-6%
90	99,155	1	3	18,788	19,890	(1,102)	-6%
91	13,503	1	1	8,483	8,917	(434)	-5%
92	61,143	7	32	8,209	8,608	(399)	-5%
93	46,762	1	1	11,438	11,963	(525)	-4%
94	37,386	12	34	9,908	10,350	(442)	-4%
95	1,845	5	25	13,630	14,137	(507)	-4%
96	1,381	4	4	2,969	3,079	(110)	-4%
97	51,031	1	1	130,438	134,340	(3,902)	-3%
98	101,427	1	4	46,369	45,997	372	1%
99	76,304	1	2	12,473	12,298	175	1%
100	4,246	2	2	2,353	2,313	40	2%
101	7,646	4	9	4,882	4,788	94	2%
102	24,847	17	62	30,903	30,300	603	2%
103	17,902	1	15	7,373	7,223	150	2%
104	66,582	12	60	7,949	7,709	240	3%
105	99,351	1	1	3,811	3,689	122	3%
106	1,306	2	2	1,105	1,068	37	3%
107	12,829	1	6	10,345	9,956	389	4%
108	1,549	4	8	11,409	10,973	436	4%
109	10,502	7	11	3,719	3,506	213	6%

Table 3 (Continued)
2000 Non-contributory Main Extensions
NPV ≥ $1,000

Item	MX Test NPV	Projected 1st Year Customers	Projected 5th Year Customers	Actual Job Cost	Estimated Job Cost	Variance	Variance as a % of Estimate
110	1,408	1	1	2,220	2,091	129	6%
111	2,649	2	3	4,955	4,625	330	7%
112	11,252	22	87	65,553	61,171	4,382	7%
113	6,659	3	11	4,000	3,724	276	7%
114	25,658	10	20	1,896	1,753	143	8%
115	16,486	10	18	8,454	7,781	673	9%
116	36,607	10	33	12,609	11,570	1,039	9%
117	25,884	1	1	126,898	116,256	10,642	9%
118	42,189	20	43	19,094	17,358	1,736	10%
119	3,171	4	9	10,890	9,897	993	10%
120	14,307	1	1	34,885	31,091	3,794	12%
121	768,915	1	1	19,115	16,509	2,606	16%
122	25,724	15	29	12,024	10,338	1,686	16%
123	28,746	30	20	9,267	7,847	1,420	18%
124	1,964	2	2	1,130	954	176	18%
125	34,761	10	30	9,945	8,379	1,566	19%
126	24,101	17	17	6,512	5,414	1,098	20%
127	2,033	1	3	2,709	2,218	491	22%
128	20,978	1	1	12,251	9,876	2,375	24%
129	6,011	1	7	4,067	3,259	808	25%
130	19,101	9	18	5,805	4,632	1,173	25%
131	6,807	4	6	2,746	2,182	564	26%
132	297,992	1	1	60,280	47,618	12,662	27%
133	29,215	17	35	15,159	11,815	3,344	28%
134	6,718	3	7	2,543	1,980	563	28%
135	11,981	2	10	2,705	2,105	600	29%
136	2,944	2	5	1,899	1,473	426	29%
137	6,048	3	7	3,342	2,572	770	30%
138	3,004	2	4	2,981	2,292	689	30%
139	22,973	18	18	4,156	3,149	1,007	32%
140	61,776	25	49	19,702	14,864	4,838	33%
141	18,548	8	17	9,705	7,203	2,502	35%
142	97,840	1	1	52,923	39,055	13,868	36%
143	15,884	9	18	7,479	5,515	1,964	36%
144	2,097	2	3	2,537	1,870	667	36%
145	6,370	3	11	7,511	5,464	2,047	37%

Table 3 (Continued)
2000 Non-contributory Main Extensions
NPV ≥ $1,000

Item	MX Test NPV	Projected 1st Year Customers	Projected 5th Year Customers	Actual Job Cost	Estimated Job Cost	Variance	Variance as a % of Estimate
146	35,744	18	35	14,262	10,131	4,131	41%
147	2,712	2	6	4,687	3,312	1,375	42%
148	6,296	1	1	12,603	8,716	3,887	45%
149	50,092	1	1	3,060	2,097	963	46%
150	1,502	2	2	2,253	1,541	712	46%
151	7,247	3	6	3,018	2,047	971	47%
152	261,653	72	144	17,033	11,540	5,493	48%
153	2,808	1	1	1,458	987	471	48%
154	5,693	12	12	2,279	1,528	751	49%
155	4,438	5	19	20,050	13,436	6,614	49%
156	61,940	15	63	17,848	11,888	5,960	50%
157	68,547	10	66	13,135	8,448	4,687	55%
158	5,740	3	6	3,389	2,170	1,219	56%
159	50,367	2	2	15,337	9,740	5,597	57%
160	3,386	4	4	1,723	1,085	638	59%
161	2,423	2	2	1,482	926	556	60%
162	4,311	3	3	2,781	1,713	1,068	62%
163	73,200	36	66	25,176	15,394	9,782	64%
164	12,621	10	15	8,602	5,242	3,360	64%
165	42,554	38	38	6,637	4,037	2,600	64%
166	1,319	1	1	1,441	867	574	66%
167	29,777	13	27	10,041	6,031	4,010	66%
168	1,838	1	4	4,965	2,933	2,032	69%
169	9,215	1	1	2,275	1,341	934	70%
170	7,613	1	1	4,821	2,840	1,981	70%
171	568,342	1	1	425,538	249,990	175,548	70%
172	3,199	1	3	1,398	746	652	87%
173	5,913	4	12	7,660	4,008	3,652	91%
174	10,539	1	13	14,861	7,698	7,163	93%
175	99,319	70	70	4,055	2,058	1,997	97%
176	17,129	3	14	4,743	2,352	2,391	102%
177	4,049	1	1	2,006	994	1,012	102%
178	21,388	1	2	57,840	27,981	29,859	107%
179	3,412	1	2	18,139	8,449	9,690	115%
180	2,551	1	1	650	297	353	119%
181	15,642	2	8	16,569	7,038	9,531	135%

Table 3 (Continued)
2000 Non-contributory Main Extensions
NPV ≥ $1,000

Item	MX Test NPV	Projected 1st Year Customers	Projected 5th Year Customers	Actual Job Cost	Estimated Job Cost	Variance	Variance as a % of Estimate
182	5,253	1	1	6,494	2,526	3,968	157%
	6,382,249	1,383	2,790	2,165,725	1,976,183	189,542	10%
	Average	**8**	**15**	**$11,900**	**$10,858**	**$1,041**	**10%**

Table 4
1999 Contributory Main Extensions
Customer Additions

Item	Projected 1st Year Customers	Actual 1st Year Customers	Variance	Projected 5th Year Customers
1	5	2	(3)	11
2	6	3	(3)	6
3	2	1	(1)	3
4	4	3	(1)	4
5	1	1	0	2
6	1	1	0	3
7	1	1	0	1
8	1	1	0	1
9	1	1	0	1
10	1	1	0	2
11	3	3	0	3
12	1	1	0	1
13	1	1	0	1
14	1	1	0	1
15	1	1	0	1
16	2	2	0	2
17	1	1	0	2
18	1	1	0	1
19	1	1	0	1
20	1	1	0	1
21	1	1	0	1
22	2	2	0	2
23	1	1	0	1
24	1	1	0	1
25	1	1	0	1
26	1	1	0	1
27	1	1	0	1
28	2	2	0	2
29	1	1	0	1
30	1	1	0	1
31	1	1	0	1
32	1	1	0	1
33	1	1	0	1
34	1	1	0	1
35	1	1	0	1
36	1	1	0	1

Table 4 (continued)
1999 Contributory Main Extensions
Customer Additions

Item	Projected 1st Year Customers	Actual 1st Year Customers	Variance	Projected 5th Year Customers
	2	2	0	2
37				
38	1	1	0	1
39	1	1	0	1
40	2	2	0	2
41	1	1	0	1
42	10	11	1	30
43	4	5	1	4
44	1	2	1	1
45	1	2	1	2
46	1	2	1	1
47	1	2	1	1
48	1	2	1	1
49	1	2	1	1
50	14	16	2	15
51	3	6	3	5
52	1	4	3	1
53	7	11	4	17
54	2	8	6	14
55	46	55	9	49
	154	181	27	215
Average	**3**	**3**	**0**	**4**

Table 5
1999 Contributory Main Extensions
NPV < $1,000
Customer Additions

Item	Projected 1st Year Customers	Actual 1st Year Customers	Variance	Projected 5th Year Customers
1	2	1	(1)	2
2	3	2	(1)	3
3	3	2	(1)	5
4	1	1	0	1
5	1	1	0	1
6	1	1	0	1
7	1	1	0	1
8	1	1	0	1
9	1	1	0	2
10	1	1	0	1
11	1	1	0	1
12	1	1	0	9
13	1	1	0	1
14	1	1	0	1
15	1	1	0	1
16	1	1	0	1
17	1	1	0	2
18	1	1	0	1
19	1	1	0	1
20	1	1	0	1
21	1	1	0	1
22	1	1	0	1
23	1	1	0	1
24	1	1	0	1
25	1	1	0	1
26	1	1	0	1
27	1	1	0	1
28	2	2	0	2
29	1	1	0	1
30	2	2	0	3
31	1	1	0	1
32	1	1	0	1
33	1	1	0	3
34	2	2	0	6
35	1	1	0	1
36	1	1	0	1
37	1	1	0	2

Table 5 (Continued)
1999 Contributory Main Extensions
NPV < $1,000
Customer Additions

Item	Projected 1st Year Customers	Actual 1st Year Customers	Variance	Projected 5th Year Customers
38	1	1	0	1
39	1	1	0	1
40	1	1	0	4
41	1	1	0	1
42	1	1	0	1
43	1	1	0	1
44	1	1	0	1
45	1	1	0	1
46	1	1	0	1
47	1	1	0	1
48	1	1	0	1
49	1	1	0	1
50	1	1	0	1
51	2	2	0	2
52	1	1	0	1
53	1	1	0	1
54	2	2	0	2
55	1	1	0	1
56	1	1	0	1
57	1	1	0	1
58	1	1	0	1
59	1	1	0	1
60	1	1	0	1
61	1	1	0	1
62	1	1	0	1
63	1	1	0	1
64	1	1	0	1
65	1	1	0	1
66	1	1	0	1
67	1	1	0	2
68	1	1	0	1
69	1	1	0	1
70	1	1	0	1
71	1	1	0	1
72	3	3	0	3
73	4	5	1	4
74	3	4	1	3

Table 5 (Continued)
1999 Contributory Main Extensions
NPV < $1,000
Customer Additions

Item	Projected 1st Year Customers	Actual 1st Year Customers	Variance	Projected 5th Year Customers
75	2	3	1	5
76	1	2	1	2
77	1	2	1	3
78	1	2	1	1
79	1	2	1	1
80	1	3	2	2
81	1	3	2	5
	99	107	8	134
Average	**1**	**1**	**0**	**2**

Table 6
1999 Contributory Main Extensions
NPV ≥ $1,000
Customer Additions

Item	Projected 1st Year Customers	Actual 1st Year Customers	Variance	Projected 5th Year Customers
1	16	4	(12)	16
2	26	14	(12)	53
3	10	0	(10)	10
4	9	1	(8)	16
5	9	2	(7)	9
6	10	3	(7)	25
7	6	0	(6)	9
8	7	1	(6)	7
9	6	1	(5)	6
10	4	1	(3)	4
11	4	1	(3)	4
12	5	2	(3)	10
13	9	6	(3)	9
14	12	9	(3)	57
15	3	1	(2)	3
16	3	1	(2)	3
17	3	1	(2)	9
18	7	5	(2)	14
19	10	8	(2)	27
20	1	0	(1)	13
21	2	1	(1)	2
22	2	1	(1)	3
23	2	1	(1)	3
24	3	2	(1)	3
25	3	2	(1)	3
26	3	2	(1)	3
27	4	3	(1)	8
28	4	3	(1)	20
29	4	3	(1)	4
30	6	5	(1)	6
31	1	1	0	1
32	2	2	0	3
33	1	1	0	1
34	1	1	0	2
35	1	1	0	1
36	1	1	0	1
37	1	1	0	1
38	3	3	0	3

Table 6 (Continued)
1999 Contributory Main Extensions
NPV ≥ $1,000
Customer Additions

Item	Projected 1st Year Customers	Actual 1st Year Customers	Variance	Projected 5th Year Customers
77	1	1	0	1
78	9	10	1	18
79	4	5	1	4
80	4	5	1	10
81	3	4	1	6
82	2	3	1	4
83	2	3	1	2
84	2	3	1	3
85	2	3	1	5
86	2	3	1	2
87	1	2	1	1
88	1	2	1	1
89	1	2	1	1
90	1	2	1	1
91	1	2	1	1
92	1	2	1	1
93	40	42	2	124
94	7	9	2	14
95	6	8	2	31
96	5	7	2	11
97	4	6	2	12
98	4	6	2	10
99	2	4	2	4
100	1	3	2	4
101	13	16	3	13
102	4	7	3	8
103	4	7	3	9
104	3	6	3	5
105	3	6	3	6
106	4	8	4	13
107	5	10	5	10
108	8	14	6	16
109	4	10	6	18
110	4	10	6	12
111	8	15	7	20
112	5	12	7	25
113	20	28	8	52
114	15	23	8	39

Table 6 (Continued)
1999 Contributory Main Extensions
NPV ≥ $1,000
Customer Additions

Item	Projected 1st Year Customers	Actual 1st Year Customers	Variance	Projected 5th Year Customers
39	1	1	0	1
40	1	1	0	1
41	2	2	0	2
42	1	1	0	1
43	2	2	0	7
44	1	1	0	1
45	1	1	0	1
46	1	1	0	1
47	1	1	0	1
48	18	18	0	36
49	1	1	0	1
50	1	1	0	1
51	4	4	0	8
52	1	1	0	4
53	1	1	0	1
54	1	1	0	1
55	1	1	0	5
56	1	1	0	1
57	1	1	0	1
58	1	1	0	1
59	24	24	0	24
60	1	1	0	2
61	6	6	0	6
62	1	1	0	1
63	3	3	0	4
64	1	1	0	1
65	1	1	0	1
66	1	1	0	1
67	4	4	0	21
68	1	1	0	1
69	1	1	0	1
70	1	1	0	2
71	1	1	0	1
72	1	1	0	1
73	1	1	0	1
74	1	1	0	1
75	22	22	0	50
76	1	1	0	1

Table 6 (Continued)
1999 Contributory Main Extensions
NPV ≥ $1,000
Customer Additions

Item	Projected 1st Year Customers	Actual 1st Year Customers	Variance	Projected 5th Year Customers
115	8	17	9	16
116	3	12	9	12
117	7	17	10	37
118	8	19	11	36
119	20	32	12	38
120	15	29	14	45
121	10	25	15	29
122	8	23	15	2
123	1	16	15	17
124	7	23	16	47
125	33	51	18	63
126	14	33	19	33
127	20	41	21	41
128	55	77	22	132
129	5	27	22	11
130	10	33	23	36
	748	993	245	1,680
Average	**6**	**8**	**2**	**13**

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David M. Masuhara
Vice President
Legal, Regulatory & Logistics
and Secretary

BCGas™
Naturally Resourceful.

December 6, 2001

British Columbia Utilities Commission
6th Floor - 900 Howe Street
Vancouver, B.C.
V6Z 2N3

Attention: Mr. R.J. Pellatt
Commission Secretary

Dear Sir:

RE: BC Gas 2000 Main Extension Review

BC Gas files herewith amended pages in response to the verbal information request received from Commission staff on November 20, 2001.

Pages included in this filing:

Page 1: Additional sentence hase been included in the first paragraph
Page 2: Addition of 'built in 2000';
Page 4, 7 and 10: Graphs illustrating costs versus estimates, in increments of $1,000 have been included
Page 11 (formerly Page 8): Additional detail surrounding the cost estimation process has been included
Page 12 : Additional detail surrounding the sampling methodology for analysis has been included
Page 18 (formerly Page 16): Additional detail surrounding large negative variances for high NPV mains has been included
Page 19: Clarification of 1998 versus 1999 customer addition figures
Page 27 (formerly Page 23): Removal of dollar sign from Table 3, Item 56

Page order has been altered due to insertion of additional graphs.

Yours truly,

BC GAS UTILITY LTD.

Per:

David M. Masuhara

1.0 Introduction and Background

In September 1998, the BC Utilities Commission directed BC Gas to implement the Main Extension Review Process filed by BC Gas in August 1998. The BC Gas Main Extension Review First Year Report (1998) was filed in August 1999. The First Year Report only contains mains installed in the fourth quarter of 1998. The second year report (1999 BC Gas Main Extension Review) was filed in October 2000. This third year report (2000 BC Gas Main Extension Review) provides construction cost variance data on the 338 main extensions built in 2000 and Year 1 customer connection variances for a random sample of the mains in the 1999 Main Extension Review.

1.1 Purpose of the Main Extension Test

It is in the interest of ratepayers that BC Gas connect customers to main extensions that are economic to build (i.e., main extensions where the present value of the revenues gained from customers exceeds the present value of the construction costs). The MX Test is used to assess potential system extensions to either ensure that they are economic (and therefore non-contributory), or to calculate the required contribution in aid of construction to make the extension economic. The use of accurate projections in the MX Test allows BC Gas to minimize contribution requirements when extending gas service, while avoiding cross-subsidization from existing ratepayers.

2.0 Third Year (2000) Review Format

This report contains a comparison of estimated versus actual 2000 main extension construction costs and a one-year follow-up on customer connections to a sample of 1999 main extensions. Section 3 addresses 2000 actual versus estimated construction costs and is divided into three segments:

1. Contributory main extensions;
2. Non-contributory main extensions with a net present value (NPV) < $1,000 per customer; and,
3. Non-contributory main extensions with a NPV ≥ $1,000 per customer.

The following information is provided for each segment:

- Construction costs (estimated, actual and variance);
- Projected one year and five year customer additions; and,
- Brief explanations of significant variances.

Section 4 addresses 1999 actual versus estimated first year customer connections and is divided into three segments:

- Customer Additions - 1999 Contributory Main Extensions;
- Customer Additions - 1999 Non-contributory Main Extensions (NPV < $1,000); and,
- Customer Additions - 1999 Non-contributory Main Extensions (NPV ≥ $1,000).

3.0 Summary of Results for 2000 Main Extensions

3.1 Contributory Main Extensions

Contributory main extensions require a monetary contribution from the customers connecting to the main extension.

3.1.1 Construction Costs

A total of 65 contributory main extensions built in 2000 were reviewed. Most of these main extensions (60%) were constructed in the Interior. In 1999, 75% of the contributory main extensions were constructed in the Interior. Below are the main findings:

- On average, BC Gas underestimated the cost of building a contributory main extension by 12% (an average $1,274 variance on an average estimated job cost of $11,028). In 1999, contributory main construction costs were overestimated by 6%, on average, (an average $2,603 variance on an average estimated job cost of $17,315). The decrease in the average estimated job cost between 1999 and 2000 is the result of one large project that occurred in 1999. Please refer to *Appendix 1: Table 1 - 2000 Contributory Main Extensions* for details.

- Almost half (49%) of contributory main extension cost variances fell within the +/- 30% range. Please refer to *Graph 1* on the next page.

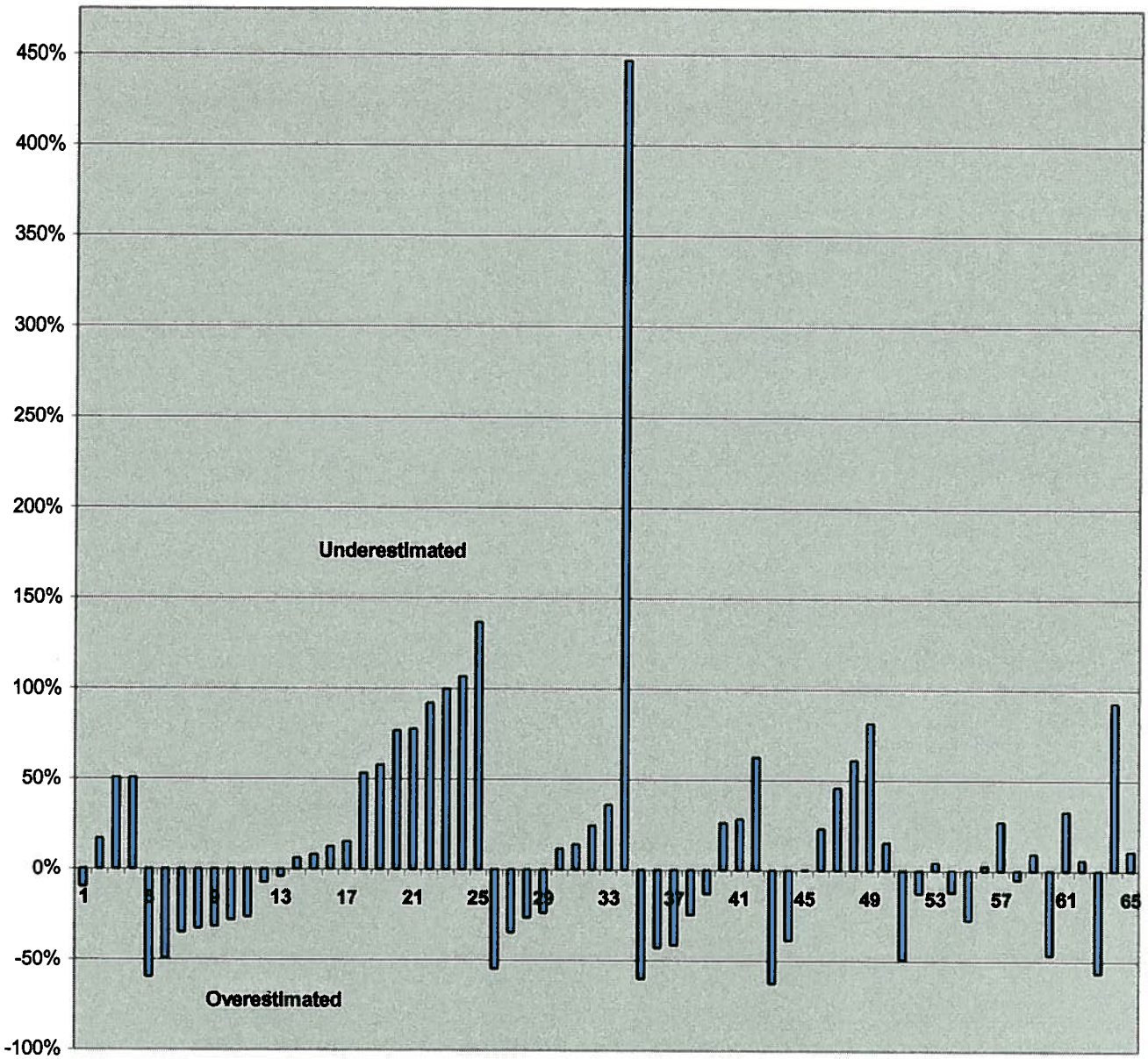
- Variances for projects that were underestimated tended to be larger percentage-wise, but smaller in absolute terms than projects that were overestimated.

- No Gas-by-Tax mains were constructed in 2000. One Gas-by-Tax main was constructed in 1999 (see Item 53 in *Table 1, 1999 Contributory Main Extensions, 1999 Main Extension Review*).

3.1.2 Projected One and Five Year Customer Additions

For contributory main extensions, on average, there were two customers projected at the end of the first year, and seven by the end of the fifth year. Note, however, that 71% of these main extensions were initially for a single customer. For more information, please refer to *Appendix 1: Table 1.*

Graph 1A
2000 Contributory Main Extensions
Variance of Actual Cost as a Percentage of Estimate
In $1,000 Increments
(n=65)



Graph 2A
2000 Non-contributory Main Extensions
Variance of Actual Costs as a Percentage of Estimate
for NPV < $1,000
in $1,000 Increments
(n=91)

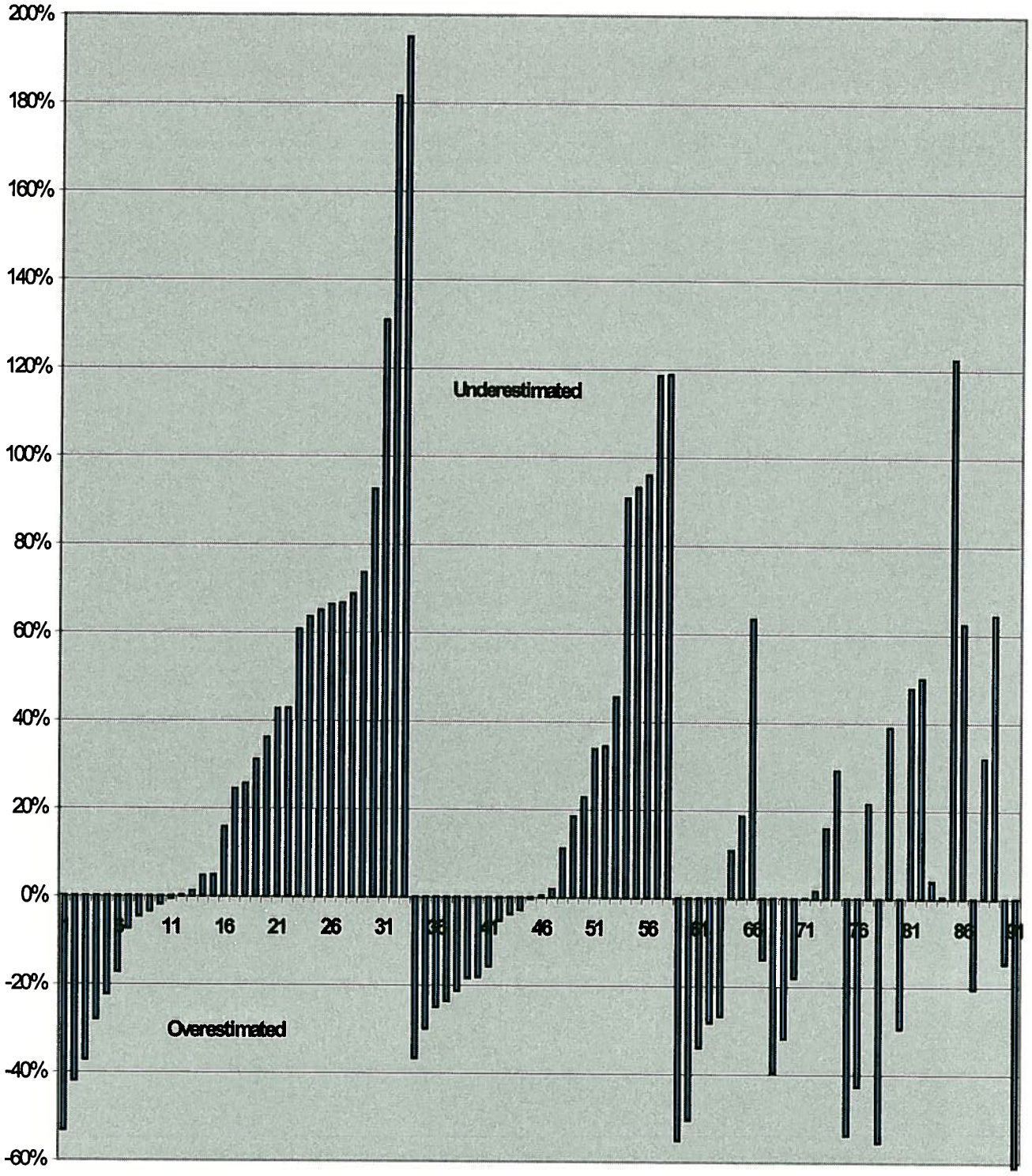
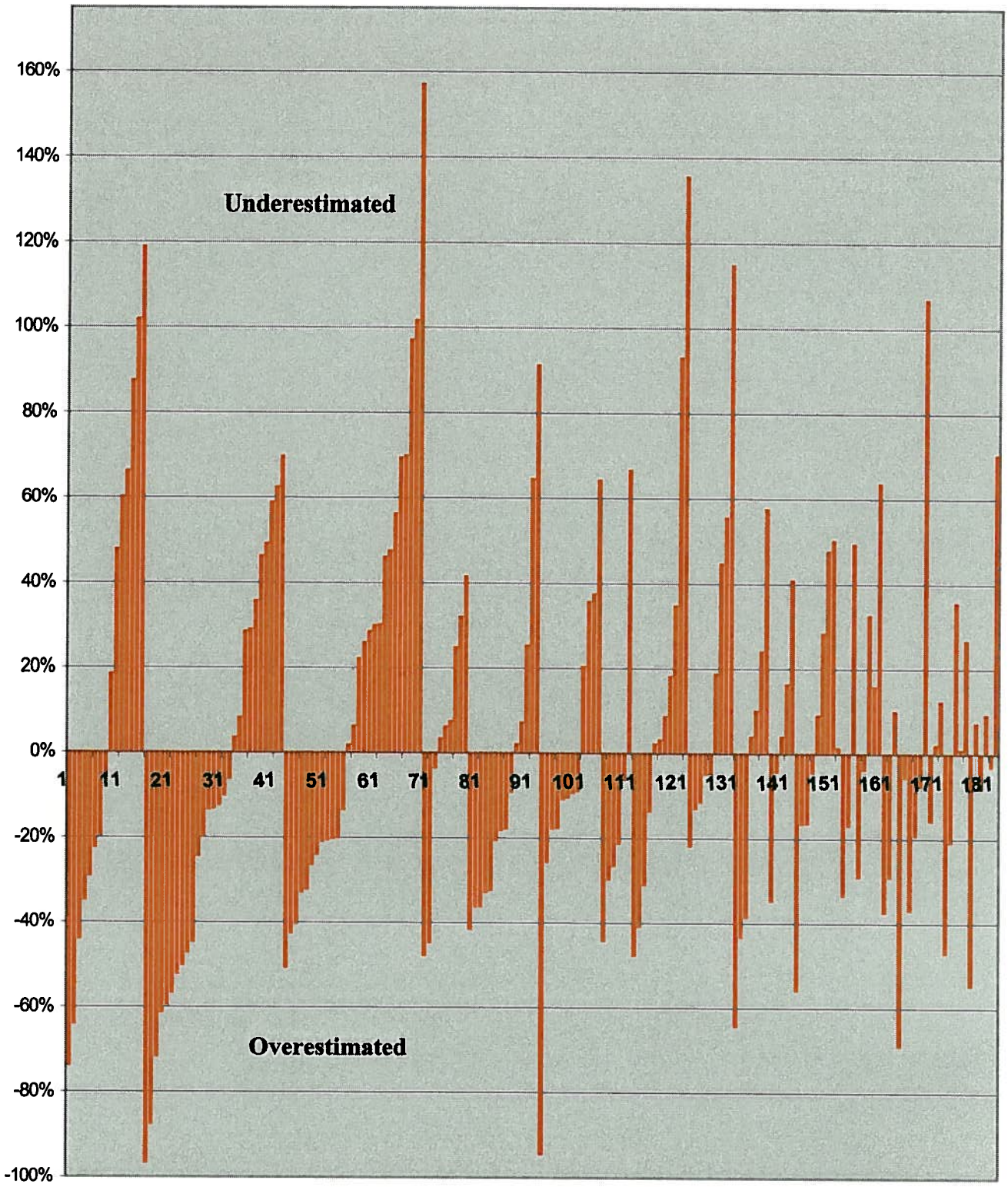


Chart 3A
2000 Non-contributory Main Extensions
Variance of Actual Costs as a Percentage of Estimate
for NPV ≥ $1,000
in $1,000 Increments
(n=182)



3.4 Actual versus Estimated Costs – Variance Explanations

When actual construction costs were lower than estimated, the most common reasons were data entry problems and unforeseen circumstances (weather, soil conditions, and late design changes). This held true for all types of main extensions.

When actual costs were greater than estimated costs, the two main reasons were changes in the resources used (e.g. contractor vs. BC Gas crew) and unforeseen circumstances (weather or soil conditions).

The percentage of main extension estimates that were within +/- 30% of the actual costs was significantly higher for contributory main extensions (64%) than for low NPV (52%) and high NPV (54%) non-contributory main extensions. Since contributory main extensions require contributions in aid of construction from customers, they are developed with a higher level of accuracy than non-contributory main extensions. Initial contributory main extension estimates are based on standard costs. Most revisions to an initial estimate are of a minor nature and do not result in a contributory main becoming non-contributory. When a significant revision to a contributory main extension estimate occurs, it often leads to an increase in the estimated cost. These additional costs are usually site specific and are identified when a more detailed estimate is prepared.

4.0 First Year Customer Additions for Sample 1999 Main Extensions

4.1 Sampling Methodology for Main Extension Customer Additions

Random samples representing a 95% confidence interval were selected for each type of main.

Type of Main	Number of Mains	Sample Size
1999 Contributory Mains	61	55
1999 Non-contributory Mains NPV < $1,000	95	81
1999 Non-contributory Mains NPV ≥ $1,000	170	130

A random number generator was used to select the mains in the 1999 samples. This technique will also be used to select the mains in future samples.

Type of Main	Number of Mains	Sample Size
2000 Contributory Mains	65	58
2000 Non-contributory Mains NPV < $1,000	91	78
2000 Non-contributory Mains NPV ≥ $1,000	182	136

In the 2001 Main Extension Review, the sample sizes in the preceding table will determine the number of 2000 mains analysed for first year customer additions.

4.2 Customer Additions – Sample 1999 Contributory Main Extensions

The sample of 1999 contributory main extensions contains 55 mains. Below are the major findings:

- First year customer additions were correctly predicted for 67% of contributory main extensions (note that 69% of estimated first year customer additions for 1999 contributory main extensions were for a single customer). Please refer to *Appendix 1: Table 4 - 1999 Contributory Main Extensions First Year Customer Additions.*

- Thirty three percent of 1999 contributory main extensions exhibited customer addition variances: 7% were overestimated and 26% were underestimated. Please refer to *Graph 4* on the next page. Thirty nine percent of contributory mains showed variances, in 1998.

- On average, the actual first year customer additions equalled projected additions.

- One large project accounted for one third of the customer addition variance.

4.5 Discussion of First Year Customer Additions for 1999 Main Extensions

In comparing the first year customer connection variances for 1999 main extensions, the following similarities were noted:

- Low NPV mains have the highest percentage of mains projecting a single customer connecting in the first year, while high NPV mains have the lowest.
- The accuracy of estimated first year connections is also related to each type of main extension. The estimate of first year connections was correct for 67% of contributory mains, 85% of low NPV mains and 36% high NPV mains.
- For all three types of mains, the number of customers connecting in the first year was underestimated. The total variance for high NPV mains was skewed by a dozen projects with large variances.
- The large positive variances for high NPV mains were due to rapid growth in new subdivisions.
- Large negative variances for high NPV mains were due to overly optimistic developer estimates and deteriorating economic conditions.

5.0 Discussion

5.1 Construction Costs

In comparing the cost variances for three types of mains in the 2000 and 1999 main extension reviews, the following items were noted:

- On average, main extensions were underestimated in 1999 and 2000.
- For both 1999 and 2000, projects that were underestimated had greater variances than projects that were overestimated.
- The variance distributions are similar for 1999 and 2000; both show no bias between estimating costs for the contributory and the two groups of non-contributory main extensions.

5.2 Customer Additions

In comparing the first year customer additions to 1998 and 1999 main extensions, the following items were noted:

- The projected average number of first year customers connecting to a contributory main fell from four in 1998 to three in 1999, but the number of contributory mains was the same in both years.
- The projected average number of first year customers connecting to a low NPV main fell from four in 1998 to one in 1999.
- The projected average number of first year customers to connecting a to a high NPV main fell from eight in 1998 to six in 1999, but the number of high NPV mains increased to 170 in 1999 from 22 in 1998.

Table 3 (Continued)
2000 Non-contributory Main Extensions
NPV ≥ $1,000

Item	MX Test NPV	Projected 1st Year Customers	Projected 5th Year Customers	Actual Job Cost	Estimated Job Cost	Variance	Variance as a % of Estimate
38	9,437	2	8	1,387	2,068	(681)	-33%
39	10,294	4	12	3,007	4,478	(1,471)	-33%
40	27,759	5	22	2,747	4,061	(1,314)	-32%
41	9,399	2	8	1,779	2,621	(842)	-32%
42	13,981	3	15	5,262	7,626	(2,364)	-31%
43	24,239	1	1	4,473	6,364	(1,891)	-30%
44	27,440	5	14	12,311	17,367	(5,056)	-29%
45	2,194	1	2	470	663	(193)	-29%
46	45,970	20	46	10,260	14,444	(4,184)	-29%
47	5,374	3	7	4,458	6,069	(1,611)	-27%
48	23,227	1	1	1,487	2,022	(535)	-26%
49	4,854	6	12	4,073	5,483	(1,410)	-26%
50	1,050	2	2	1,471	1,946	(475)	-24%
51	7,214	3	8	2,164	2,847	(683)	-24%
52	1,359	1	1	235	303	(68)	-22%
53	462,909	1	1	6,675	8,534	(1,859)	-22%
54	12,564	8	16	4,733	6,010	(1,277)	-21%
55	5,183	4	4	1,612	2,041	(429)	-21%
56	56,409	7	20	26,922	34,012	(7,090)	-21%
57	160,447	1	1	3,775	4,758	(983)	-21%
58	11,483	10	10	2,049	2,579	(530)	-21%
59	6,830	1	1	1,741	2,183	(442)	-20%
60	3,617	1	1	1,606	2,008	(402)	-20%
61	27,912	2	2	1,388	1,733	(345)	-20%
62	1,033	1	1	715	890	(175)	-20%
63	55,070	10	47	16,538	20,486	(3,948)	-19%
64	12,711	15	15	3,964	4,843	(879)	-18%
65	73,315	59	59	4,224	5,141	(917)	-18%
66	21,650	1	8	3,980	4,842	(862)	-18%
67	14,068	10	17	4,662	5,663	(1,001)	-18%
68	6,503	12	20	11,447	13,785	(2,338)	-17%
69	23,485	8	40	9,611	11,521	(1,910)	-17%
70	54,567	38	38	9,918	11,874	(1,956)	-16%
71	92,505	76	76	25,405	30,170	(4,765)	-16%
72	18,654	12	20	6,099	7,070	(971)	-14%
73	4,262	4	4	2,003	2,314	(311)	-13%

ROBERT J. PELLATT
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LETTER NO. L-7-02

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Log No. 348

VIA FACSIMILE

February 15, 2002

Mr. David M. Masuhara
Vice President,
Regulatory, Environment & Safety,
Supply Chain & Logistics
BC Gas Utility Ltd.
24th Floor, 1111 West Georgia Street
Vancouver, B.C. V6E 4M4

Dear Mr. Masuhara:

Re: BC Gas Utility Ltd.
2000 Main Extension Review Report

The Commission has completed its review of the 2000 Main Extension Review Report (Amended) and accepts the report as filed.

The Commission has also determined that it is no longer necessary for BC Gas to continue to file future Main Extension Review Reports. While there may be requirements in the future for the Commission to review data related to system extension tests, the Commission believes that these reviews can be carried out when triggered by a customer complaint or inquiry on an individual basis.

The Commission thanks BC Gas for contributing to an important review process during the past three years.

Yours truly,

Original signed by:

Robert J. Pellatt

EC/ac

Attachment 12.1

BC Gas

Residential End Use Survey Results

Prepared for: BC Gas – Marketing Planning

Prepared by:

December, 2003

Table of Contents

1 PURPOSE

The purpose of this study is to report on a Residential End Use Study conducted for BC Gas in December 2002 through January 2003. BC Gas has conducted three previous end use studies in December 1993, December 1996 and December 1999, and this present survey was intended to maximize comparability of the information over time while ensuring that issues of current interest to stakeholders within BC Gas were adequately covered. The 1993 survey was a mail survey, like the current survey, while the 1996 and 1999 surveys were telephone surveys.

Key objectives of the 2002 Residential End Use Survey include the following.

1. Estimate residential end use saturations and compare these with previous surveys. Collect information on appliance inventories, appliance age, level of usage, and planned future expenditures.
2. Determine building envelope, renovation plans and decision criteria. Identify building characteristics, recently completed renovations, planned renovations and preferred methods of contracting, information collection and decision-making.
3. Determine interest in product and service bundles and customer purchase decisions. Examine in particular customer interest in alternative rate options.
4. Explore customer relationships with BC Gas. Building on current customer satisfaction research, identify customers' preferred choice of communication method and information channel.
5. Review, replicate or modify customer segmentation. Validate existing customer segments or develop new ones based on evolving psychographic and demographic information.
6. Undertake a conditional demand analysis. Integrate information from the survey with billing data and assess changes in unit energy consumption and appliance saturation rates.
7. Explain the drop in natural gas consumption or "use per account" since 1993.
8. Better understand the impact of rate increases on BC Gas' customers.
9. Better understand the change in appliance saturation and usage since 1993.

2 OBJECTIVES AND SURVEY METHODOLOGY

2.1 Survey Design

Before beginning survey design, two workshops were held with BC Gas stakeholders covering market segmentation and conditional demand analysis. The purpose of these workshops was to ensure that there was a shared understanding on the range of analytical techniques available and agreement on which ones would best meet the needs of BC Gas' internal customers for this study. The market segmentation workshop covered a variety of techniques including a priori segmentation, K-means analysis, discriminant analysis, logit and probit regression. The conditional demand workshop reviewed data requirements, relevant statistical techniques and preliminary statistical specifications.

The current survey design was largely based on the 1993 survey, but with substantial additions to incorporate questions dealing with products and services, customer segmentation and conditional demand analysis. Several iterations of the survey were prepared and reviewed by the project team. The areas covered in the final design included the following:

- Residential characteristics;
- Space heating;
- Fireplaces;
- Water heating;
- Appliances;
- Pools and hot tubs;
- Energy use and renovations;
- Managing household energy use (tariff options);
- Products and services;
- Communications with BC Gas;
- Attitudes towards energy use (segmentation); and
- Demographics.

2.2 Sampling

It was agreed that the sample frames would be all BC Gas residential customers and that the sample would be stratified by BC Gas' five zones to ensure that each zone was adequately represented. The sample was equally distributed so that 1600 surveys were mailed to customers in each zone. The data is primarily reported by the five Zones, as well as for the Lower Mainland, Interior and the BC Gas service territory as a whole. The sample size, or un-weighted base and weighting for the survey results are shown below. The tables in the report show the un-weighted base.

	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas
Un-weighted base	249	308	298	368	387	855	755	1610
Customers ('000)	167.6	118.8	192.3	80.5	127.9	478.8	208.5	687.2
Weighting Factor	1.58	0.90	1.51	0.51	0.77	1.31	0.65	-
Weighted Base	393	278	451	189	300	1122	488	1610
Margin of Error (%)	±6.3	±5.7	±5.8	±5.2	±5.1	±3.4	±3.6	±2.5

Margin of Error is estimated at the 95% confidence level.

Zone 1 – Greater Vancouver West – Richmond, Vancouver, North Shore, Squamish
Zone 2 – Fraser North – Burnaby, New Westminster, Tri-cities east to Mission (generally areas north of the Fraser River)
Zone 3 – Fraser South – Delta, White Rock, Surrey east to Hope (generally areas south of the Fraser River).
Zone 4 – North/Thompson – Merritt north to Fort Nelson.
Zone 5 – Okanagan/Kootenay –Okanagan valley from Osoyoos to Sorrento, and the Kootneys from Midway east to Elkford.

Results are also presented for the Lower Mainland (Zones 1,2,3) and the Interior (Zones 4,5). In addition, where comparable statistics are available from the 1993 Residential End Use Survey[1], they are also shown in the tables.

2.3 Survey Administration

The survey layout was completed by Consumer Scan, who were responsible for the data scanning on completed surveys. This ensured that there were no issues in scanning the data from completed surveys in a valid manner. When the file of residential customer information was received from BC Gas, the file was loaded into the DASH System for the preparation of cross tabs. Each customer was assigned a unique case number that stayed with that customer's data throughout the subsequent data collection and analysis.

[1] BC Gas Residential End Use Survey, Campbell Goodell Consultants Ltd, May 11, 1994. See Section 2.4 for more details on 1993 study.

Address labels were printed from this file and the address labels and the surveys contained the unique case number. The relevant programming and survey labelling was spot checked and closely managed to ensure that there was superior control over the quality of the process.

Surveys were mailed to the selected potential respondents. Surveys were mailed to the billing address on BC Gas' file, but the participant was asked to respond for the building at the service address.

Some 8000 surveys were distributed, but because of the mailing during the Christmas season, the response rate was lower than anticipated with 1610 completed surveys eventually received.

Completed and returned surveys were coded and scanned and the data entered into DASH. The data set was then cleaned to deal with any problematic information and an analysis plan was prepared. The analysis plan was reviewed with BC Gas and modified to reflect comments and suggestions.

2.4 Definitions

Penetration: Market penetration is defined as the number of households with a certain feature/appliance divided by the number of households. This represents the percentage of BC Gas customers who have one or more of a specific feature/appliance in their household. For example: 98.6% of BC Gas customers have one or more showerheads in their house.

Saturation: Market saturation is defined as the number of features/appliances divided by the number of households. This represents the average number of a specific feature/appliance in BC Gas customer households. For example, BC Gas customers have, on average, 1.95 showerheads per household.

DK/NR: Indicates that the respondent either replied as Don't Know or did not respond to the specific question. Typically results are shown in this report with the DK/NR information reported separately.

1993: Various tables in the report show comparable data for 1993. Sampling for the 1993 Residential End Use Survey was done based on a modified general residential basis (ie: it included both natural gas and electric only customers, but excluded some number of apartments, although it is not clear from the report to what extent this was done). In addition, the report included data for PNG's service territory. In order to develop comparable data for this report, the dataset from the 1993 study was re-analyzed by BC Gas and is presented in this report.

Unweighted Base: Most tables show the base upon which the statistics are calculated. The base is the unweighted base, or the number of responses for each zone or roll-up. The statistics are based on the weighted roll-ups for the Lower Mainland, Interior and BC Gas service territory to provide statistically valid

data. However, one implication of weighting the data is that the statistics, such as the percentage of customers who have natural gas furnaces cannot be applied to the unweighted base to determine the base of a subsequent table, such as the number of respondents who reported on furnace efficiency levels.

2.5 Major Changes Since 1993

Through the decade of the 1990s a number of changes took place in the market for natural gas in BC and in North America. These included changes in regulation, changes in awareness of energy efficiency and changes in the price of natural gas.

The regulatory changes are summarized in the following table.

Development	Year	Description
Energy Efficiency Act	1992	Federal Act to allow minimum energy performance standards and labelling
BC Building Code	1992	Insulation and window standards for new construction
Energy Efficiency Regulations	1995	Minimum standards for natural gas water heaters and furnaces
EnerGuide Label for furnaces	1996	Voluntary testing and label
Model National Energy Code	1997	Recommended minimum requirements for energy use
Kyoto Protocol	1998	Canada agrees to reduce CO2 levels
Action Plan 2000	2000	Action plan for key sectors Introduction of Energy Star to Canada
Energy Efficiency Regulations	2003	Raised minimum water heater standards.

The net impact of these changes was to increase the level of weatherization in new houses and increase the level of efficiency in new appliances, furnaces and water heaters as well as increasing the public's awareness of efficiency issues.

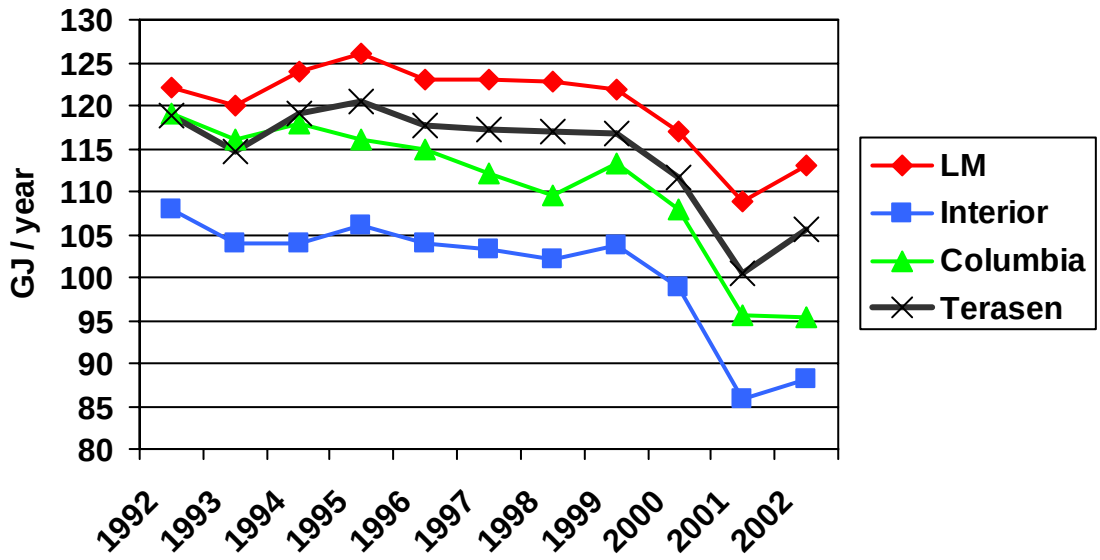
At the same time, the long running "bubble" in natural gas supplies for North America ended, with the consequence that prices started to spike upwards for BC Gas customers as it did for all users in North America. This had the impact of both increasing the cost of natural gas to customers, and reducing the cost advantage that natural gas historically had over electricity, as electricity rates were essentially frozen over this time period. The following table shows the change in natural gas prices for a typical Lower Mainland customer between 1998 and 2002. While the rates are slightly different for the Interior (Inland and Columbia tariff regions), the pattern is the same. The table shows the change in variable cost and a typical monthly bill.

	1998	Jan. 1999	Sept. 1999	Jan. 2000	July 2000	Jan. 2001	Oct. 2001	Jan. 2002
Variable charge	$4.858	$5.396	$6.001	$6.442	$8.794	$11.359	$10.069	$9.222
Typical monthly bill	$ 56	$ 61	$ 67	$ 72	$ 96	$ 121	$ 108	$ 102
% change (Prev. yr)	-3.4%	9.8%	9.8%	6.9%	32.5%	26.7%	-10.7%	-5.8%

Source: BC Gas Rates Reference Guide – 2002

Compared with a trailing step cost of electricity of 5.77 cents per kW.h, in 1998, natural gas cost about 38% of the equivalent amount of electricity, but by January 2001 this had increased to about 89% (assuming an 80% efficient natural gas appliance).

Not surprisingly, through this period, BC Gas customers responded to these pressures, and the average use rate per customer dropped. This is illustrated in the following chart.



Source: BC Gas Forecast and Planning Department.

3 RESIDENTIAL END USE SATURATIONS

In examining residential end use saturations, the main focus is on understanding the following at the level of the individual zones, Lower Mainland region, Interior region and for the BC Gas service territory as a whole.

- Main space heating fuel, secondary space heating fuels, changes in space heating fuels, reasons for these changes, main space heating method, secondary space heating methods.
- Saturation and usage rates of fireplaces.
- Water heating fuels, changes in water heating fuels, reasons for the changes.
- Saturation of hot water using end uses and usage patterns.
- Saturation and usage patterns of cooking appliances.
- Saturation of cooling, cleaning, air conditioning and heating appliances.

Almost all respondents know that they have natural gas service as indicated in Exhibit 3.1. All surveys were mailed to BC Gas customers, but as this was self-reported data, there were 0.2% of the respondents who stated that they did not have gas service and 4.1% who did not respond to the question. Zone 1 has the highest rate of don't knows/no responses for this question.

Awareness of natural gas service is comparable with the 1993 results.

3.1 Natural gas service (%)

Type of service	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas	1993
Unweighted base	249	308	298	368	387	855	755	1610	4814
Natural gas	92.4	95.5	93.3	97.8	94.6	93.5	95.8	94.2	94.1
Piped propane	-	0.6	1.3	-	1.6	0.7	1.0	0.8	0.1
Yes, type unknown	2.4	1.9	1.7	0.5	-	2.0	0.2	1.5	1.7
No service	-	-	0.3	0.5	0.3	0.1	0.4	0.2	0.5
DK/NR	5.6	2.9	4.7	1.3	4.1	4.6	3.1	4.1	3.6

3.1 Space heating

Natural gas is the main space heating fuel for 92% of respondents (Exhibit 3.2). This varies relatively little by region, at 93% for the Interior and 92% for the Lower Mainland. Electricity is reported as the second most common main space heating fuel for BC Gas customers at 7% overall, 4% in the Interior and 9% in the Lower Mainland. Zone 1 has the highest stated use of electricity as the main space heating fuel at over 10%. About 2% reported that wood was their main space heating fuel with wood being much more common in the Interior than the Lower Mainland. However, it should be noted that in the 2002 study, about 4.5% of the respondents stated more than one main fuel. A further examination of the responses show that the main combinations of heating fuels are:

- Electricity and natural gas (2.5%);
- Natural gas and wood (1.0%);
- Electricity and wood (0.1%); and
- Electricity, natural gas and wood (0.1%)

Once these combinations have been removed from the totals, and assuming that when natural gas is used in combination with other fuels it is the main source of energy, the share of electricity drops from 7.4% to 3.5%. The revised fuel share estimates are shown in Exhibit 3.2a.

Compared with 1993, and using the revised estimate of main fuel shares, the share of electricity as the main heating source would appear to have increased only slightly from 3.1% to 3.5%, a change that is not statistically significant.

3.2 Main space heating fuel (%)

Main Fuel	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas	1993
Unweighted base	249	308	298	368	387	855	755	1610	4814
Electricity	10.4	6.2	9.4	2.4	4.9	9.0	4.0	7.4	3.1
Natural gas	91.2	94.5	91.3	95.9	91.0	92.0	92.9	92.3	93.0
Piped propane	-	0.6	0.7	0.3	1.3	0.4	0.9	0.6	0.1
Oil	-	-	-	0.3	0.3	-	0.3	0.1	0.1
Wood	0.8	1.3	2.3	4.6	3.4	1.5	3.8	2.2	1.0
Kerosene	-	-	-	-	-	-	-	-	-
Other	0.4	-	0.3	-	0.5	0.3	0.3	0.3	0.3
DK/NR	1.6	1.2	2.0	1.1	2.6	1.7	2.0	1.8	2.5

Note: due to multiple responses, columns will not sum to 100%

3.2a Revised main space heating fuel (%)

Main Fuel	2002 (Reported)	2002 (Adjusted)	1993
Electricity	7.4	3.5	3.1
Natural gas	92.3	92.9	93.1
Wood	2.2	1.4	1.0
Other/DK/NR	2.8	2.1	2.5

Of the 825 respondents (or about 51% of BC Gas' customer base) who reported a supplementary space heating fuel, electricity is the supplementary space heating fuel for 58% of respondents (Exhibit 3.3). This varies somewhat by region, at 49% for the Interior and 62% for the Lower Mainland. Natural gas is the second most common secondary space heating fuel at 27% overall, 28% in the Interior and 27% in the Lower Mainland. About 24% reported that wood was their secondary space heating fuel with wood being much more common in the Interior at 32% than the Lower Mainland at 20%.

3.3 Supplementary space heating fuels (%)

Supplementary fuel	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas
Unweighted base	159	161	145	170	190	465	360	825
Electricity	67.9	62.1	53.8	45.9	50.0	61.5	48.5	57.9
Natural gas	25.2	24.2	29.7	26.5	29.5	26.5	28.4	27.0
Piped propane	-	-	0.7	-	2.1	0.2	1.3	0.5
Oil	-	-	0.7	-	0.5	0.2	0.3	0.3
Wood	18.2	22.4	20.7	33.5	31.6	20.1	32.3	23.5
Kerosene	0.6	0.6	0.7	-	-	0.6	-	0.5
Other	1.3	-	0.7	0.6	1.6	0.8	1.2	0.9
DK/NR	6.3	3.1	5.5	2.9	2.1	5.3	2.4	4.5

Note: due to multiple responses, columns will not sum to 100%

In addition to the reporting of primary and secondary fuels, there was interest in understanding the proportion of BC Gas customers who used each fuel type, either as a primary or supplemental fuel, and netting out the impact of reporting multiple main fuels. This was accomplished by running a cross-tabulation of primary fuel against secondary fuel, and then netting out the double reporting of fuels. The results are show in Exhibit 3.3a, and indicate that over one third of BC Gas' customers have some form of electric space heating.

3.3a Net space heating fuels (%)

	BC Gas
Unweighted base	1610
Electricity	36.1
Natural gas	96.0
Piped propane	0.8
Oil	*
Wood	13.5
Kerosene	*
Other	0.7
DK/NR	3.8

* Indicates a proportion smaller than one-half of one percent.

About 4% of the sample changed their space heating fuel over the five years previous to the survey (Exhibit 3.4), with a greater propensity to change in the Interior (7%) than the Lower Mainland (3%). Zone 5 featured the highest propensity to change space-heating fuel at over 8%. There is no clear explanation for the higher rate of fuel change in the Interior, although restrictions on wood burning in some communities may be a factor.

The 1993 study asked respondents if they had changed fuel over the past 2 years rather than 5 years. Looking at an annual average rate of change[2], this would indicate a reduction in the rate of fuel change. A reduction in the rate of fuel change is consistent with the current high penetration in gas usage where service is available.

3.4 Changed space heating fuel over past five years (%)

	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas	1993
Unweighted base	249	308	298	368	387	855	755	1610	4814
Yes	2.8	2.6	3.0	4.9	8.3	2.8	7.0	4.1	3.4*
No	94.0	96.1	94.3	92.7	88.4	94.6	90.0	93.2	95.7
DK/NR	3.2	1.3	2.7	2.4	3.4	2.5	3.0	2.7	1.0

* The 1993 study asked for changes over the past 2 years.

Among those who changed heating fuels, the most common previous space heating fuels (Exhibit 3.5) for those who had changed were electricity at 42%, natural gas at 29%, wood at 20% and oil at 14%.

In 1993, the largest proportion of customers was switching from oil, electricity and wood (over 70%). In 2002 the sequence had shifted to electricity, natural gas and wood (83%). This likely reflects the declining share of oil heating in B.C.

[2] Calculated as the total change divided by the number of years. This declined from 1.7% per year in 1993 and 0.8% per year in 2002.

3.5 Previous main space heating fuel (%)

Previous main fuel	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas	1993
Unweighted base*	7	8	9	18	32	24	50	74	152
Electricity	57.1	37.5	55.6	16.7	37.5	52.0	31.8	41.6	24.0
Natural gas	28.6	-	22.2	44.4	34.4	19.4	37.1	28.5	4.6
Piped propane	-	-	-	5.6	3.1	-	3.8	2.0	2.3
Bottled propane	-	-	-	5.6	-	-	1.5	0.8	3.4
Oil	14.3	37.5	11.1	11.1	9.4	18.2	9.8	13.9	36.5
Wood	-	25.0	33.3	33.3	15.6	19.9	20.4	20.2	11.4
Kerosene	-	-	11.1	-	-	4.7	-	2.3	na
Other	-	-	-	-	-	-	-	-	0.3
DK/NR	-	-	-	-	3.1	-	2.3	1.2	17.5

Note: due to multiple responses, columns will not sum to 100%
* Caution, when sample sizes are less than 50, results are directional only.

For the 74 people who answered yes to changing the fuel switching, Exhibit 3.6 shows their previous and current space heating fuel. Of all the people who switched fuel, about 70% switched to natural gas while about 24% switched to electricity and 18% switched to wood. Of the 27 people who reported their previous fuel as electricity, 78% switched to natural gas. Of the 23 people who reported their previous fuel as natural gas, about 35 % switched to electricity while 48% switched to wood. It is not known why some respondents reported the same fuel as both the previous and current fuel.

3.6 Changed space heating fuel over past five years (%)

Current Fuel	Previous Fuel								
	Elec.	NGas	Piped Prop.	Bott. Prop.	Oil	Wood	Kero	DK	Total
Unweighted base*	27	23	2	1	10	16	1	1	74
Electricity	31.1	35.4	-	-	8.5	15.2	100.0	-	23.5
Natural Gas	77.5	32.7	100.0	100.0	91.5	88.6	-	100.0	70.3
Piped propane	8.9	-	-	-	8.5	-	-	-	4.9
Wood	9.9	48.1	-	-	-	10.7	-	-	18.4
Other	-	8.2	-	-	-	-	-	-	2.4

Note: due to multiple responses, columns will not sum to 100%
* Caution, when sample sizes are less than 50, results are directional only.

About 86% of respondents report having a natural gas furnace (Exhibit 3.7) with levels of 91% in the Interior and 83% in the Lower Mainland. About 19% installed a natural gas furnace or boiler over the past five years, slightly higher in the Interior at 21% than the Lower Mainland at 18%. Average age of the furnace is about 13 years overall (12 years in the Interior and 14 years in the Lower Mainland). When analysing responses to the questionnaires, it became evident that some respondents confused boilers and hot water tanks, and

reported both. For this reason, separate boiler data has not been reported for this table.

3.7 Natural gas furnace (%)

Furnace	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas
Unweighted base	249	308	298	368	387	855	755	1610
Have natural gas furnace	83.5	86.4	81.2	94.6	89.1	83.3	91.2	85.7
Do not have a natural gas furnace	12.9	11.0	13.4	4.6	7.8	12.6	6.5	10.8
DK/NA	3.6	2.6	5.4	0.8	3.1	4.1	2.2	3.5
Installed natural gas furnace or boiler over past five years	22.9	14.3	15.4	25.5	18.3	17.8	21.1	18.8
Unweighted base	228	288	270	359	355	786	714	1500
Age of this furnace (average - years)	14.9	15.3	13.2	10.6	12.2	14.3	11.6	13.4

About two-thirds of respondents with furnaces or boilers were able to address the question of the efficiency level of their furnace or boiler (Exhibit 3.8). Standard efficiency furnaces were cited by 35% of respondents, mid efficiency furnaces by 17% of respondents, high efficiency furnaces by 9% of respondents, standard efficiency boilers by 7% of respondents and high efficiency boilers by 3% of respondents. Higher efficiency levels are more common in the Interior than the Lower Mainland likely a reflection of the colder climate in the Interior.

3.8 Furnace or boiler efficiency level (%) (Among those with a furnace or boiler)

Furnace or boiler	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas
Unweighted base	228	288	270	359	355	786	714	1500
Standard efficiency gas furnace	39.0	36.1	33.0	32.9	31.8	35.9	32.2	34.8
Mid efficiency gas furnace	11.8	18.8	13.3	21.7	22.0	14.2	21.9	16.6
High efficiency gas furnace	8.3	6.3	7.4	14.5	13.2	7.4	13.7	9.4
Standard efficiency gas boiler	11.0	8.0	5.2	7.2	5.6	7.9	6.3	7.4
High efficiency gas boiler	3.1	2.4	3.7	3.6	3.1	3.2	3.3	3.2
DK/NR	37.3	34.0	40.4	25.6	30.9	37.7	28.8	35.0

The 312 homeowners who had installed a natural gas furnace or boiler over the

past five years were asked why they had done so (Exhibit 3.9). In decreasing order of importance, the main reasons were furnace or boiler had failed at 36%, wanted more efficient furnace or boiler at 26%, anticipated failure at 21%, needed a furnace or boiler for a new home at 15%, wanted a lower cost alternative at 7%, wanted to change to natural gas at 6%, house was too cold at 3%, wanted environmentally friendly fuel at 2% and heated floor area increased at 1%.

Looking at general reasons for replacement of the furnace or boiler, in the Lower Mainland about 63% are driven by failure or anticipated failure vs. 44% for these reasons in the Interior. In the Interior, almost 40% of the replacements are driven by efficiency or lower costs while this accounts for only about 30% in the Lower Mainland.

3.9 Main reason installed natural gas furnace or boiler (%)

	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas
Unweighted base*	57	44	46	94	71	147	165	312
New home	12.3	9.1	19.6	8.5	25.4	14.2	17.5	15.3
Wanted to change to natural gas	8.8	4.5	2.2	4.3	8.5	5.6	6.5	5.9
Wanted more efficient furnace or boiler	24.6	15.9	23.9	40.4	23.9	22.6	31.6	25.7
Furnace or boiler failed	36.8	47.7	41.3	26.6	25.4	40.6	25.9	35.6
Anticipated failure	22.8	18.2	23.9	19.1	16.9	22.3	18.0	20.8
House was too cold	1.8	2.3	4.3	3.2	4.2	2.8	3.7	3.1
Heated floor area increased	1.8	4.5	-	-	1.4	1.7	0.8	1.4
Wanted environmentally friendly fuel	1.8	2.3	2.2	2.1	1.4	2.0	1.7	1.9
Wanted lower cost alternative	10.5	2.3	2.2	6.4	8.5	6.0	7.5	6.5
Other / NR	-	4.5	-	2.2	1.4	0.9	1.7	1.2

Note: reasons may sum to more than 100% due to multiple responses.
* Caution, when sample sizes are less than 50, results are directional only.

The common main heating method was a central forced air furnace (Exhibit 3.10), at 79% overall, 88% in the Interior and 75% in the Lower Mainland. The second most common main heating method was hot water in-floor radiant heating at 6%, which was significantly higher in the Lower Mainland than in the Interior. Other main heating methods included fireplaces (6%), hot water baseboards (5%), wired in electric heating (4%) and wood stove (2%).

Compared with 1993, the use of central forced air heat has decreased slightly. However, when furnace and boiler usage (hot water baseboards and hot water in-floor radiant) are combined, the total for these technologies remains almost

constant at 90% which indicates that the change is more in heating technology than in fuel choice. Hot water in-floor heating appears to have been the fastest growing heating technology and has taken over from hot water baseboards.

Use of electric baseboards as a main heating source would appear to have about doubled from 1.7% to 3.7% but again this is a reflection of respondents reporting multiple heating technologies. When the reported incidence of electric baseboards used in combination with other technologies is removed, this number drops from 3.7% to 1.7%, and reflects no change over the 10 year period.

3.10 Main heating method (%)

	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas	1993
Unweighted base	249	308	298	368	387	855	755	1610	4814
Central forced air furnace	73.9	79.5	74.2	90.5	85.8	75.4	87.6	79.1	81.5
Wire-in electric heater (baseboards)	3.2	3.9	5.4	2.2	2.8	4.2	2.6	3.7*	1.7
Hot water baseboards	6.4	7.5	5.7	2.2	1.8	6.4	1.9	5.0	5.7
Hot water in-floor radiant	10.4	3.9	9.1	1.4	1.8	8.3	1.6	6.3	2.5
Radiant electric cables	0.8	0.3	-	-	0.3	0.4	0.2	0.3	0.3
Natural gas wall heater	2.0	2.6	2.3	1.9	1.8	2.3	1.8	2.2	na
Portable electric heaters	0.4	0.6	0.7	0.8	1.6	0.6	1.3	0.8	na
Wood stove	0.8	0.6	1.7	2.2	2.8	1.1	2.6	1.6	0.9
Heat pump	0.8	0.3	0.3	-	1.3	0.5	0.8	0.6	0.2
Fireplace	4.8	6.5	5.7	5.7	6.5	5.6	6.2	5.8	0.7
Other	-	0.3	-	0.5	1.6	0.1	1.2	0.4	2.3
NR	2.4	1.3	2.0	1.4	2.6	2.0	2.1	2.0	4.3

Note: Heating methods sum to more than 100% in 2002 due to multiple responses from survey.
* See paragraph above

Other or secondary heating methods cited (Exhibit 3.11) included fireplace (37%), central forced air furnace (20%), wire-in electric heater (17%), wood stove (5%), natural gas wall heater (4%) and hot water baseboards and hot water in-floor radiant (each 3%). Again, respondents provided more than one response for “other heating methods”, so the numbers do not sum to 100%.

In 1993, fireplaces were also the largest secondary heating method, and this has not changed in the past decade. However, use of central systems as a secondary method appears to have increased significantly both for forced air and hot

water[3]. The reported use of portable electric heaters as a secondary method has increased only slightly. If the electric methods (baseboards, radiant cables, portable heaters and heat pumps) are added, the use of electricity as a supplementary fuel source has increased from about 30% to about 35%.

3.11 Other heating methods (%)

	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas	1993
Unweighted base	249	308	298	368	387	855	755	1610	4814
Central forced air furnace	19.3	20.5	18.5	21.7	19.9	19.2	20.6	19.7	2.5
Wire-in electric heater (baseboards)	22.5	15.3	17.1	9.2	14.0	18.5	12.1	16.6	14.2
Hot water baseboards	3.6	4.5	2.0	0.8	1.0	3.2	0.9	2.5	1.0
Hot water in-floor radiant	6.4	1.9	2.7	0.8	0.8	3.8	0.8	2.9	0.9
Radiant electric cables	2.0	0.3	0.7	1.9	0.5	1.1	1.1	1.1	0.2
Natural gas wall heater	4.0	3.2	3.0	3.5	4.4	3.4	4.1	3.6	3.4
Portable electric heaters	20.9	22.1	13.8	12.8	13.4	18.3	13.2	16.8	15.8
Wood stove	2.8	3.6	4.4	8.2	8.3	3.6	8.2	5.0	7.5
Heat pump	1.2	0.3	-	0.3	1.0	0.5	0.7	0.6	0.2
Fireplace	35.3	37.0	40.6	37.5	34.1	37.9	35.4	37.1	39.2
Other	2.4	1.6	1.7	3.0	3.1	1.9	3.1	2.3	5.4
NR	19.3	20.8	22.8	28.5	30.7	21.1	29.9	23.7	-

Note: Heating methods sum to more than 100% due to multiple responses from survey.

In addition to the reporting of primary and secondary heating methods, there was interest in understanding the proportion of BC Gas customers who used each heating technology, either as a primary or supplemental, and netting out the impact of reporting multiple main fuels. This was accomplished by running a cross-tabulation of primary method against secondary method, and then netting out the double reporting. The results are show in Exhibit 3.11a, and are similar to the results in 3.3a showing the net fuels.

[3] One hypothesis is that some customers used this question as a "protest" against rate increases.

Exhibit 3.11a Net space heating methods

	BC Gas
Unweighted base	1610
Central forced air furnace	80.8
Wire-in electric heater (baseboards)	19.0
Hot water baseboards	6.2
Hot water in-floor radiant	7.0
Radiant electric cables	1.2
Natural gas wall heater	4.8
Portable electric heaters	17.1
Wood stove	5.9
Heat pump	1.0
Fireplace	39.5
Other	2.5

3.2 Fireplaces

Respondents had an average of 1.3 fireplaces with a low of 1 fireplace in the Interior and a high of 1.5 fireplaces in the Lower Mainland. Zone 2 had the highest saturation level at 1.6 fireplaces per household. The penetration of fireplaces has increased from 77% in 1993 to 81% in 2002, while the saturation has increased from about 1.2 fireplaces per house to about 1.3.

3.12 Fireplaces

Number of fireplaces	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas	1993
Unweighted base	249	308	298	368	387	855	755	1610	4814
Penetration (%)	86.3	86.7	87.6	72.6	64.3	86.9	67.5	81.0	76.7
Saturation	1.38	1.59	1.43	1.09	0.90	1.45	0.98	1.31	1.21

Among houses with fireplaces, the most common type of fireplace is wood burning with a penetration rate of about 38% (Exhibit 3.13). However natural gas heater inserts and fire log sets are a close second with 35% of households reporting one or more of these. Electric inserts have a very small penetration. There appears to have been over reporting of fireplace inserts, as the saturation of inserts (1.56) exceeds the saturation of fireplaces (1.31), and hence the data should be used with discretion. It appears likely that most of the over reporting is related to natural gas inserts where respondents were unable to differentiate between heater inserts and fire logs.

3.13 Fireplace inserts (among those with a fireplace)

Number of inserts by type	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas
Unweighted base	215	267	261	267	249	743	516	1259
NG heater insert								
Penetration (%)	25.6	33.3	42.1	45.3	34.1	34.2	38.8	35.4
Saturation	0.34	0.45	0.61	0.56	0.42	0.47	0.47	0.47
NG fire logs								
Penetration (%)	27.0	35.6	42.1	24.0	40.2	35.2	33.4	34.8
Saturation	0.39	0.46	0.58	0.29	0.46	.049	0.39	0.46
Electric insert								
Penetration (%)	4.7	0.4	-	0.4	-	1.7	0.2	1.3
Saturation	0.08	*	-	*	-	0.03	*	0.02
Propane insert								
Penetration (%)	1.4	-	-	-	0.8	0.5	0.5	0.5
Saturation	0.03	-	-	-	0.01	0.01	0.01	0.01
Wood b'ng insert								
Penetration (%)	7.0	6.0	6.9	9.4	3.6	6.7	6.0	6.5
Saturation	0.09	0.08	0.07	0.10	0.04	0.08	0.06	0.08
Wood burning**								
Penetration (%)	53.5	44.2	25.3	36.7	30.5	39.8	33.1	38.1
Saturation	0.71	0.62	0.33	0.48	0.36	0.53	0.41	0.50
Other								
Penetration (%)	1.4	1.5	0.4	1.5	1.2	1.0	1.3	1.1
Saturation	0.03	0.02	*	0.02	0.01	0.02	0.01	0.02

* indicates a proportion smaller than 0.01

Exhibit 3.13a shows the penetration and saturation of fireplace inserts adjusted to the full population base, and compared with the 1993 data. The increase in reported penetration of natural gas fireplace inserts since 1993 is significant, with heater type inserts increasing from 17% to 29% and fire logs increasing from 18% to 28%. It should also be noted that this study does not include the majority of condominiums (classed as commercial buildings in the BC Gas tariffs), which have experienced a high growth rate in natural gas inserts.

3.13a Fireplace inserts (reprofiled to full BC Gas population)

Number of inserts by type	BC Gas	1993
Unweighted base	1610	4814
NG heater insert		
Penetration (%)	28.6	16.5
Saturation	0.38	0.21
NG fire logs		
Penetration (%)	28.2	18.2
Saturation	0.37	0.23
Electric insert		
Penetration (%)	1.1	0.3
Saturation	0.02	*
Propane insert		
Penetration (%)	0.4	0.1
Saturation	0.01	*
Wood b'ng insert		
Penetration (%)	5.3	15.0
Saturation	0.06	0.18
Wood burning**		
Penetration (%)	30.9	30.1
Saturation	0.41	0.41
Other		
Penetration (%)	0.9	-
Saturation	0.01	

* indicates a proportion smaller than 0.01

** The equivalent question in the 1993 survey was "no insert".

Of homes with a fireplace device (Exhibit 3.14), shares are: open fireplace 14%; mesh curtain 33%; opening glass doors 31%; and solid glass cover 43%.

3.14 Fireplace devices (among those with a fireplace)

Fireplace device	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas
Unweighted base	215	267	261	267	249	743	516	1259
Open fireplace								
Penetration (%)	28.8	12.7	6.5	8.2	5.6	15.8	6.7	13.5
Saturation	0.37	0.13	0.08	0.10	0.07	0.20	0.09	0.17
Mesh curtain								
Penetration (%)	40.0	41.9	28.0	27.3	22.9	35.6	24.7	32.9
Saturation	0.52	0.55	0.33	0.34	0.26	0.45	0.29	0.41
Glass doors that open								
Penetration (%)	28.8	36.3	31.8	25.8	29.7	31.9	28.1	30.9
Saturation	0.37	0.47	0.40	0.29	0.36	0.41	0.33	0.39
Solid plate glass cover								
Penetration (%)	28.4	36.7	51.3	49.8	51.8	39.7	51.0	42.6
Saturation	0.38	0.49	0.75	0.61	0.63	0.56	0.62	0.57

Detailed information on hours of fireplace use by season was collected as part of the season (Exhibit 3.15). Among those with a fireplace, the average hours of fireplace use by season were as follows: summer 0.6 hours per week; fall 10.1 hours per week; winter 20.8 hours per week; and spring 9.3 hours per week. Hours of use were higher in the Interior than the Lower Mainland for summer and winter, but not for the shoulder seasons.

3.15 Weekly hours of fireplace operation by season (hours per week) (Among those with a fireplace)

	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas
Unweighted base	215	267	261	267	249	743	516	1259
Summer	0.39	0.66	0.31	0.51	1.09	0.43	0.85	0.56
Fall	8.38	7.37	13.28	11.37	8.64	10.17	9.77	10.06
Winter	14.88	15.62	25.38	32.31	18.75	19.62	24.35	20.83
Spring	5.95	7.24	14.16	9.30	7.77	9.72	8.38	9.34

3.3 Water Heating and Usage

A variety of detailed questions were asked about hot water heaters (Exhibit 3.16). The average number of hot water heaters was slightly more than 1.0 per household with little difference across regions or across zones. Approximately 3% of respondents reported having a second hot water heater. The average age of the first hot water heater was 7.5 years, slightly higher in the Interior at 7.8 years and slightly lower in the Lower Mainland at 7.3 years. The average age of second hot water years was higher at 8.5 years overall, 8.8 years in the Interior and 8.3 years in the Lower Mainland. About 37% of overall respondents installed a new hot water heater over the past five years, slightly lower at 32% in the Interior and slightly higher at 39% in the Lower Mainland.

Compared with 1993, the average age of water heaters has increased by about 1 year.

3.16 Hot water heaters

	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas	1993
Unweighted base	249	308	298	368	387	855	755	1610	4814
Hot water heaters									
Penetration (%)	91.2	93.5	97.0	96.7	95.1	94.1	95.7	94.6	92.1
Saturation	1.05	1.02	1.01	1.02	1.04	1.03	1.03	1.03	1.03
NR (%)	8.8	6.5	3.0	3.3	4.9	5.9	4.3	5.4	5.4
Installed new water heater over the past five years (%)	43.0	39.6	35.9	34.8	30.7	39.3	32.3	37.2	-

3.17 Age of Hot Water Heaters (Years)

	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas	1993
Unweighted base	227	288	289	356	368	804	724	1528	3730
Age of first water heater	7.3	6.8	7.6	7.3	8.2	7.3	7.8	7.5	6.4
Unweighted base*	11	6	4	8	14	21	22	43	108
Age of second water heater	9.4	4.7	10.0	12.5	7.4	8.3	8.8	8.5	7.4

* Caution: when sample sizes are less than 50, results are directional only

Natural gas is the hot water heater fuel in 85% of first hot water heaters and 78% of second hot water heaters. Electricity is the hot water heater fuel in 14% of first and second hot water heaters.

Since 1993, the market share of electric water heaters in houses with gas service has remained constant at about 14%.

3.18 Hot water heater fuel (%)

Fuel	Heater 1	Heater 2	1993 Htr. 1	1993 Htr. 2
Unweighted base	1528	44*	3557	83
Electricity	14.3	14.3	14.3	33.8
Natural gas	84.7	78.4	84.3	64.6
Piped propane	0.2	-	0.2	-
Other	-	3.6	0.2	1.6
NR	0.9	3.6	1.2	-

* Caution, when sample sizes are less than 50, results are directional only.

Over 5% of households changed water-heating fuel over the past five years (Exhibit 3.19). The share of those changing water heating fuel was slightly higher in the Interior than in the Lower Mainland.

The 1993 REUS asked for changes in water heating fuel over the past two years rather than the 5 years in this survey. If the rate of change was fairly constant around 1993, this would indicate that the per annum rate of change has dropped from about 1.5% to about 1.1%, which would be consistent with the increasing saturation of natural gas water heating. However it should be noted that the 1993 survey asked just for changes to natural gas from other fuels.

3.19 Changed water heater fuel over past five years (%)

	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas	1993
Unweighted base	249	308	298	368	387	855	755	1610	4814
Yes	5.6	4.5	5.4	8.7	3.9	5.3	5.7	5.4	2.9*
No	87.6	89.3	90.9	87.5	87.9	89.3	87.7	88.8	97.1
DK/NR	6.8	6.2	3.7	3.8	8.3	5.4	6.5	5.8	0

*The 1993 survey asked for changes in the past 2 years rather than 5 years.

Of the 89 people who noted that they had changed water-heating fuel, 90% switched to natural gas while the remaining 9% switched to electricity (Exhibit 3.20). This table indicated that a number of respondents reported the same fuel as both the previous and current fuel. However, it appears that 72% of the 24 people previously on electricity switched to natural gas, while only about 43% of the 51 people previously on natural gas switched to electricity.

3.20 Changed water heating fuel over past five years (%)

Current Fuel	Previous Fuel						
	Elec.	NGas	Piped Prop.	Bott. Prop.	Solar	DK	Total
Unweighted base	24	51	1	2	1	5	89
Electricity	32.4	43	-	-	-	25.1	8.9
Natural Gas	72.0	96.7	100.0	100.0	100.0	74.9	89.9

The main reasons for installing a new water heater in the past 5 years were: water heater failure (67%), anticipated water heater failure (17%), installed in a new home (7%), and wanted a more efficient water heater (4%) as indicated in Exhibit 3.21.

3.21 Main reason for installing new hot water heater (%)

	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas
Unweighted base	107	122	107	128	119	336	247	583
New home	2.8	5.7	8.4	7.0	11.8	5.6	9.8	6.7
Wanted to change to natural gas	4.7	0.8	-	3.9	2.5	2.0	3.1	2.3
Wanted more efficient hot water heater	6.5	2.5	1.9	7.0	0.8	3.8	3.4	3.7
Water heater had failed	66.4	74.6	65.4	68.0	63.0	68.1	65.1	67.3
Anticipated water heater failure	18.7	10.7	19.6	13.3	18.5	17.0	16.3	16.8
Needed more hot water	2.8	3.3	2.8	2.3	3.4	2.9	2.9	2.9
Quicker hot water recovery	0.9	1.6	0.9	0.8	0.8	1.1	0.8	1.0
Wanted environmentally friendly fuel	0.9	0.8	-	0.8	-	0.6	0.3	0.5
Wanted cheaper fuel	1.9	-	0.9	-	-	1.1	-	0.8
Other	2.8	4.1	2.8	3.1	0.8	3.1	1.8	2.8
NA/DK	0.9	-	0.9	0.8	-	0.7	0.3	0.6

Note: reasons may sum to more than 100% due to multiple responses.

Detailed information was collected on hot water appliances (Exhibit 3.22) and hot water usage (Exhibit 3.23). Households had an average of 1.95 showerheads with about 1.1 low flow showerheads and 0.2 water heater blankets. Hot water

usage included 4.3 dishwasher loads per week, 5.8 laundry loads per week, 4.4 baths per week and 13.1 showers per week.

Compared with 1993, there has been an increase in all hot water loads, including a 30% increase in the number of dishwasher loads, a 13% increase in showers, and 11% increase in laundry and an 8% increase in baths.

3.22 Hot water appliances

Number	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas
Unweighted base	249	308	298	368	387	855	755	1610
Showerheads								
Penetration (%)	98.2	98.9	98.2	99.1	98.9	98.4	99.0	98.6
Saturation	2.07	2.00	1.91	1.84	1.86	1.99	1.85	1.95
Low flow showerheads								
Penetration (%)	56.6	63.2	60.4	68.2	63.9	59.8	65.5	61.6
Saturation	1.06	1.12	1.04	1.20	1.06	1.07	1.11	1.08
Water heater blankets								
Penetration (%)	14.2	16.5	11.6	20.7	16.8	13.8	18.3	15.2
Saturation	0.18	0.18	0.12	0.22	0.17	0.15	0.19	0.16

3.23 Hot water usage

Per week	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas	1993
Unweighted base	249	308	298	368	387	855	755	1610	4814
Dishwasher loads	4.26	4.43	4.06	4.48	4.45	4.22	4.46	4.29	3.32
Laundry loads	5.51	6.26	5.90	5.76	5.34	5.86	5.51	5.75	5.16
Number of baths	4.39	4.69	4.29	4.50	4.38	4.42	4.43	4.42	4.11
Number of showers	15.72	14.09	12.31	11.46	10.87	13.93	11.10	13.08	11.53

3.4 Pools and Hot Tubs

Detailed information was also collected on pools and hot tubs (Exhibit 3.24), covers (Exhibit 3.25) swimming pool heating (Exhibit 3.26) and hot tub heating (Exhibit 3.27). About 7% of homes have a swimming pool, 80% of the 98 people reporting having a pool, cover it when not in use. Eleven percent have a hot tub and 95% of the 185 people reporting a hot tub, cover it when not in use. Natural gas is the predominant heating fuel for pools, while electricity is the preferred method for hot tubs.

The number of swimming pools has increased about 27% since 1993, while the number of hot tubs has increased by 32%. However, as the predominant hot tub fuel is electricity, the impact on natural gas usage should be relatively small. As reflected in Exhibit 3.25, the level of pool and hot tub owner's usage of covers has increased by 11% and 10% respectively.

3.24 Pools and hot tubs (%)

	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas	1993
Unweighted base	249	308	298	368	387	855	755	1610	4814
Have a swimming pool	4.8	5.5	4.4	7.6	7.3	4.8	7.4	6.6	5.2
Have a hot tub	7.6	11.4	10.1	12.5	14.5	9.6	13.7	10.8	8.2

3.25 Pool covers and hot tub covers (%) (Among those with a pool/ hot tub)

	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas	1993
Unweighted base*	12	17	13	28	28	42	56	98	238
Cover pool when not in use	41.7	76.5	100.0	96.4	85.7	72.8	90.0	79.7	72.0
Unweighted base*	19	35	29	46	56	83	102	185	374
Cover hot tub when not in use	84.2	97.1	96.6	95.7	100.0	93.2	98.5	95.3	86.9

* Caution, when sample sizes are less than 50, results are directional only.

Since 1993, there has been a shift away from natural gas to electric heating for hot tubs.

3.26 Swimming pool fuel (%) (Among those with a pool)

	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas	1993
Unweighted base*	12	17	13	28	28	42	56	98	238
Not heated	8.3	41.2	30.8	21.4	21.4	25.9	21.4	24.1	26.8
Natural gas	75.0	41.2	53.8	53.6	53.6	57.7	53.6	56.0	49.1
Propane	-	-	-	-	-	-	-	-	-
Solar	8.3	17.6	23.1	35.7	21.4	16.4	27.1	20.7	14.2
Electric	-	-	-	3.6	3.6	-	3.6	1.4	3.4
NA/DK	8.3	-	-	-	3.6	2.9	2.1	2.6	5.8

* Caution, when sample sizes are less than 50, results are directional only.

3.27 Hot tub fuel (%) (Among those with a hot tub)

	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas	1993
Unweighted base*	19	35	29	46	56	83	102	185	374
Natural gas	26.3	5.7	17.2	6.5	8.9	16.4	8.1	13.1	21.8
Propane	-	2.9	-	-	-	0.9	-	0.5	0.4
Solar	-	-	-	2.2	1.8	-	1.9	0.7	0.3
Electric	73.7	91.4	82.8	93.5	91.1	82.8	91.9	86.3	74.7
DK/NR	-	-	3.4	-	-	1.4	-	0.9	2.8

* Caution, when sample sizes are less than 50, results are directional only.

3.5 Cooking Appliances

Information on the penetration and saturation of cooking appliances (Exhibit 3.28) and age of cooking appliances was collected (Exhibit 3.29). Highest penetrations were for microwave ovens (93%), electric ranges (82%), propane barbeques (63%), electric cook tops (17%) and natural gas ranges (16%). Average age of cooking appliances varied from 6 years to 11 years.

Since 1993, there has been a general increase in the penetration of cooking appliances, such that the penetration per household has increased from 100.7% in 1993 to 121% in 2002. Similarly, the saturation has increased from 1.13 per house to 1.35 per house. No explanations or hypothesis for this change has been found in the survey results, although it may be related to an increasing number of suites (including basement suites) and some houses that have a separate kitchen or appliance for wok cooking. In spite of this unexplained phenomenon, there does appear to be a significant increase in the incidence of natural gas cooking in homes.

3.28 Cooking appliances

	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas	1993
Unweighted base	249	308	298	368	387	855	755	1610	4814
Electric range									
Penetration (%)	77.1	83.8	80.2	85.9	86.0	80.0	86.0	81.8	77.9
Saturation	0.95	0.96	0.87	0.89	0.92	0.92	0.91	0.92	0.87
NG range									
Penetration (%)	23.3	13.6	15.8	10.6	10.9	17.9	10.8	15.7	9.1
Saturation	0.24	0.15	0.16	0.11	0.12	0.19	0.11	0.17	0.10
Electric cook top									
Penetration (%)	20.5	13.0	16.8	15.5	15.2	17.1	15.3	16.6	11.8
Saturation	0.25	0.15	0.18	0.16	0.17	0.19	0.17	0.19	0.13
NG cook top									
Penetration (%)	12.9	6.8	5.7	4.3	3.4	8.5	3.7	7.0	3.1
Saturation	0.13	0.07	0.06	0.04	0.03	0.09	0.04	0.07	0.03
Microwave oven									
Penetration (%)	89.2	93.2	95.0	93.8	93.0	92.5	93.3	92.7	79.4
Saturation	1.03	1.05	1.01	0.98	0.99	1.03	0.99	1.01	1.04
Propane barbeque									
Penetration (%)	54.6	69.5	64.8	66.0	63.6	62.4	64.5	63.0	51.7
Saturation	0.58	0.73	0.66	0.68	0.65	0.65	0.66	0.65	0.56
NG barbeque									
Penetration (%)	7.6	8.4	9.7	10.9	12.7	8.7	12.0	9.7	4.5
Saturation	0.08	0.08	0.10	0.11	0.13	0.09	0.12	0.10	0.05

In general, appliance ages have increased since 1993. The exception is natural gas barbeques, and this probably represents a new appliance that is still increasing in market share, and does not have a significant number of units dying at this time.

3.29 Age of cooking appliances (first appliance)

	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas	1993
Electric range	10.8	11.2	11.0	9.7	9.6	11.0	9.6	10.6	9.7
Natural gas range	11.1	8.8	7.3	9.6	7.6	9.3	8.4	9.2	10.3
Electric cook top	9.4	9.3	11.4	9.9	9.2	10.2	9.5	10.0	9.9
NG cook top	8.0	6.5	10.9	8.1	8.8	8.5	8.5	8.5	6.2
Microwave oven	7.4	8.1	8.1	7.7	8.3	7.8	8.0	7.9	6.1
Propane barbeque	5.8	6.3	6.8	6.8	8.0	6.4	7.5	6.7	5.2
NG barbeque	5.5	3.4	5.7	6.4	6.2	5.1	6.2	5.6	4.0

3.6 Cooling Appliances

Information on the penetration and saturation of cooling appliances (Exhibit 3.30) and age of cooling appliances were collected (Exhibit 3.31). Penetrations were 98% for refrigerators and 69% for stand-alone freezers. The saturation of refrigerators is about 1.32 per household, while the saturation for freezers is about 0.76. Average age of cooling appliances was 9 years for refrigerators and 14 years for freezers.

3.30 Cooling appliances

Number	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas
Unweighted base	249	308	298	368	387	855	755	1610
Refrigerator								
Penetration (%)	96.8	97.4	98.3	97.8	97.9	97.6	97.9	97.7
Saturation	1.42	1.36	1.27	1.24	1.26	1.34	1.26	1.32
Stand alone freezer								
Penetration (%)	53.4	70.5	75.5	77.7	75.2	66.5	76.2	69.4
Saturation	0.56	0.76	0.83	0.87	0.85	0.72	0.86	0.76

3.31 Age of cooling appliances (first appliance)

Number	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas
Refrigerator	8.8	8.6	8.8	8.6	8.7	8.7	8.6	8.7
Stand alone freezer	13.4	13.7	13.7	14.9	13.5	13.6	14.1	13.7

3.7 Cleaning Appliances

Information on the penetration and saturation of cleaning appliances (Exhibit 3.32) and age of cleaning appliances (Exhibit 3.33) were collected. Penetrations were calculated for electric clothes dryers (90%), top loading clothes washers (88%), dishwashers (81%), front-loading clothes washers (9%) and natural gas clothes dryers (5%). Saturation numbers are also included in the table. Average age of cleaning appliances varied from 5 years to 9 years and appears to have increased over the past decade.

Since 1993, the penetration of dishwashers has increased significantly, (almost 20%) while other cleaning appliances have shown a lower rate of growth. When combining both top and front loading clothes washers, the penetration has increased from 95% to about 98%. The overall penetration of clothes dryers (both electric and gas) has remained constant. However natural gas clothes dryers appear to have grown by 36% to over 5%.

3.32 Cleaning appliances

	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas	1993
Unweighted base	249	308	298	368	387	855	755	1610	4814
Dishwasher									
Penetration (%)	75.5	84.1	88.3	75.5	79.1	82.8	77.7	81.2	68.2
Saturation	0.77	0.89	0.90	0.76	0.81	0.85	0.79	0.83	0.69
Top loading clothes washer									
Penetration (%)	88.8	87.0	89.3	88.0	87.6	88.5	87.8	88.3	95.2
Saturation	0.91	0.90	0.90	0.89	0.89	0.90	0.89	0.90	0.96
Front loading clothes washer									
Penetration (%)	7.2	11.4	11.1	9.8	7.8	9.8	8.5	9.4	na
Saturation	0.08	0.12	0.11	0.10	0.08	0.10	0.09	0.10	na
Electric clothes dryer									
Penetration (%)	85.9	87.7	91.6	92.4	91.2	88.6	91.7	89.6	90.8
Saturation	0.88	0.91	0.92	0.93	0.93	0.90	0.93	0.91	0.92
Natural gas clothes dryer									
Penetration (%)	6.4	6.2	4.7	4.6	4.4	5.7	4.5	5.3	3.9
Saturation	0.06	0.06	0.05	0.05	0.04	0.06	0.05	0.05	0.04

3.33 Age of cleaning appliances (first appliance)

	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas	1993
Dishwasher	8.7	8.5	8.8	7.3	8.2	8.7	7.8	8.4	7.1
Top loading clothes washer	8.5	8.9	8.6	8.7	9.2	8.6	9.0	8.7	8.1
Front loading clothes washer	5.1	4.1	5.4	5.0	5.6	4.9	5.4	5.0	na
Electric clothes dryer	9.5	9.5	9.1	9.3	9.9	9.3	9.7	9.4	9.0
Natural gas clothes dryer	10.4	8.6	7.7	9.4	8.5	8.9	8.9	8.9	8.6

3.8 Air Conditioning and Heating

Information on the penetration and saturation of air conditioning and heating appliances (Exhibit 3.34) and age of air conditioning and heating appliances (Exhibit 3.35) were collected. Highest penetrations were for electric central air conditioners (15%), electric wall units (9%), and humidifiers (7%). Saturation levels follow the same pattern. Average age of these appliances varied from 2 to 10 years.

3.34 Air conditioning and heating appliances

	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas	1993
Unweighted base	249	308	298	368	387	855	755	1610	4814
Electric central air conditioner									
Penetration (%)	6.0	5.8	6.4	25.8	42.1	6.1	35.8	15.1	18.4
Saturation	0.07	0.06	0.06	0.26	0.43	0.07	0.36	0.16	0.19
Electric wall unit									
Penetration (%)	8.8	7.8	8.1	10.3	11.4	8.3	11.0	9.1	4.0
Saturation	0.13	0.11	0.13	0.13	0.13	0.12	0.13	0.13	0.05
Humidifier									
Penetration (%)	4.8	4.9	4.4	12.8	12.4	4.6	12.5	7.0	9.6
Saturation	0.05	0.05	0.05	0.13	0.13	0.05	0.13	0.07	0.10
Air source heat pump									
Penetration (%)	0.8	1.6	1.0	0.5	1.8	1.1	1.3	1.2	1.0
Saturation	*	0.02	0.02	*	0.02	0.01	0.01	0.01	0.01
Ground source heat pump									
Penetration (%)	3.6	0.6	0.3	-	0.3	1.6	0.2	1.1	na
Saturation	0.04	0.01	*	-	*	0.02	*	0.01	na
Propane outdoor heater									
Penetration (%)	1.2	1.0	1.7	0.8	0.5	1.3	0.6	1.1	na
Saturation	0.01	0.01	0.02	*	*	0.01	*	0.01	na
Natural gas outdoor heater									
Penetration (%)	0.8	-	1.0	1.4	1.6	0.7	1.5	0.9	na
Saturation	0.02	-	0.01	0.02	0.02	*	0.02	0.01	
Heat recovery ventilator									
Penetration (%)	3.2	1.0	1.7	1.1	1.3	2.0	1.2	1.8	na
Saturation	0.03	0.01	0.02	0.02	0.01	0.02	0.01	0.02	na

* Indicates a proportion less than 0.01

3.35 Age of air conditioning and heating appliances (first appliance)

	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas
Electric central air conditioner	17.0	8.7	9.1	11.5	8.9	11.4	9.6	10.1
Electric wall unit	8.3	11.9	7.7	9.5	9.8	9.0	9.7	9.2
Humidifier	10.0	8.8	7.3	9.6	6.2	8.7	7.4	8.0
Air source heat pump	4.5	15.2	8.0	2.5	5.8	10.0	5.2	8.4
Ground source heat pump	8.5	10.0	-	-	-	8.6	-	8.6
Propane outdoor heater	3.0	1.0	1.2	4.0	4.0	1.6	4.0	2.1
Natural gas outdoor heater	5.0	-	2.5	7.2	3.8	3.4	5.2	4.4
Heat recovery ventilator	6.1	10.5	5.5	10.5	4.7	6.3	7.4	6.5

4 BUILDING ENVELOPE AND RENOVATIONS

In examining residential building envelope and renovations, the main focus is on understanding the following at the level of the zone and region for the BC Gas service territory as a whole.

- Dwelling characteristics including dwelling type, age, size, stories, ownership and length of tenure.
- Dwelling insulation including ceiling, wall and basement insulation as well as windows and doors.
- Renovations undertaken over the past five years including who did the renovation and reasons for the renovations.
- Renovations planned for the next two years including who will likely do the renovations.
- Sources of information on renovations.
- Energy conservation actions taken.

Type of dwelling is shown is Exhibit 4.1. Single-family dwellings dominate the sample, with 79% of dwellings for the sample as whole, 79% of Interior homes and 78% of Lower Mainland home being single-family dwellings. Row and townhouses are next at 10% for the sample as a whole, 5% in the Interior and 13% in the Lower Mainland. Duplexes are about 4% of the overall sample. Mobile homes and other make up about 4% of the overall sample and are more concentrated in the Interior at 8% than the Lower Mainland at 2%. At the zone level, the most striking feature is the large number of row houses and townhouses in Zones 1 and 3 compared to the other zones.

Since 1993, the share of single-family dwellings has reduced by about 7 percentage points, while duplexes and row / townhouses have increased, reflecting the changing housing mix in B.C. There also appears to be a decrease in the percentage of individually metered mobile homes in BC Gas' service territory, but sample sizes are quite small.

4.1 Type of dwelling (%)

Dwelling type	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas	1993
Unweighted base	249	308	298	368	387	855	755	1610	4814
Single family home	80.3	83.4	73.5	83.2	76.7	78.4	79.2	78.6	84.4
Duplex	4.8	4.5	3.4	4.9	5.2	4.2	5.1	4.4	3.0
Row / townhouse	11.2	8.8	16.1	4.6	4.9	12.6	4.8	10.2	5.8
Apartment	-	-	0.3	0.5	1.3	0.1	1.0	0.4	0.7
Mobile home/other	-	1.6	4.0	5.2	9.3	2.0	7.7	3.7	5.0
DK/NR	3.6	1.6	2.7	1.6	2.6	2.7	2.2	2.6	1.1

Age of dwelling is shown in Exhibit 4.2. Only 13% of houses in the sample were built before 1950, 9% in the Interior and 15% in the Lower Mainland. The largest group of homes, 30% was built between 1950 and 1975, with this share quite similar for the Interior and the Lower Mainland. About 19% of homes were built between 1976 and 1985. Almost one-quarter of the homes were built between 1986 and 1995 with similar regional distributions. Finally, about 10% of homes were built in 1996 or later, again with little regional difference. At the zone level, the key feature is that about one-half the homes in Zone 3 have been built since 1986 compared to about 20% for Zone 1.

4.2 Period of Construction (%)

Year built	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas	1993
Unweighted base	249	308	298	368	387	855	755	1610	4814
Before 1950	29.7	12.3	4.0	6.0	11.6	15.1	9.4	13.4	13.2
1950-1975	29.7	34.1	24.5	38.3	24.5	28.7	29.9	29.1	36.5
1976-1985	15.7	18.2	18.1	22.6	20.9	17.3	21.6	18.6	23.1
1986-1995	12.9	23.4	35.9	20.7	23.8	24.7	22.6	24.1	24.3*
1996 or later	6.8	9.1	13.1	9.0	13.2	9.9	11.6	10.4	na
DK/NR	5.2	2.9	4.3	3.5	5.9	4.3	5.0	4.5	2.9

* Data to 1993 only.

The average length of residence as shown in Exhibit 4.3 is about 12.4 years for the sample as a whole, slightly higher than average at 12.7 years in the Lower Mainland and slightly lower than average at 11.8 years in the Interior. Length of residence differs substantially across zones at 14.5 years in Zone 1, 13.3 years in Zone 2, 10.9 years in Zone 3, 12.4 years in Zone 4 and 11.4 years in Zone 5. The average length of residence has increased by about 2 years since 1993.

4.3 Length of residence (years)

Length of residence	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas	1993
Unweighted base	249	308	298	368	387	855	755	1610	4814
Mean	14.48	13.34	10.85	12.44	11.40	12.72	11.80	12.44	10.4
Standard deviation	12.82	11.05	11.01	11.39	11.68	11.77	11.57	11.71	na

BC Gas' residential customers are overwhelmingly owners rather than renters. As Exhibit 4.4 indicates, some 92% of respondents are homeowners with this share varying little across regions or across zones. Similarly, the pattern has not changed since 1993.

4.4 Ownership status (%)

Ownership status	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas	1993
Unweighted base	249	308	298	368	387	855	755	1610	4814
Rent	7.2	7.1	6.7	6.8	4.7	7.0	5.5	6.5	6.6
Own	90.8	90.9	91.6	92.1	92.2	91.1	92.2	91.5	92.7
DK/NR	2.0	1.9	1.7	1.1	3.1	1.9	2.3	2.0	0.7

Similarly, BC Gas' residential customers use their home as their principal residence. As shown in Exhibit 4.4a, this is true for almost 94% of the respondents, and has little variation across the regions.

4.4a Principal Residence status (%)

Principal Residence status	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas	1993
Unweighted base	249	308	298	368	387	855	755	1610	4814
Yes	92.8	94.8	95.6	93.8	91.0	94.4	92.0	93.7	98.4
No	2.4	1.0	-	1.6	3.6	1.1	2.9	1.6	0.8
DK/NR	4.8	4.2	4.4	4.6	5.4	4.5	5.1	4.7	0.8

About 14% of respondents reported that they pay a maintenance fee. Exhibit 4.4b shows the percentages that pay a fee, and what fuel uses are included as a part of this fee.

4.4b Maintenance Fee and End Uses Included (%)

Maintenance Fee	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas
Unweighted base	249	308	298	368	387	855	755	1610
Pay maintenance fee	14.1	9.7	22.5	5.7	12.1	16.4	9.7	14.3
Maintenance fee includes space heat	4.0	1.0	1.3	2.4	1.6	2.2	1.9	2.1
Maintenance fee includes water heat	6.4	1.0	1.7	2.7	2.6	3.2	2.6	3.0
Maintenance fee includes fireplace fuel	3.2	0.3	1.7	2.7	1.3	1.9	1.8	1.9

Note: DK/NR varies by question, but was generally in the range of 8 – 20%

4.1 Building Characteristics

Average number of stories varies substantially across regions and across zones, as shown in Exhibit 4.5, with two stories or more dominating Zones 1, 2 and 3, while single story dominates Zones 4 and 5. Over 60% of homes overall have two stories or more while the share of two or more story homes is 44% in the Interior and 70% in the Lower Mainland. Comparison with the 1993 results shows a trend to an increased number of stories since 1993. This trend appears stronger than the increase in floor space (Exhibit 4.8), and may represent a move to smaller building lots and building footprints, but more floors to maintain or increase usable floor area.

4.5 Number of stories (%)

Number of stories	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas	1993
Unweighted base	249	308	298	368	387	855	755	1610	4814
Mean	2.12	1.95	1.72	1.60	1.58	1.92	1.59	1.82	1.63
Standard deviation	1.38	1.00	0.70	1.35	0.80	1.06	1.05	1.07	-
One story	19.3	25.0	34.6	54.6	50.9	26.8	52.3	34.6	42.8
Two stories	54.6	56.2	55.4	37.2	36.4	55.3	36.7	49.7	47.9
Three stories	19.7	14.3	6.0	4.9	7.5	12.9	6.5	10.9	5.5
More than 3 stories	1.6	1.3	0.7	1.4	0.8	1.2	1.0	1.1	0.7
DK/NR	4.8	2.6	2.7	1.6	4.4	3.4	3.3	3.4	3.1

Some 30% of dwellings have a crawl space, with similar levels in the Interior and in the Lower Mainland as shown in Exhibit 4.6. However, presence of a crawl space varies substantially across zones: 23% in Zone 1; 31% in Zone 2; 37% in Zone 3; 22% in Zone 4; and 34% in Zone 5.

4.6 Crawlspace (%)

Home has crawlspace	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas	1993
Unweighted base	249	308	298	368	387	855	755	1610	4814
Yes	23.3	30.8	36.6	21.7	34.1	30.5	29.3	30.1	32.8
No	72.7	67.2	62.4	75.0	62.3	67.2	67.2	67.2	64.1
DK/NR	4.0	1.9	1.0	3.3	3.6	2.3	3.5	2.7	3.1

About 70% of homes in the sample have a basement, but this share varies substantially across BC Gas' service territory with significantly more homes having no basement in the Lower Mainland as in the Interior. About 38% of homes have a fully finished basement with this figure varying little by region although Zone 3 has substantially fewer fully finished basements than other zones.

Comparison with the 1993 survey shows that the percentage of crawlspaces and houses with no basements, unfinished basements or partly finished basements has decreased while fully finished basements has increased. This may indicate that houses are being more intensively used than previously.

4.7 Basement (%)

Condition of basement	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas	1993
Unweighted base	249	308	298	368	387	855	755	1610	4814
No basement	29.7	25.0	40.3	12.2	23.0	32.8	18.8	28.6	27.8
Unfinished	3.2	5.8	8.7	10.6	9.8	6.1	10.1	7.3	9.0
Partly finish'd	22.1	21.1	17.4	32.6	22.7	20.0	26.6	22.0	26.1
Fully finished	41.8	46.1	28.9	42.4	38.5	37.7	40.0	38.4	33.1
DK/NR	3.2	1.9	4.7	2.2	5.9	3.5	4.5	3.8	4.0

Respondents were queried about the use of the basement, and if it was part of the living space or a separate suite. Exhibit 4.7a shows that about 7% of the dwellings reported having suites, with the Lower Mainland having about double the incidence as the Interior. There may be some underreporting of suites, as this is a sensitive local issue, and may have contributed to almost one third of the respondents not replying to the question.

4.7a Basement Usage (%)

Condition of basement	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas
Unweighted base	249	308	298	368	387	855	755	1610
Part of living space	57.4	63.3	47.7	79.1	65.9	55.0	71.0	59.8
Separate suite	10.0	10.4	6.4	4.1	4.1	8.7	4.1	7.3
DK/NR	32.5	26.3	46.0	16.8	30.0	36.4	24.9	32.9

The average home in the sample has an area of 2199 square feet, smaller in the Interior at 2079 square feet and larger in the Lower Mainland at 2250 square feet. Homes are largest in Zone 2 and smallest in Zone 4, although the difference in average area between these two zones is less than 10%. The average size of the home has increased by about 4% since 1993.

4.8 Size of residence

Area in square feet	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas	1993
Unweighted base	213	273	268	317	345	754	662	1416	4364
Mean	2228	2326	2223	2064	2088	2250	2079	2199	2107
Standard deviation	876	977	935	957	1015	926	993	950	-

4.8a Size of residence by dwelling type

Area in square feet	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas	1993
Unweighted base	213	273	268	317	345	754	662	1416	4364
Single family home	2348	2474	2391	2159	2241	2398	2208	2340	2205
Duplex*	1718	1954	2304	2102	2006	2005	2035	2015	2008
Row / townhouse*	1543	1406	1640	1346	1720	1570	1571	1570	1605
Apartment*	-	-	1428	2440	1276	1428	1566	1529	1072
Mobile home/other*	-	988	1639	1034	1225	1422	1178	1245	1028

* Caution, small sample sizes, results are indicative only.

For purposes of the next three tables, less than average insulation was defined as about R6 or 1.75 inches of fibreglass insulation or less, average insulation was defined as about R12 or 3.5 inches of fibreglass insulation and more than average insulation was defined as about R18 or 5.25 inches of fibreglass insulation or more. About 80% of homes are able to estimate their attic insulation levels. Attic insulation levels are generally good as shown in Exhibit 4.9, with 31% of homes claiming above average insulation levels (39% Interior and 28% Lower Mainland) and 41% claiming average insulation levels (35% Interior and 43% Lower Mainland). Only about 7% claimed they had less than average insulation. As expected, houses in the Interior are better insulated than those in the Lower Mainland.

When looking at attic insulation by age of home, the trend is that between 35% and 45% of all homes have average insulation. Older homes tend to have less than average insulation while newer homes tend to be better insulated.

4.9 Attic insulation (%)

Level	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas
Unweighted base	249	308	298	368	387	855	755	1610
Less than average	11.2	6.5	3.0	5.4	5.9	6.8	5.7	6.5
Average	40.6	43.5	45.0	34.5	35.7	43.1	35.2	40.7
More than average	21.3	30.5	31.9	41.0	37.2	27.8	38.7	31.1
DK/NR	26.9	19.4	20.2	19.0	21.2	22.3	20.4	21.8

4.10 Attic insulation by age of home (%)

Level	Before 1950	1950 -1975	1976 -1985	1986 -1995	1996 -Later	DK	BC Gas
Unweighted base	191	488	313	379	168	34	1610
Less than average	21.4	7.3	2.7	1.8	1.5	14.5	6.5
Average	44.2	38.4	45.1	43.6	35.9	26.1	40.7
More than average	21.2	34.0	30.0	35.6	36.5	4.4	31.1
DK/NR	13.2	20.3	22.1	19.0	26.1	55.0	21.8

About 70% of homes are able to estimate their wall insulation levels. Reported wall insulation levels are lower than attic insulation (Exhibit 4.11) with about 11% of respondents indicating better than average wall insulation (17% Interior and 9% Lower Mainland). About 48% report average wall insulation levels, with less difference between regions, and 12% report less than average wall insulation. Again, older homes are less well insulated.

4.11 Wall insulation (%)

Level	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas
Unweighted base	249	308	298	368	387	855	755	1610
Less than average	19.3	12.0	7.4	8.2	10.3	12.7	9.5	11.7
Average	41.8	51.0	49.3	52.2	46.0	47.1	48.4	47.5
More than average	6.0	7.8	11.1	15.8	18.3	8.5	17.3	11.2
DK/NR	32.9	29.2	32.2	23.9	25.3	31.7	24.8	29.6

4.12 Wall insulation by age of home (%)

Level	Before 1950	1950 -1975	1976 -1985	1986 -1995	1996 -Later	DK	BC Gas
Unweighted base	191	488	313	379	168	34	1610
Less than average	39.9	15.2	5.3	0.9	0.5	16.6	11.7
Average	34.1	50.6	54.7	48.0	45.4	25.7	47.5
More than average	0.8	3.4	11.6	20.2	29.1	-	11.2
DK/NR	25.1	30.7	28.4	31.0	24.9	57.7	29.6

About 55% of homes are able to estimate their basement insulation levels (Exhibit 4.13). About 9% of respondents have higher than average basement insulation levels, 12% in the Interior and 7% in the Lower Mainland. About 36% have average basement insulation levels, 39% in the Interior and 34% in the Lower Mainland. About 12% have less than average basement insulation levels, about 15% in the Interior and 10% in the Lower Mainland. By age of home the same trend of lower insulation in older homes and greater insulation levels in newer homes continues.

4.13 Basement insulation (%)

Level	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas
Unweighted base	249	308	298	368	387	855	755	1610
Less than average	15.7	10.1	6.0	14.4	14.7	10.4	14.6	11.7
Average	32.9	43.5	29.5	44.3	34.6	34.2	38.4	35.5
More than average	4.4	6.2	9.4	12.5	11.9	6.9	12.1	8.5
DK/NR	47.0	40.2	55.0	28.8	38.8	48.6	34.9	44.4

4.14 Basement insulation by age of home (%)

Level	Before 1950	1950 -1975	1976 -1985	1986 -1995	1996 -Later	DK	BC Gas
Unweighted base	191	488	313	379	168	34	1610
Less than average	30.8	14.6	8.0	3.1	3.7	12.2	11.7
Average	35.8	42.2	37.9	28.6	32.8	19.2	35.5
More than average	2.2	3.8	8.4	13.2	22.0	-	8.5
DK/NR	31.2	39.4	45.7	55.1	41.4	68.6	44.4

Window glazing levels are shown in Exhibit 4.15. The most common type of glazing is double glazed regular glass at 63% overall, 68% in the Interior and 60% in the Lower Mainland. The second most common type of glazing is single glazed regular glass at 25% overall, 14% in the Interior and 30% in the Lower Mainland. Double glazed low E glass is used by about 7% of households, slightly higher in the Interior and less common in the Lower Mainland. Triple glazed windows are used by 1% of the sample.

Looking at the window glazing by age of house, the same pattern as previously noted emerges. Between 43% and 49% of the houses built before 1976 have now been retrofitted with double glazed windows. The apparent decline in double-glazing in houses built after 1996 is a combination of the use of more efficient glazing and a higher level of DK/NR responses for this vintage.

4.15 Windows - Glazing of majority of windows (%)

Type	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas
Unweighted base	249	308	298	368	387	855	755	1610
Single glazed regular glass	38.2	29.9	21.8	13.6	14.0	29.5	13.8	24.8
Double glazed regular glass	54.6	60.1	65.8	68.8	66.9	60.4	67.6	62.6
Double glazed low E glass	6.8	5.8	6.4	7.3	10.1	6.4	9.0	7.2
Triple glazed regular glass	0.4	0.3	0.3	0.8	1.3	0.4	1.1	0.6
Triple glazed low E glass	0.4	1.0	-	0.8	0.3	0.4	0.5	0.4
DK/NR	2.0	5.2	7.1	10.8	9.3	4.8	9.9	6.4

Note: Columns sum to more that 100% due to multiple responses

4.16 Windows - Glazing by age of house (%)

Type	Before 1950	1950 -1975	1976 -1985	1986 -1995	1996 -Later	DK	BC Gas
Unweighted base	191	488	313	379	168	34	1610
Single glazed regular glass	51.9	41.1	17.1	4.0	3.7	53.8	24.8
Double glazed regular glass	43.2	49.0	72.2	80.9	74.7	21.9	62.6
Double glazed low E glass	7.6	6.3	6.9	7.5	9.4	3.8	7.2
Triple glazed regular glass	-	0.1	0.7	0.6	1.8	4.6	0.6
Triple glazed low E glass	0.4	0.1	0.8	0.3	1.1	-	0.4
DK/NR	2.0	4.8	4.1	8.3	9.3	22.8	6.4

Note: Columns sum to more that 100% due to multiple responses

Most respondents are able to state the type of outside doors they have (Exhibit 4.17). The most common types of outside doors are insulated steel or fibreglass at 43% (57% Interior and 37% Lower Mainland), and standard wood doors at 35% (21% Interior and 41% Lower Mainland). Less common are standard wood with aluminium storm door at 19% overall (19% Interior and Lower Mainland). Again older houses tend to have less efficient doors. Houses in the Interior tend to have more insulated steel or fibreglass doors while the Lower Mainland has more standard wood doors.

4.17 Outside doors (%)

Type of majority of doors	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas
Unweighted base	249	308	298	368	387	855	755	1610
Standard wood	57.8	35.1	30.9	20.9	20.7	41.1	20.8	35.1
Standard wood with aluminium storm	19.3	21.8	18.1	19.8	18.1	19.4	18.8	19.2
Insulated steel or fibreglass	20.1	40.9	49.0	58.4	55.8	36.9	56.8	42.9
DK/NR	5.2	4.9	6.1	4.4	7.5	5.5	6.2	5.7

Note: Columns sum to more that 100% due to multiple responses

4.18 Outside doors by age of house (%)

Type of majority of doors	Before 1950	1950 -1975	1976 -1985	1986 -1995	1996 -Later	DK	BC Gas
Unweighted base	191	488	313	379	168	34	1610
Standard wood	62.3	42.0	39.9	17.0	12.8	49.2	35.1
Standard wood with aluminium storm	23.3	27.4	17.8	10.6	14.6	18.8	19.2
Insulated steel or fibreglass	14.2	30.9	41.7	66.7	67.6	29.0	42.9
DK/NR	3.2	3.6	2.8	7.6	7.9	14.2	5.7

Note: Columns sum to more that 100% due to multiple responses

4.2 Renovations

Based on previous research, a comprehensive list of renovations that affect natural gas use was developed. Respondents were asked about which of these renovations they had undertaken over the past five years as well as whether they did the renovation themselves, had a contractor do the renovations or both did it themselves and used a contractor (Exhibit 4.19). In decreasing order of frequency, the most commonly undertaken renovations (those with incidence of 10% or more) were purchased energy efficient appliances (38%), installed weather stripping or caulking (35%), installed low flow showerheads (32%). Installed programmable thermostats (25%), installed double glazed windows (18%), installed natural gas fireplace (18%), started using or increased usage of portable electric heaters (17%), improved insulation in attic or walls (16%), installed insulated steel or fibreglass doors (13%), installed storm doors (12%), installed energy efficient windows (10%), and installed glass fireplace doors (11%).

The Exhibit also shows how the renovations were done, either by the homeowner, by a contractor, or jointly between the homeowner and a contractor. Homeowners primarily did the simpler renovations including: caulking and weather stripping, installing storm doors, showerheads and thermostats; purchasing efficient appliances and purchasing portable electric heaters. Contractors primarily did many of the larger installations including; furnaces; fireplaces; fireplace doors; windows, home energy audits and pool heaters. Renovations that were about evenly split between the homeowner and a contractor include: installing insulation, doors, hot water blankets and wood stoves; doing duct sealing and removing fireplaces.

Notes:

- On the following tables, the “No Response” column for the renovation method has been omitted due to a lack of space.
- The survey questionnaire asked for renovations undertaken within the last five years, and the year of the renovation. The data presented on the following tables reflect participant responses regarding renovations undertaken within the past five years. Inspection of the year for the renovations indicated that approximately 50% of the work was undertaken prior to the five year period. However data was not adjusted for this discrepancy to provide consistency with the 1993 report which did not ask for the specific year.
- Base for these tables is 1610.

4.19 Renovations undertaken over past five years (%)

Renovations undertaken at the residence over the past five years	Did this	Did not do this	No Response	Did it myself	Used a contractor	Both did it myself and use a contractor
Improved insulation in attic or walls	15.8	62.7	21.5	6.8	5.7	1.1
Installed weather stripping / caulking	34.5	46.0	19.6	23.6	3.6	1.3
Installed double glazed window(s)	18.3	58.0	23.7	2.9	11.0	1.5
Installed energy efficient window(s)	10.3	62.4	27.3	1.6	6.1	0.7
Installed storm door(s)	12.1	61.5	26.4	4.9	3.0	0.6
Installed insulated steel/fibreglass door(s)	13.3	61.0	25.7	4.2	5.1	0.7
Installed low flow shower head(s)	32.4	46.4	21.2	18.1	3.7	1.3
Installed programmable thermostat(s)	24.7	54.1	21.2	12.6	4.2	0.6
Had a home energy audit	8.5	67.3	24.2	0.5	4.0	0.4
Installed duct insulation or sealing	6.2	68.3	25.5	2.9	1.6	0.1
Purchased energy efficient appliance(s)	38.0	41.9	20.1	11.3	1.6	1.4
Start/increase use of portable electric heater	17.3	58.6	24.2	6.1	-	0.3
Installed a hot water heater blanket	8.6	66.2	25.1	2.8	2.2	0.2
Installed glass fireplace doors	10.5	63.0	26.4	2.0	3.2	0.2
Installed mid-efficiency n. gas furnace/boiler	8.9	63.4	27.7	0.4	5.1	0.4
Install'd high efficiency n. gas furnace/boiler	8.8	64.6	26.6	0.2	5.0	0.6
Installed natural gas fireplace	17.9	58.6	23.6	0.8	10.0	0.7
Installed electric fireplace	1.9	69.9	28.3	0.3	0.4	0.1
Removed natural gas fireplace	1.3	70.1	28.6	0.2	0.2	-
Installed a swimming pool heater	2.0	69.4	28.6	0.3	0.7	0.1
Installed wood stove	3.6	68.3	28.1	0.8	0.7	0.2

Respondents were also asked which renovations they planned to do over the next two years and whether they plan to do it themselves, use a contractor or both do it themselves and use a contractor (Exhibit 4.20). Again in decreasing order of frequency, the most commonly planned renovations are (with incidence of 10% or more) install weather stripping or caulking (27%), purchase energy efficient appliances (18%), improve insulation in attic or walls (14%), install a hot water heater blanket (13%), install programmable thermostats (13%), install double glazed windows (12%), install low flow shower heads (11%), and install energy efficient windows (10%). Base is 1610, but it should be noted that about 25% of respondents did not provide information on renovations.

Exhibit 4.21 shows this same information for only those people who reside in the Lower Mainland, while Exhibit 4.22 shows results for people in the Interior. However the differences between the two areas are generally too small to be statistically significantly.

4.20 Renovations planned over next two years – BC Gas (%)

Renovations planned over the next two years	Plan to do this	Do not plan to do this	No Response	Do it myself	Use a contractor	Both do it myself and use a contractor
Improve insulation in attic or walls	13.9	62.8	23.3	5.1	3.2	2.5
Install weather stripping / caulking	27.2	49.0	23.8	19.2	1.3	1.4
Install double glazed window(s)	11.8	61.8	26.4	2.8	5.2	1.4
Install energy efficient window(s)	10.1	63.5	26.4	1.2	4.8	1.4
Install storm door(s)	7.6	66.4	26.0	2.5	1.8	0.9
Install insulated steel/fibreglass door(s)	7.2	66.1	26.7	2.7	1.7	0.9
Install low flow shower head(s)	10.8	62.3	26.9	6.4	0.3	0.3
Install programmable thermostat(s)	12.9	61.2	25.9	6.4	1.2	0.5
Have a home energy audit	8.8	65.5	25.7	0.3	2.7	0.4
Install duct insulation or sealing	6.0	67.0	27.1	3.0	0.7	0.4
Purchase energy efficient appliance(s)	18.4	56.7	24.9	6.2	1.5	1.1
Purchase a portable electric heater(s)	6.3	66.3	27.3	3.0	0.2	0.2
Install a hot water heater blanket	13.3	60.9	25.8	7.1	0.7	0.6
Install glass fireplace doors	3.2	69.1	27.6	1.1	0.8	0.2
Install mid-efficiency n. gas furnace/boiler	3.5	67.9	28.6	0.2	1.7	0.2
Install high efficiency n. gas furnace/boiler	8.5	65.2	26.3	0.4	4.4	0.3
Install natural gas fireplace	6.3	66.4	27.3	0.4	3.6	0.5
Install electric fireplace	1.5	70.9	27.6	0.4	0.3	0.2
Remove natural gas fireplace	1.5	70.7	27.8	0.4	0.2	0.9
Install swimming pool heater	1.0	70.7	28.3	0.4	0.2	-
Install wood stove	2.3	69.9	27.8	0.6	0.4	0.4

4.21 Renovations planned over next two years – Lower Mainland (%)

Renovations planned over the next two years	Plan to do this	Do not plan to do this	No Response	Do it myself	Use a contractor	Both do it myself and use a contractor
Improve insulation in attic or walls	14.1	63.5	22.4	5.0	3.2	2.5
Install weather stripping / caulking	28.0	49.2	22.8	19.6	1.4	1.5
Install double glazed window(s)	12.6	61.6	25.8	2.6	6.0	1.6
Install energy efficient window(s)	9.6	64.2	26.1	1.0	4.9	1.1
Install storm door(s)	7.4	67.4	25.2	2.0	1.8	1.0
Install insulated steel/fibreglass door(s)	7.1	66.8	26.2	2.7	1.7	1.0
Install low flow shower head(s)	10.5	63.6	25.9	5.9	0.2	0.3
Install programmable thermostat(s)	13.0	62.1	24.9	6.2	0.9	0.6
Have a home energy audit	9.1	66.2	24.7	0.2	2.8	0.4
Install duct insulation or sealing	6.3	67.5	26.1	3.1	0.9	0.3
Purchase energy efficient appliance(s)	19.5	56.9	23.6	6.3	1.7	1.2
Purchase a portable electric heater(s)	7.1	66.3	26.6	3.4	0.2	0.3
Install a hot water heater blanket	12.6	62.1	25.3	6.2	0.7	0.6
Install glass fireplace doors	3.1	70.2	26.7	0.7	0.8	0.2
Install mid-efficiency n. gas furnace/boiler	3.6	68.4	28.0	0.2	1.6	0.3
Install high efficiency n. gas furnace/boiler	8.9	66.1	25.0	0.3	4.7	0.3
Install natural gas fireplace	7.1	66.9	26.0	0.4	4.2	0.5
Install electric fireplace	1.7	71.6	26.7	0.4	0.4	0.2
Remove natural gas fireplace	1.3	72.0	26.8	0.3	0.1	0.9
Install swimming pool heater	0.8	71.7	27.5	0.4	0.1	-
Install wood stove	1.1	71.6	27.3	0.2	0.1	0.3

4.22 Renovations planned over next two years – Interior (%)

Renovations planned over the next two years	Plan to do this	Do not plan to do this	No Response	Do it myself	Use a contractor	Both do it myself and use a contractor
Improve insulation in attic or walls	13.5	61.0	25.5	5.4	3.2	2.5
Install weather stripping / caulking	25.4	48.5	26.0	18.2	0.8	1.1
Install double glazed window(s)	10.0	62.2	27.6	3.3	3.5	1.1
Install energy efficient window(s)	11.1	61.7	27.2	1.5	4.8	2.2
Install storm door(s)	8.3	64.0	27.7	3.8	1.6	0.7
Install insulated steel/fibreglass door(s)	7.4	64.5	28.1	2.5	1.7	0.7
Install low flow shower head(s)	11.5	59.4	29.1	7.4	0.6	0.4
Install programmable thermostat(s)	12.6	58.9	28.4	6.8	2.0	0.3
Have a home energy audit	8.1	63.8	28.1	0.5	2.3	0.4
Install duct insulation or sealing	5.2	65.6	29.2	2.6	0.4	0.7
Purchase energy efficient appliance(s)	16.0	56.0	27.9	6.0	1.2	0.8
Purchase a portable electric heater(s)	4.7	66.3	29.0	2.0	0.3	-
Install a hot water heater blanket	15.0	58.0	27.0	9.0	0.7	0.4
Install glass fireplace doors	3.6	66.6	29.8	2.0	0.8	-
Install mid-efficiency n. gas furnace/boiler	3.2	66.8	30.0	0.2	1.7	0.1
Install high efficiency n. gas furnace/boiler	7.4	63.3	29.3	0.5	3.7	0.4
Install natural gas fireplace	4.5	65.3	30.2	0.6	2.3	0.5
Install electric fireplace	1.1	69.3	29.6	0.3	0.2	-
Remove natural gas fireplace	2.0	67.9	30.1	0.5	0.6	0.9
Install swimming pool heater	1.5	68.4	30.1	0.4	0.4	0.2
Install wood stove	5.1	65.9	29.0	1.6	0.9	0.5

Exhibit 4.23 compares the results of the 1993 study with this study and shows both a significant decline in respondent's willingness or plan to undertake actions, but at the same time shows an increase in the renovations that have been undertaken[4]. The base for 2002 is 1610 while the base for 1993 is 4814.

The Exhibit appears to indicate that respondents have undertaken quite a few energy efficiency renovations over the past 10 years, as shown by a number of measures where the willingness or intention to undertake a measure has dropped significantly while the people reporting having done the measure has increased. For example:

- Programmable thermostats. The intention to do this has dropped from 32% to 13% while the reported installations have increased from 13% to 25%.
- Home energy audits. The intention to do this has dropped from 44% to 9% while the number of people reporting having had audits has increased from 2% to 9%. Part of this increase, but less than half, could be explained by NRCan's EnerGuide for Homes program, which has done about 16,000 audits in B.C.
- Purchased energy efficiency appliances. The intention has dropped from 35% to 18% while the reported activity has increased from 29% to 38%. The increase in installation activity may partially reflect the increased availability of efficient appliances over the last decade.
- Installation of hot water blankets. The intention has dropped from 43% to 13% while installations have increased from 4% to 9%. This may be partially explained by the reduced emphasis on blankets by the Power Smart program since 1993.
- Mid efficiency furnaces and boilers. The intention to install has dropped from 13% to 4%, while the reported action has increased from 8% to 9%. This is a surprisingly small increase given that legislation was passed in the mid 1990s that made mid efficiency furnaces mandatory, and may be explained as people who have installed furnaces since this time not realizing that they are mid efficiency.
- High efficiency furnaces and boilers. Here the intent to install has dropped from 19% to 9%, but the reported installation has increased from 3% to 9%.

[4] Note: the questions were phrased differently between the two surveys, and asking for willingness to undertake an action (1993) may elicit more positive responses than asking if they plan to undertake an action (2002). Also, the 1993 survey asked if actions had been done in the home, without specifying a timeframe, while the 2002 survey asked for renovations undertaken over the past five years.

4.23 Comparison of renovation activities / plans (2002 vs 1993)

Renovations Activity	Did this (2002)	Have Done (1993)	Plan to do this (2002)	Willing to do this (1993)
Improve insulation in attic or walls	15.8	25.8	13.9	13.8
Install weather stripping / caulking	34.5	37.3	27.2	19.7
Install double glazed window(s)	18.3	17.5	11.8	12.9
Install energy efficient window(s)	10.3	8.8	10.1	17.2
Install storm door(s)	12.1	21.7	7.6	17.2
Install insulated steel/fibreglass door(s)	13.3		7.2	
Install low flow shower head(s)	32.4	38.7	10.8	24.6
Install programmable thermostat(s)	24.7	13.3	12.9	32.3
Have a home energy audit	8.5	2.0	8.8	43.7
Install duct insulation or sealing	6.2	NA	6.0	NA
Purchase energy efficient appliance(s)	38.0	29.0	18.4	35.1
Purchase a portable electric heater(s)	17.3	NA	6.3	NA
Install a hot water heater blanket	8.6	3.9	13.3	43.1
Install glass fireplace doors	10.5	19.8	3.2	14.6
Install mid-efficiency n. gas furnace/boiler	8.9	7.8	3.5	13.0
Install high efficiency n. gas furnace/boiler	8.8	3.3	8.5	18.8
Install natural gas fireplace	17.9	NA	6.3	NA
Install electric fireplace	1.9	NA	1.5	NA
Remove natural gas fireplace	1.3	NA	1.5	NA
Install swimming pool heater	2.0	NA	1.0	NA
Install wood stove	3.6	NA	2.3	NA

Customers were asked to select the reasons for undertaking their renovations from a list (Exhibit 4.24). The main reasons cited included to reduce energy costs (48%), increase comfort of their home (43%), as a response to natural gas rate increase (31%), as part of a general renovation (28%) and increase resale value of their home (24%). Other mentions include: environment; allergies; convenience; efficiency; and safety, but were less than 1% each. The base for this question is 1610.

4.24 Reasons for undertaking renovations (%)

	Yes	No	No Answer
Response to natural gas rate increase	31.1	15.3	53.6
Reduce energy costs	47.6	7.2	45.2
Increase resale value of home	24.4	17.8	57.8
Increase comfort of home	43.0	9.2	47.8
Part of general renovation	27.8	15.1	57.1

Customers used a wide variety of information sources in obtaining information in support of their renovations (Exhibit 4.25). The share of respondents using various sources were as follows: building supply companies 24%; contractors 23%; home shows 18%; books 16%; television shows 16%; magazines 15%; web pages 14%; yellow pages 6% and radio shows 6%.

4.25 Main sources of information for renovations (%)

Source	LM	Int.	BC Gas
Unweighted base	855	755	1610
Building supply co's	23.6	26.4	24.4
Contractor	23.0	23.8	23.3
Home shows	19.7	14.9	18.2
Books	17.2	13.6	16.1
Television shows	16.4	14.4	15.8
Magazines	15.3	12.8	14.6
Web pages	14.4	11.5	13.5
Yellow pages	6.0	4.2	5.5
Radio shows	5.6	5.5	5.5
Friends / relatives	3.3	2.4	3.0
Personal experience	2.7	3.8	3.0
BCH Power Smart	0.8	0.7	0.7
Other	1.0	0.5	1.0
NR	40.0	41.6	40.5

4.3 Actions to Save Energy

Finally in this part of the survey, customers were asked about actions they take to save energy (Exhibit 4.26). The overall shares of respondents who always or usually take various actions are as follows: turn back the thermostat or use a programmable thermostat at bedtime 82%; turn back the thermostat or use a programmable thermostat when no one is at home 77%; change furnace filter regularly 70%; wash clothes in warm water with cold water rinse 61%; use less heat or no heat in unused rooms 58%; wash and rinse clothes in cold water 47%; service heating system annually by contractor 38%; service heating system myself 27%; and undertake duct cleaning 21%.

4.26 Actions taken to save energy (%)
(Base 1610)

Action	Always	Usually	Occasionally	Never	DK/NR
Turn back the thermostat or use a programmable thermostat at bedtime	69.5	12.4	6.3	8.6	3.1
Turn back the thermostat or use programmable thermostat when no one home	60.0	16.5	8.2	8.5	6.8
Use less heat or no heat in unused rooms	35.5	22.0	11.8	18.9	11.8
Wash and rinse clothes in cold water	28.1	19.3	26.8	12.2	13.6
Wash clothes in warm water with cold water rinse	35.2	25.9	19.7	7.6	11.6
Change furnace filter regularly	44.9	24.6	11.4	5.6	13.6
Service heating system annually by contractor	21.4	16.8	27.2	21.2	13.3
Service heating system annually myself	15.1	11.4	12.2	37.2	24.0
Duct cleaning	10.0	10.6	34.7	26.7	18.1

Over the past few years, BC Gas has been actively encouraging customers to service their furnaces. Based on the above table, about 65% of the respondents have indicated that they always or usually service their furnaces, either by themselves or by a contractor. Further analysis of the data indicates that about 4.7% of the respondents both did it themselves or used a contractor. If this is netted out, then about 60% of BC Gas's customers always or usually service their furnaces annually.

In addition to looking at the overall response, it is interesting to look at the difference between behaviour in the Lower Mainland and the Interior. The following table compares the responses for the Lower Mainland, Interior and BC Gas service area. The data presented combines the responses of people who responded to each question with either “Always” or “Usually”. The table shows that people in the Interior are in general more energy conscious than those in the Lower Mainland, with a greater tendency to turn down the heat (with the possible exception of using less heat in unused rooms), and are more likely to change the furnace filter regularly / service their heating systems. This is possibly a consequence of the colder climate, and more severe consequences of a heating system failure such as frozen water pipes. Customers in the Interior also appear to be more conscious of saving hot water when doing laundry.

Compared with the 1993 study, many of the behaviours are comparable or slightly lower now than with the previous study, although the changes are generally not significant. There may be a slight increase in the incidence of washing with cold water and with servicing the heating system regularly.

4.27 Actions always or usually taken to save energy (%)

Action	LM	Int.	BC Gas	1993
Unweighted base	855	755	1610	4814
Turn back the thermostat or use a programmable thermostat at bedtime	80.4	85.7	81.9	80.0
Turn back the thermostat or use programmable thermostat when no one home	74.2	81.7	76.5	79.3
Use less heat or no heat in unused rooms	57.8	57.0	57.5	58.6
Wash and rinse clothes in cold water	47.0	47.9	47.4	42.1
Wash clothes in warm water with cold water rinse	58.8	66.4	61.1	65.6
Change furnace filter regularly	65.1	79.5	69.5	na
Service heating system annually by contractor	37.3	40.6	38.2	57.1
Service heating system annually myself	24.8	30.3	26.5	
Duct cleaning	21.1	19.6	20.6	na

5 Demographics and Segmentation

5.1 Customer Demographics

Exhibit 5.1 shows the distribution of the members of sample households by age category of family members. For example, in Zone 1 there is an average of 0.63 individuals in the 0-18 years category. Perhaps the most important features of the data are the large number of individuals age 0-24 years in Zones 1 and 2 and the large number of individuals age 65 years and over in Zones 3 and 5. Exhibit 5.1a shows the age groupings of respondents to the survey.

5.1 Distribution of household members by age (%)

Age category	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas	1993
Unweighted base	249	308	298	368	387	855	755	1610	4814
0-18 years	0.63	0.73	0.60	0.54	0.48	0.64	0.50	0.60	0.71
19-24 years	0.32	0.22	0.19	0.19	0.11	0.24	0.14	0.21	0.17
25-34 years	0.32	0.30	0.27	0.27	0.15	0.29	0.20	0.26	0.31
35-44 years	0.51	0.51	0.34	0.36	0.25	0.44	0.29	0.40	0.46
45-54 years	0.47	0.49	0.42	0.47	0.41	0.45	0.43	0.45	0.42
55-64 years	0.35	0.32	0.38	0.39	0.37	0.36	0.38	0.36	0.33
65 years and over	0.41	0.34	0.53	0.24	0.47	0.44	0.38	0.42	0.44

5.1 a Demographics of Survey Respondents by age

	< 25	25 - 34	35 - 44	45 - 54	55 - 64	> 64	NR
Respondents (%)	0.6	7.5	18.2	23.7	20.1	22.5	7.4

Exhibit 5.2 shows the distribution of the sample by respondent marital status. The largest share of single individuals is in Zone 1, while the highest rate of divorced or separated individuals occurs in Zone 4.

5.2 Distribution by marital status (%)

Marital status	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas
Unweighted base	249	308	298	368	387	855	755	1610
Single	8.4	4.5	5.7	7.1	5.4	6.4	6.1	6.3
Married/common law	70.3	76.3	76.2	71.5	72.9	74.1	72.3	73.6
Divorced/separated	6.4	5.8	7.4	9.0	5.2	6.7	6.6	6.7
Widowed	3.6	6.5	6.0	6.5	5.7	5.3	6.0	5.5
NR	11.2	6.8	4.7	6.0	10.9	7.5	9.0	8.0

Exhibit 5.3 shows the distribution of the number of people in the house. The average number of people in the house is about 3.4 in Zone 1, 3.2 in Zone 2, 2.8 in Zone 3, 2.7 in Zone 4 and 2.6 in Zone 5.

5.3 Number of people in the household

	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas	1993
Unweighted base	249	308	298	368	387	855	755	1610	48.14
Mean	3.38	3.20	2.84	2.69	2.60	3.11	2.63	2.97	2.84
Standard deviation	1.68	1.41	1.47	1.34	1.31	1.54	1.33	1.50	1.41

Exhibit 5.4 shows whether or not there was a change in the number of people in the household over the past five years. The share of households reporting a change in the number of occupants was about 33% in Zone 1, 33% in Zone 2, 30% in Zone 3, 42% in Zone 4 and 28% in Zone 5.

5.4 Change in the number of people in the household (%)

	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas
Unweighted base	249	308	298	368	387	855	755	1610
Yes	32.5	33.1	29.9	42.1	27.9	31.6	33.4	32.1
No	56.2	60.4	66.1	52.4	60.7	61.2	57.5	60.1
NR	11.2	6.5	4.0	5.4	11.4	7.2	9.1	7.7

Exhibit 5.5 shows the direction of change of the number of people in households over the past 5 years, for those households where the number of individuals has changed. For all five zones, the percentage of households that were larger in the past is greater than the percentage of households that were smaller in the past.

5.5. Direction of change in the number of people in the household (%)

	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas
Unweighted base	249	308	298	368	387	855	755	1610
In the past there were more people in the household	17.3	20.8	18.8	26.6	16.8	18.8	20.6	19.3
In the past there were fewer people in the household	13.7	12.7	10.1	12.2	11.6	12.0	11.9	11.9
In the past there were sometimes more and sometimes fewer people in the household	6.8	3.2	4.4	6.0	2.6	4.9	3.9	4.6
NR	62.2	63.3	66.8	55.2	69.0	64.3	63.7	64.1

Exhibit 5.6 shows the highest level of education achieved by the respondents. The highest rate for completion of university or college was reported in Zone 1 and the lowest rate of completion of university or college was reported in Zone 4 and Zone 5.

5.6 Highest educational level attained (%)

Educational category	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas
Unweighted base	249	308	298	368	387	855	755	1610
Some high school	11.6	9.7	8.7	8.2	6.7	10.0	7.3	9.2
Completed high School	12.4	15.3	15.4	14.4	14.7	14.3	14.6	14.4
Some university/college	5.2	5.5	8.7	8.7	8.8	6.7	8.8	7.3
Completed university/college	33.3	23.4	21.8	17.9	17.8	26.2	17.9	23.7
Some trade/ technical school	10.8	17.5	17.4	15.5	16.3	15.2	16.0	15.4
Completed trade/ technical school	11.2	16.6	15.1	20.4	14.5	14.1	16.8	14.9
Post graduate	2.8	4.5	8.1	7.6	8.0	5.3	7.9	6.1
NR	12.4	7.5	4.7	7.3	13.2	8.1	10.9	9.0

Exhibit 5.7 shows household income before income tax. The share of households reporting incomes of $60,000 or higher was about 44% in Zone 1, 43% in Zone 2, 41% in Zone 3, 43% in Zone 4 and 29% in Zone 5. However, it should be noted that about one-fifth of respondents declined to report their household income.

5.7. Household income before tax in 2001 (%)

	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas	1993
Unweighted base	249	308	298	368	387	855	755	1610	4814
Less than $20,000	5.2	3.2	6.7	6.0	9.3	5.3	8.0	6.1	13.1
20,000 to $39,999	15.3	13.6	18.1	17.9	21.4	16.0	20.1	17.2	21.0
40,000 to $59,999	15.3	19.8	17.4	17.7	18.9	17.3	18.4	17.6	22.0
60,000 to $79,999	13.3	14.9	17.1	19.0	11.4	15.2	14.3	14.9	13.9
80,000 to $99,999	8.8	13.3	11.4	13.3	8.5	11.0	10.4	10.8	7.3
100,000 to $124,999	7.6	8.8	6.7	6.8	3.4	7.5	4.7	6.7	6.0
Over $125,000	14.1	5.5	5.4	3.8	5.4	8.4	4.8	7.3	
NR	20.5	20.8	17.1	15.5	21.7	19.2	19.3	19.2	16.9

Exhibit 5.8 shows the main language spoken at home. About 85% speak English, about 6% speak a Chinese dialect, about 1% speak Punjabi and 1% speak German.

5.8. Main language spoken at home (%)

	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas
Unweighted base	249	308	298	368	387	855	755	1610
English	71.1	87.3	89.6	93.2	87.1	82.6	89.4	84.6
French	-	-	0.3	0.5	0.5	0.1	0.5	0.3
Mandarin	2.4	1.0	0.7	-	-	1.4	-	0.9
Cantonese	12.9	1.3	0.3	0.5	-	5.0	0.2	3.5
Other Chinese	0.8	0.3	-	-	-	0.4	-	0.3
Punjabi	0.4	0.6	1.7	-	-	1.0	-	0.7
Japanese	-	0.3	0.3	-	-	0.2	-	0.2
German	0.8	0.3	1.3	0.3	1.3	0.9	0.9	0.9
Other	1.2	1.5	0.6	0.3	0.9	1.2	0.7	0.9
NR	10.0	6.8	4.7	5.4	10.6	7.1	8.6	7.6

5.2 Segmentation

Data from the survey were clustered using an agglomerative hierarchical clustering algorithm (Ward's sum of squares). This method does not impose a predetermined or a priori number of clusters but rather allows the user the opportunity to explore a variety of variable combinations and cluster agglomerations. The primary objective of this approach is to arrive at clusters or segments constructed to be as different as statistically possible across clusters and as internally homogeneous as statistically possible.

Criteria used to arrive at the final number of clusters included: reviewing standard t-tests for cluster differentiation to ensure sufficient diversity between the demographic and psychographic characteristics to adequately define clusters; comparing clustering results with the overall survey results to ensure sufficient representation of key demographic agglomerations and variable response distributions; and allocating responses to questions not included in the model to their respective clusters and looking for consistency within individual profiles. Determining the final number of segments was guided by the practical matter that cluster models with too many segments tend to be unwieldy. Conversely, models with only a few segments tend to be too general to be useful.

The final specification of the cluster model was derived using an iterative, exploratory approach. Several different specifications of the clustering model were explored. This was necessary, in part, because several groups of questions in the survey addressed common subjects, issues, or behaviours suggesting that respondent responses could be collinear (i.e., move in a similar direction or pattern). Since collinearity between variables reduces the effectiveness of the clustering algorithm, these groups of questions required alternative specification or selective exclusion. Also, a review of the survey results revealed that respondents did not vary greatly in their responses to some questions (i.e., standard deviations were small). Including these variables would add little additional explanatory power to the cluster model.

To reduce the influence of collinearity yet retain key differentiating information for respondents, some variables were combined or recoded to form new variables. These variables served as proxies for groups of similar or related questions. Other variables were initially included in preliminary and then withdrawn when they failed to significantly add to the explanatory power of the cluster model or they resulted in a solution that failed other clustering criteria. Prior to each clustering round, the data set was reviewed for missing data (respondent non-answers). Respondents who did not answer 75% of the questions selected for the cluster model were excluded from the analysis.

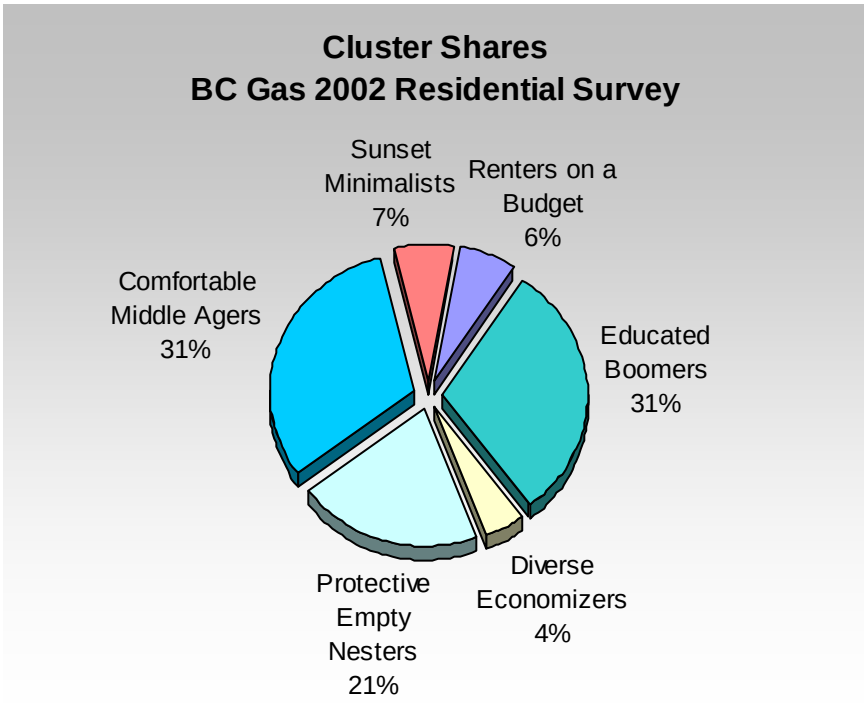
A six-cluster model best describes and groups the respondents of the residential 2002 survey. The model is based on 1,466 survey responses with 144 cases, or 8.9% of survey responses, removed because of missing or incomplete data.

The clusters, which are fully described below, include:

- Renters on a Budget.
- Educated Boomers with Money.
- Diverse Economizers.
- Protective Empty Nesters.
- Comfortable Middle Agers.
- Sunset Minimalists.

The relative number of survey respondents represented by each of the six clusters is presented in Figure 5.1. Comfortable Middle Agers and Educated Boomers are the two largest segments, followed by the Protective Empty Nesters, Sunset Minimalists, Renters on a Budget, and Diverse Economizers. Clusters containing many members (e.g., Educated Boomers and Comfortable Middle Agers) were explored for the possibility that relevant sub-clusters were being unduly agglomerated. In the end, expanding the model beyond six clusters was rejected because of the minimal increase in explanatory power and descriptive contribution to the analysis. Exhibit 5.9 defines the variables used in the final six-cluster segmentation model.

Figure 5.1



5.9. Cluster model variables for six-cluster model

Variable Name	Variable Short Description	Variable Long Description
1A	Residence Type	Residence (dwelling) type
1D	Years Residing	Years in residence
1E	Rent vs Own	Rent or own residence
Q7AVRSCO	Conserve Score	Average energy conserving score for questions in Sec. 7A
9A1	Audit Interest	Interest in home energy audit
9A2	Online Audit Int	Interest in do-it-yourself online energy audit
9A3-A8	Other Product Int	Sum of total interest in energy saving products and services for questions 9A3 to 9A8
9B6&7	Internet Use	Proxy for Internet use created from positive responses to either question 9B6 or 9B7
11A1	Savings Potential	Energy savings potential in the home
11A4	Make it work	Amount of thought given to natural gas or electricity
11A8	Hire Contractor	Tendency to hire outside help for home renovation projects
11A9	Reno Activity	Degree of home renovation activity
11B3	Adopter Status	Rate of new product adoption (innovator, early adopter, early majority, late majority, laggard)
11B4	Brand Premium	Willingness to pay a premium for brand name products
11B6	Best Price	Purchase price sensitivity
11B7	Local Preference	Small, local company preference
11B8	Well Researched	Tendency to research issues before purchasing
11B9	Well Insured	Degree of insurance coverage
12A	Respondent Age	Age
12B	Marital Status	Marital status
12C	People in House	Number of people in the household
12D1	0-18 Age	Household occupants aged 0 – 18 years of age
12D2	19-24 Age	Household occupants aged 19 – 24 years of age
12Gnew	Education	Restated education variable combining trade and technical college and some university/ college categories (completed or not) into “some post-secondary” Some High School: Old 7, New 1 Completed High School: Old 6, New 2 Some University /College: Old 5, New 3 Completed University / College: Old 4, New 4 Some Trade / Technical: Old 3, New 3 Completed Trade / Technical: Old 2, New 3 Post Graduate: Old 1, New 5
12H	Income	Annual household income
12I	Language	Main language spoken in the home

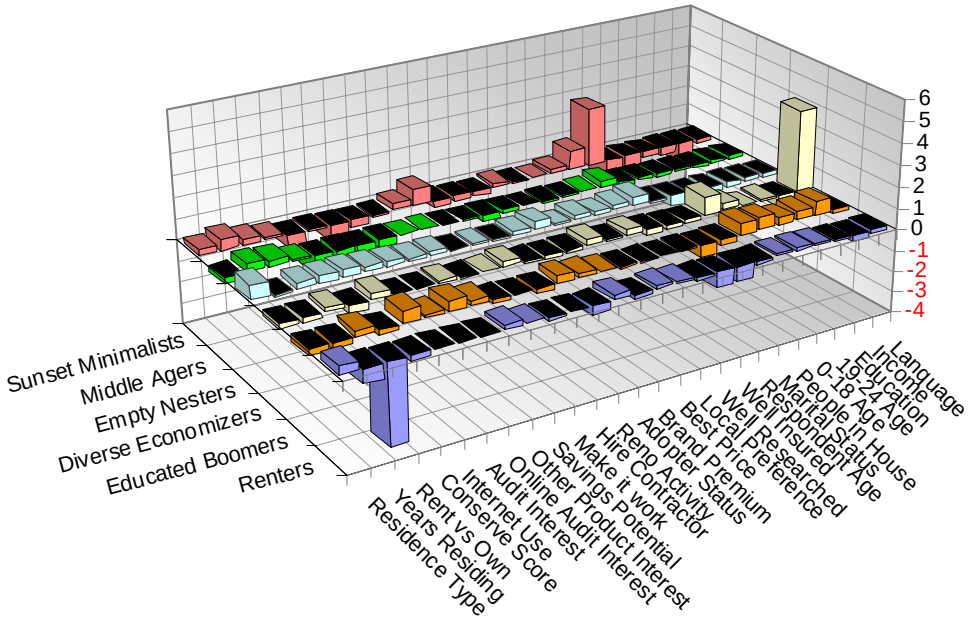
Exhibit 5.10 presents the normalized results for each question included in the six cluster model. These normalized results express the cluster mean score for each question in terms of the number of standard deviations away from the overall survey mean. As an example, internet use for Educated Boomers is 0.6 standard deviations above the survey mean for internet use which suggests they are much more comfortable with the medium than the average survey respondent. In contrast, Comfortable Middle Agers are almost one full standard deviation below the survey mean (-0.9) suggesting they are much less comfortable using the Internet than the average survey respondent.

5.10 Six Cluster Model: Normalized Results by Question
(number of standard deviations from the sample mean)

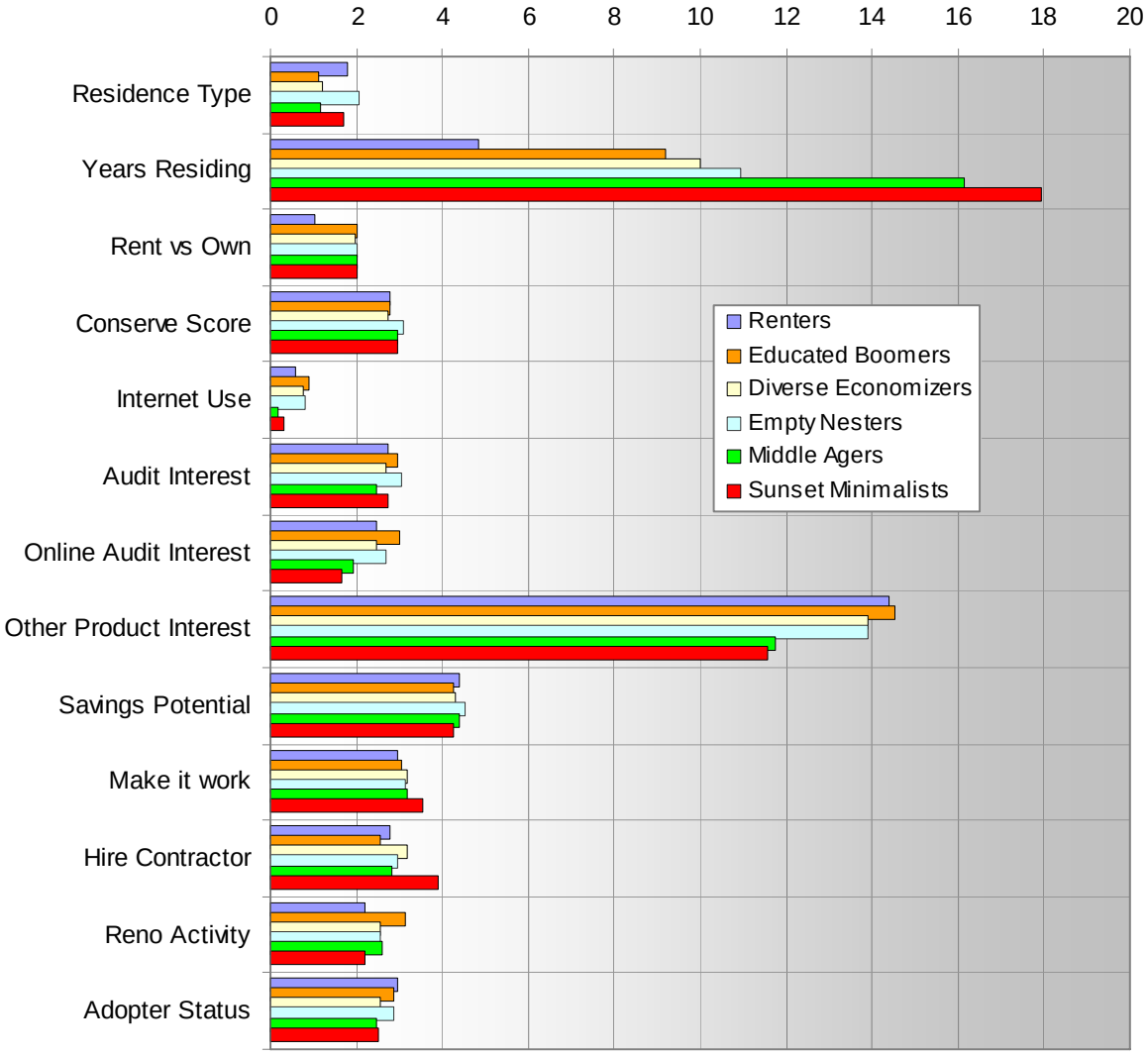
	Renters on a budget	Educated boomers	Diverse econo-mizers	Protective empty nesters	Middle agers	Sunset minimalists
No. of cases	94	448	64	302	459	99
Percentage of sample	6%	31%	4%	21%	31%	7%
Residence type	0.4	-0.3	-0.2	0.7	-0.3	0.3
Years residing	-0.7	-0.3	-0.2	-0.1	0.4	0.5
Rent vs own	-3.7	0.3	0.2	0.3	0.3	0.3
Conserve score	-0.3	-0.2	-0.3	0.3	0.1	0.1
Internet use	-0.1	0.6	0.3	0.3	-0.9	-0.6
Audit interest	0.0	0.2	-0.1	0.3	-0.3	0.0
Online audit interests	0.0	0.5	0.0	0.2	-0.5	-0.7
Other product interest	0.2	0.3	0.1	0.1	-0.3	-0.4
Savings potential	0.1	-0.1	-0.1	0.2	0.0	-0.1
Make it work	-0.1	-0.1	0.0	0.0	0.0	0.3
Hire Contractor	0.0	-0.2	0.2	0.1	0.0	0.8
Reno activity	-0.4	0.3	-0.1	-0.1	-0.1	-0.4
Adopter status	0.2	0.2	-0.1	0.1	-0.3	-0.2
Brand premium	-0.2	0.0	-0.1	0.4	-0.2	-0.2
Best price	0.1	-0.1	0.2	0.0	0.0	0.1
Local preference	0.1	-0.1	-0.1	0.2	-0.1	0.0
Well researched	-0.1	0.0	0.2	0.1	-0.1	0.0
Well insured	-0.7	-0.1	-0.3	0.2	0.0	0.2
Respondent age	-0.7	-0.6	-0.2	0.4	0.3	0.9
Marital status	-0.2	-0.2	-0.2	-0.1	-0.2	2.7
People in house	0.1	0.6	0.9	-0.5	-0.1	-1.0
0-18 age	0.1	0.6	0.3	-0.5	-0.2	-0.5
19-24 age	0.1	0.3	0.0	-0.3	-0.1	-0.3
Education	0.0	0.4	0.1	-0.2	-0.2	-0.4
Income	-0.3	0.6	-0.5	-0.2	-0.2	-0.9
Language	-0.2	-0.2	3.9	-0.2	-0.1	-0.2

The following graphs present this information in alternative ways. The first provides a simulated three-dimensional display of the information in the previous exhibit. The second provides a bar graph of mean values by segment for the clustering variables.

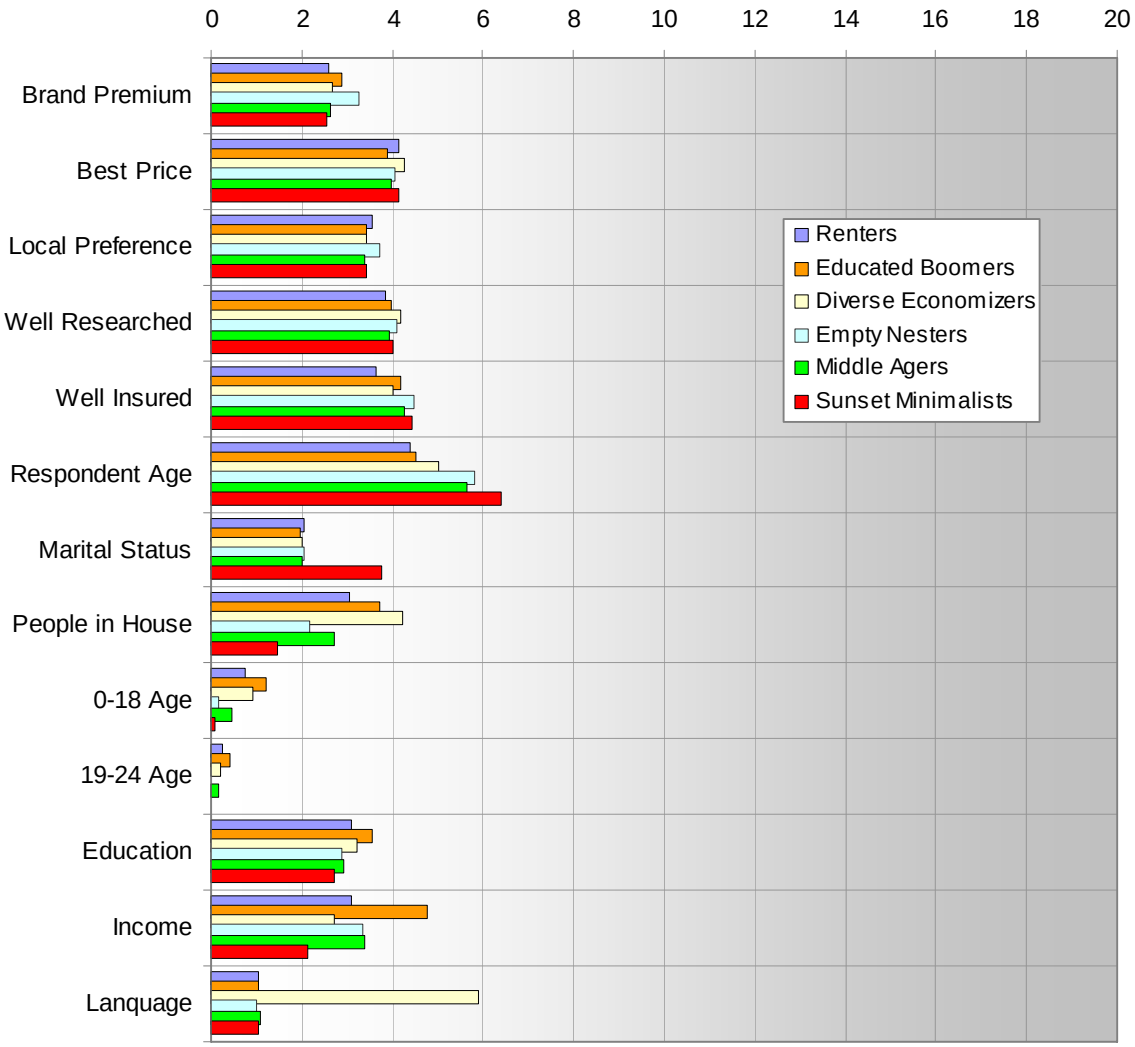
BC Gas 2002 Residential Survey
Cluster Analysis
Number of Standard Deviation Away From Survey Means



BC Gas 2002 Residential Survey
Cluster Analysis Results - Graph 1 of 2
Non- Standardized Mean Values



BC Gas 2002 Residential Survey
Cluster Analysis Results - Graph 2 of 2
Mean Values



Cluster 1 - Renters on a Budget.

This segment is characterized by the need to manage their limited resources. In addition to the financial obligations of raising a family, they are likely trying to save money for a down payment on a house or apartment. They are price sensitive and because their assets are modest and money is tight, they tend to not purchase more insurance than absolutely needed.

The characteristics of the exemplar are as follows:

- respondent aged 35 to 54 years
- married with a family
- lives in a rented duplex or rented single detached house
- has lived in the premise for less than five years
- English is main language spoken in the home
- 3 to 4 people in household - 2 adults and 1 to 2 children under 19 years of age
- $40K to $60K in annual household income
- some post-secondary education
- majority adopter for new products
- low brand allegiance – less willing to pay a premium for brand name products than most other segments
- price conscious (consistent with low brand allegiance) - commonly shops around for the best price but has exceptions
- tends to not spend a great deal of time researching issues before making a decision
- favours smaller, local companies over larger organizations
- least likely of the six segments to have good insurance coverage
- above average belief in energy savings potential around the home but exhibits relatively modest energy conserving habits in their day to day routine
- thinks about natural gas and electricity rather than accepting it unconditionally
- displays moderate interest in products to save energy around home but may be expecting these services to come at no cost or subsidized cost
- least likely of the six segments to have undertaken energy-related renovations
- has the fewest plans of the six clusters to undertake energy-related renovations during the next two years
- tends to undertake most projects themselves rather than hire someone
- has very few home renovation projects on the go
- has some interest in a home energy audit but less interested if it is an online do-it-yourself energy audit
- some familiarity with the Internet but still uses more traditional channels (brochures, other publications, etc.) to research products

With their modest resources and housing status (i.e., renting), this segment has limited potential to deliver significant energy savings through campaigns focused on equipment retrofits or improvements in the integrity of the building envelope.

This is borne out by their stated intentions to undertake mostly low cost renovations such as installing weather stripping, hot water heater blankets, and low flow showerheads. This segment will be receptive to education and awareness campaigns that illustrate how to save energy around the home using low cost or no cost means. They will look to the home energy audit to provide this type of advice. However, they will be reluctant to undertake the audit if there is a financial charge for the service.

Their use of the Internet to research products is limited, so reaching this segment will require more traditional means (e.g., bill stuffers, magazines, newspapers, etc.). Awareness generated by these campaigns may be of use to people in this segment if they become homeowners.

Cluster 2 - Educated Boomers with Money.

With their above average household income and a low to moderate belief in the energy savings potential around the home, Educated Boomers will tend to respond poorly to campaigns to conserve energy marketed solely on the premise of saving money. Rather, emphasizing ancillary benefits such as improving the comfort of their home or the coincident opportunity to upgrade their energy-using appliances during one of their frequent home renovation projects will influence their participation. They appreciate quality and will tend to purchase recognized brands. They are Internet savvy, meaning that online marketing campaigns will be an important channel for providing information about new products and services.

The characteristics of the exemplar are as follows:

- respondent aged 35 to 54 years
- married with a family
- homeowner - lives in a single detached house
- has lived in the premise for 9 years
- English is main language spoken in the home
- 4 people in the household - 2 adults and 2 children under 24 years
- above average annual household income, $60K to $100K
- most educated of the six segments with some post-secondary education or a university degree
- early majority to majority adopter for new products
- exhibits moderate to strong brand allegiance, willing to pay more for recognized brands
- aware of prices but willing to pay more for quality products and services
- researches issues before making a decision but not unduly so
- modest preference towards smaller, local companies over that of large organizations
- carries basic insurance
- a low-moderate belief in energy savings potential around the home and exhibits moderate energy conserving behaviour
- somewhat more likely than other segments to think about natural gas and electricity

- displays moderate interest in products to save energy around home
- has already undertaken many energy-related renovations and upgrades around the home but still plans to undertake several energy renovation projects during the next two years
- tends to undertake most projects themselves, but hires help occasionally
- the most likely of the six segments to have a home renovation project on the go
- very comfortable with the Internet - uses it regularly to research products
- high level of interest in a home energy audit
- exhibits the most interest of the six segments in taking the online do-it-yourself energy audit

Educated Boomers have undertaken many energy saving upgrades and improvements to their home during the past five years, second only to Middle Agers. They will continue to be active in this regard, undertaking several energy-related renovations to their home over the upcoming two years. The most common renovations or upgrades planned include improving weather stripping, purchasing energy-efficient appliances, improving insulation in walls or the attic, installing hot water blankets, and installing programmable thermostats.

Their interest in a home energy audit confirms their receptiveness to other opportunities to save energy. Their comfort using the Internet explains this segment's receptiveness to an online, do-it-yourself energy audit. Their frequent home renovation activity means that these individuals will frequent home shows and home renovation stores making these outlets key marketing channels as well.

Cluster 3 - Diverse Economizers.

According to the 2001 Statistics Canada Census, 7.8% of people in British Columbia speak, as their mother tongue, Cantonese, Mandarin, or other Chinese language dialect. Including other Asia-Pacific languages like Tagalog (Philippines) and Vietnamese boosts this cultural cohort to 9.4% of the population. The Diverse Economizer segment is distinguished by its cultural background but also its moderate belief in energy savings potential, low energy conserving behaviour, and a relatively modest amount of past energy-related renovation and upgrading to the home. This segment is further distinguished by its declared intention to undertake the greatest number of energy-related renovation projects of all the segments during the next two years. They intend to purchase energy-efficient appliances, install low flow showerheads, improve weather stripping, install programmable thermostats, and purchase portable electric heaters.

Characteristics of the exemplar are as follows:

- respondent aged 45 to 54 years
- married with a family
- homeowner - lives in a single detached house
- has lived in the premise for 10 years
- Cantonese, Mandarin or other Chinese dialect spoken in the home

- 4 people in household – parents, a child and possibly an elderly grandparent
- annual household income of $40K to $60K
- some post-secondary education
- majority to late majority adopter for new products
- very price sensitive, tend to look for the best price for most goods and services
- exhibits a willingness to pay a premium for brand name products, but with an eye to the price
- most likely of the six segments to thoroughly research products before making a decision
- modest favouritism towards smaller, local companies over that of large organizations
- carries basic insurance
- moderate belief in energy savings potential around the home and exhibits low conserving behaviour
- somewhat more willing than others to accept natural gas and electricity at face value
- displays moderate interest in products to save energy around home but will be sensitive to their up-front costs
- has undertaken some energy-related upgrades but lags all other segments except Renters on a Budget
- intends to undertake the most energy-related renovations of all the six segments during the next two years.
- tackles most projects around the home themselves, occasionally hiring help
- occasionally has a home renovation project on the go
- some familiarity with the Internet but still uses more traditional means and channels to research products
- some interest in a home energy audit but less interested if it is an online do-it-yourself energy audit

Diverse Economizers tend to be very price sensitive, but will pay for premium or brand name products if priced competitively. They tend to tackle most home improvement projects on their own rather than hire help. Consequently, marketing channels should include local hardware and home renovation stores, including smaller independent outlets. Price conscious, avid researchers, and somewhat doubtful about energy saving potential around their homes, this segment will need product information that clearly illustrates the link between price and realized value. The Internet offers limited potential to reach this segment.

Cluster 4 - Protective Empty Nesters.

Protective Empty Nesters tend to be risk adverse. They are very aware of what they have and take steps to protect themselves from losing it. They research their decisions thoroughly and then, having decided to proceed, tend to choose brand name products even if priced at a premium. Indeed, this segment likely equates somewhat higher purchase prices and recognized brand names with quality and durability. They tend to favour reputable, recognized BC-based

companies. They are moderate do-it-yourselfers that tend to pay for assistance when required. This segment obtains their information on new products and services for the home from a variety of sources, including local hardware and home renovation stores, home renovation professionals, and to a lesser degree, the Internet.

Characteristics of the exemplar are as follow.

- aged 55 to 64 years
- married
- homeowner - lives in a single detached house or duplex
- has lived in the premise for 11 years
- English is main language spoken in the home
- 2 people in household
- annual household income of $40K to $80K
- some post-secondary education
- early majority to majority adopter for new products
- exhibits the most willingness of the six segments to pay a premium price for recognized brands
- aware of prices but willing to buy higher value or quality products and services in spite of the price
- tends to research issues thoroughly before making a decision
- moderate to strong preference for smaller, local companies over that of large organizations
- assigns a high value to protecting what they already have – tends to have full insurance coverage
- a strong believer in the potential for energy savings around the home and practices this belief through energy conserving behaviours
- somewhat less willing than others to accept natural gas and electricity at face value
- is comfortable using the Internet for research
- exhibits the most interest of the six segments for a home energy audit
- somewhat less interested in an online do-it-yourself energy audit
- displays moderate interest in other products to save energy around home
- have undertaken a moderate number of energy efficient upgrades and improvements around the house
- will undertake some energy-related renovations in the next two years
- undertakes projects themselves but also hires help
- typically has some home renovation projects on the go

Protective Empty Nesters already are firm believers in the importance and value of conserving energy and demonstrate this belief with soft actions like adjusting the thermostat and washing their clothes in cold water. However, they have not undertaken as many energy-related renovations or upgrades as the Educated Boomers or Comfortable Middle Agers. They intend to do some energy-related upgrades in the near future but not as much as the Diverse Economizers or Educated Boomers. The top five actions this segment will likely undertake over the next two years include installing weather stripping, purchasing energy-efficient appliances, installing hot water heater blankets, installing programmable

thermostats, and having a home energy audit.

This segment expressed the most interest of the six segments in having a home energy audit, suggesting they are curious as to whether other energy-saving opportunities exist. The audit will provide an excellent opportunity to identify energy saving opportunities for this large segment. Their income position, life stage, and early majority adopter status means they will actively entertain new ideas in conserving energy and commit if they feel they make sense.

Cluster 5 - Comfortable Middle Agers.

Comfortable Middle Agers will be the most difficult of the six segments to target and convert on products and services. This is because many of their behaviours are neutral to indifferent. They tend to maintain few strong allegiances to brand name products or companies, local or otherwise. They have sufficient household income but a relatively weak inclination to let price determine whether, where or when they buy. They treat new products as unknowns and unproven until their neighbours and relatives have adopted them and appear satisfied. Once having made the decision to purchase, convenience, convention, and actions that reduce the acquisition effort tend to guide where and when they purchase the product.

Characteristics of the exemplar are as follow.

- respondent tends to be older – either 45 to 54 or 55 to 64 years
- married
- homeowner – has lived in a single detached house for the past 11 to 16 years
- English is main language spoken in the home
- older couples are empty nesters, younger couples still have one or two children at home
- household income of $40K to $80K
- some post-secondary education
- late majority adopter for new products
- sometimes willing to pay a premium for brand name products
- not overly concerned about getting the best price
- researches issues before making a decision but not unduly so
- do not go out their way to shop in smaller, local companies, choosing larger organizations when convenient
- tends to be sufficiently insured
- believes there is some energy savings that could be found in the home and displays average energy conserving behaviour in the home
- tends not to think about natural gas and electricity
- next to Sunset Minimalists, displays the least amount of interest in products to save energy around home and an online do-it-yourself energy audit
- exhibits the least interest of the six segments for a home energy audit
- most likely of the six segments to have undertaken energy-related improvements over the past five years
- intend to do a less-than-average number of energy-related upgrades to their house in the next two years

- the least likely of the six segments to use the Internet to research products - tends to rely on other sources of product information (e.g., brochures, magazines, newspapers, etc.)
- undertakes projects themselves but also hires help
- has a few home renovation projects on the go

Next to Sunset Minimalists, this large segment is the least receptive to new energy saving products and services. They are unreceptive probably not because of a lack of knowledge or awareness about energy saving retrofits, but because they feel they have addressed many of the energy saving opportunities around the home. As a result, they are sceptical there is much else that needs to be done. Consistent with this belief, Middle Agers expressed the least amount of interest in an energy audit. They intend to undertake only a few energy-related renovations during the next two years, concentrating on weather stripping, energy-efficient appliances, double glazed and/or energy-efficient windows, insulation, and water heater blankets. The lack of interest in an audit, combined with their limited use of the Internet, explains why this segment, after to the Sunset Minimalists, displays the least amount of interest in an online energy audit.

The tendency for Middle Agers to be late majority purchasers, combined with their poor sales potential for energy-related products and services, means that marketing campaigns that target this segment will show only modest results over the long haul. This segment's potential may rest with attracting their interest in individual energy saving products they have yet to implement (i.e., filling the gaps) rather than promoting comprehensive or broad-based energy services. Because of this segment's size, this potential is worth addressing.

The lack of strong allegiance to where they purchase goods and services means that marketing campaigns and delivery channels for this segment need to be broad-based. Product information or services delivered using the Internet will generate little response.

Cluster 6 - Sunset Minimalists.

Sunset Minimalists hold limited potential for capturing energy savings though products and services because of their stage of life and fixed income. Living on a fixed income forces them to be sensitive to prices of day-to-day items and they will alternate between brands depending upon which one saves them the most money. They make very few durable goods purchases and do only limited renovations to their property. For those planning to do energy-related upgrades in the next two years, they will focus on upgrading their weather stripping, purchasing energy-efficient appliances (to replace worn out appliances), installing hot water heater blankets, installing programmable thermostats, and/or improving insulation in walls and attics.

Characteristics of the exemplar are as follows.

- respondent aged 65 or older
- most likely widowed and living alone
- English speaking
- homeowner - lives in a single detached house or a duplex
- has lived in the premise for 18 years
- fixed income, $20K to $40K
- has completed high school and maybe some post-secondary education
- late majority adopter for new products
- least willing of the six segments to pay a premium for brand name products
- seeks out good prices but purchases relatively few goods and services beyond those required for their everyday needs
- tends to be risk adverse, has good insurance coverage
- most likely of the six segments to hire someone for projects and repairs around the home
- occasionally has home renovation projects on the go
- spends an average amount of time researching decisions
- modest favoritism towards smaller, local companies over that of large organizations
- average belief in energy savings potential around the home and displays an above average tendency to conserve energy around the home
- does not want to think about natural gas and electricity, just make it work
- indicates the least amount of interest of the six segments in products and services to save energy around home
- has undertaken some energy saving upgrades to the home and is the most likely of the six segments to have undergone a home energy audit sometime in the past five years.
- next to Renters, plans to undertake the fewest energy-related renovations over the next two years of the six segments
- moderate interest in a home energy audit and the least interested of the six segments in an online do-it-yourself energy audit

As late majority adopters for new products, successfully reaching this group will require sustained campaigns with clear demonstrations of benefits particularly for households similar to their own. This segment tends also to learn about new products through informal channels including casual conversations with friends and neighbours. Their relative stage in life also means they will be receptive to products and services if they can deliver immediate or near immediate financial savings and are simple to understand and implement. Sunset Minimalists will likely be receptive to home energy audits delivered by qualified trades people. A caveat, they may look for this service to be provided at low or no cost.

Exhibit 5.11 analyzes planned renovations over the next two years in terms of the six clusters. The cluster least likely to undertake a renovation is ranked one and the cluster most likely to undertake a renovation is ranked six.

5.11 Renovations Planned in the Next Two Years
(ranked lowest 1 to highest 6)

	Renters on a budget	Educated boomers	Diverse econo-mizers	Protective empty nesters	Middle agers	Sunset minimalists
Insulation	1	6	5	4	3	2
Weather stripping	1	6	3	5	4	2
Double windows	2	6	5	3	4	1
EE windows	1	5	6	3	4	2
Storm doors	2	4	6	5	3	1
Insulated doors	1	4	6	3	5	2
Low flow showerhead	1	4	6	5	3	2
Programmable thermo	1	5	6	4	3	2
Home energy audit	1	4	6	5	3	2
Duct insulation	3	5	6	4	2	1
EE appliances	1	5	6	3	4	2
Portable electric heat	1	5	6	2	4	3
Water heater blanket	1	6	2	5	4	3
Glass fireplace doors	1	5	6	3	2	4
Mid-E gas furnace	1	3	4	6	5	2
High-E gas furnace	1	3	6	4	5	2
Gas fireplace	1	5	4	6	3	2
Electric fireplace	1	5	6	3	4	1
Remove gas fireplace	1	4	6	3	5	1
Swimming pool heater	1	6	5	4	3	1
Wood stove	1	6	4	3	5	2
Overall rank	1	5	6	4	3	2

Note: Yellow shading denotes cells with a score of 5 or 6.

6 INTEREST IN PRODUCT AND SERVICE BUNDLES

6.1 Rate Options

Focus in this section is consumer interest in four main service alternatives: standard tariff option; stable rate option; variable rate option; and fixed bill option. Aspects to be examined include the following.

- Level of interest in the options.
- Adequacy of information on the options.
- Willingness to participate in the options.
- Importance of features.
- Interest in non-rate product and services.
- Sources of information for products and services.

The four service options are defined in Exhibit 6.1 below.

6.1 Definition of rate options

	Description
Standard tariff option	Consists of a delivery charge and a commodity charge. The delivery charge, which is collected as a basic monthly fee plus a per gigajoule charge, pays for the cost of natural gas delivery. The commodity charge pays for the natural gas itself without markup.
Stable rate option	Guarantees the commodity rate per GJ for one year. There is a premium over the standard rate option to pay for the cost of locking in the commodity rate for one year. Delivery charges are the same as for the standard tariff option.
Variable rate option	Changes the commodity rate to reflect BC Gas' current cost of purchasing gas on the open market, including administrative costs. The term of this option is one year. Delivery charges are the same as for the standard tariff option.
Fixed bill option	Charges a fixed bill each month for a one-year period. The fixed bill includes both delivery and commodity costs. The fixed bill is based on weather normalized past usage. Premium for the fixed bill option is typically higher than for the stable rate option.

The level of interest in the four options varies substantially by option, as shown in Exhibit 6.2. The first point to note is that despite the complexities of these rate options, most respondents were able to offer a view on their level of interest. The share of respondents not offering a response varied from a low of 16% for the fixed bill option to a high of 24% for the variable rate option. Not surprisingly, the level of interest in the standard rate option was high, since this is the alternative consumers are familiar with. About 60% of respondents indicated that they were very or somewhat interested in the standard rate option. Interest in the stable rate option was significant. About 40% of respondents indicated that they were very or somewhat interested in this option.

Interest was weakest for the variable rate option, perhaps because it potentially exposes customers to the most risk, if risk is measured as the standard deviation of the rate. About 24% of respondents said that they were very or somewhat interested in this option. Interest was stronger for the fixed bill option, which minimizes customer risk. About 36% of respondents stated that they were very or somewhat interested in this option. The base for this table is 1610.

6.2 Interest in rate options (%)
(Base 1610)

	Not at all interested 1	Not very interested 2	Somewhat interested 3	Very interested 4	NA
Standard tariff option	12.0	7.6	30.2	29.4	20.8
Stable rate option	23.4	16.2	29.2	9.5	21.6
Variable rate option	32.3	20.6	17.4	6.1	23.6
Fixed bill option	32.6	15.3	18.7	17.5	15.9

Looking at the demographics of age and considering respondents who are very or somewhat interested, those 65 and over are consistently less interested in any of the options, while those under 45 are more interested. Looking at income, those with higher incomes are more interested in all options except the fixed bill option. For education, those with post graduate degrees are generally less interested in all options except the fixed bill option. Looking at ownership, owners are more interested in the standard and stable rate options, while renters are more inclined to the variable and fixed bill options.

6.2a Interest in rate options by Demographics (%)
(Base 1610)

	Age of Respondent					Income		
	Under 35	35 to 44	45 to 54	55 to 64	65 +	< $40k	$40k <$80k	$80k +
Standard Tariff option	74.1	74.2	64.9	64.4	42.3	50.7	62.9	74.2
Stable rate option	51.8	45.2	46.4	39.6	25.5	33.8	42.7	46.5
Variable rate option	32.9	30.4	28.0	23.7	11.4	21.6	22.8	31.6
Fixed bill option	48.9	43.6	37.6	36.5	29.2	38.3	40.2	35.8

6.2b Interest in rate options by Demographics (%)
(Base 1610)

	Education				Ownership	
	High school	Trade/ tech	Univ/ college	Post Grad	Rent	Own
Standard Tariff option	65.6	58.4	67.4	43.4	56.5	60.2
Stable rate option	45.2	39.3	40.3	32.2	37.1	39.0
Variable rate option	29.0	21.5	23.4	23.6	24.5	23.7
Fixed bill option	39.1	39.9	33.3	43.1	42.6	36.1

Because customer interest in rate options is a relatively sophisticated research area, respondents were asked about the adequacy of the information on the options provided in the survey, as shown in Exhibit 6.3. Around one-quarter of respondents provided no response to the various parts of this question. Interestingly, responses on the adequacy of information appeared quite similar across the four options. Forty percent or more of respondents felt that they needed more information on each rate option, while between 26% and 36% of respondents felt that they had enough information. Additional effort should perhaps be given to the issue of how the options can best be communicated to customers. It is perhaps surprising that more than 40% of respondents wanted more information on the standard rate option. This suggests that there may be scope for more active communication of existing natural gas pricing to BC Gas' residential customers.

6.3 Adequacy of information on rate options (%)
(Base 1610)

	Have enough information	Need more information	NA
Standard tariff option	35.5	41.4	23.1
Stable rate option	26.3	47.1	26.6
Variable rate option	26.7	46.3	27.0
Fixed bill option	33.7	44.6	21.7

A central aspect of the research was to explore customers' willingness to participate in various rate options under alternative scenarios. Exhibit 6.4 shows willingness to participate in the stable rate option at various premiums above the standard tariff. About 40% of respondents are very or somewhat likely to participate in the stable rate option at a premium of 5%. This interest in participating falls rapidly with the size of the premium. At a 10% premium, about 13% of respondents are very or somewhat interested in participating, and this falls to 3% at a price premium of 15% and to 2% at a price premium of 20% above the standard tariff.

6.4 Willingness to participate in the stable rate option (%)
(Base 1610)

	Not at all likely 1	Not very likely 2	Somewhat likely 3	Very likely 4	NA
Premium of 5% above standard tariff	32.3	10.4	24.7	15.2	17.4
Premium of 10% above standard tariff	48.4	14.2	11.1	1.5	24.9
Premium of 15% above standard tariff	58.3	13.6	1.9	1.0	25.2
Premium of 20% above standard tariff	65.5	7.5	1.1	1.0	25.0

Exhibit 6.5 shows willingness to participate in the variable rate option. Here it is difficult to define alternative scenarios since the variable rate is market driven. About 24% of respondents indicated that they are very or somewhat likely to participate in the variable rate option.

6.5 Willingness to participate in the variable rate option (%)
(Base 1610)

	Not at all likely 1	Not very likely 2	Somewhat likely 3	Very likely 4	NA
Variable rate	38.8	21.2	19.4	4.9	15.8

Exhibit 6.6 shows willingness to participate in the fixed bill rate option at various premiums above the standard tariff. About 35% of respondents are very or somewhat likely to participate in the fixed bill option at a premium of 5%. As in the case of the stable rate option, this interest in participating falls rapidly with the size of the premium. At a 10% premium, about 11% of respondents are very or somewhat interested in participating, and this falls to 3% at a price premium of 15% and to 2% at a price premium of 20% above the standard tariff.

6.6 Willingness to participate in the fixed bill option (%)
(Base 1610)

	Not at all likely 1	Not very likely 2	Somewhat likely 3	Very likely 4	NA
Premium of 5% above standard tariff	36.7	11.4	20.2	15.0	16.7
Premium of 10% above standard tariff	50.2	13.9	9.1	1.5	25.3
Premium of 15% above standard tariff	57.9	14.2	1.6	0.9	25.4
Premium of 20% above standard tariff	63.5	8.7	0.7	1.1	26.0

Survey respondents were asked about their preferred term in years as shown in Exhibit 6.7. Here there appears to be a fairly high level of uncertainty since between 36% and 42% of respondents did not answer this question. Of those responding, about two-thirds preferred a term of one year to a longer term. This varied relatively little by option.

6.7 Preferred term in years
(Base 1610)

	One	Two	Three	Four	Five	NA
Stable rate option	40.4	8.3	6.8	0.6	7.3	36.6
Variable rate option	42.4	7.8	4.4	0.5	3.3	41.6
Fixed bill option	44.4	7.6	5.2	0.8	6.4	35.6

Customers were asked about the importance of various features of rate options. The most important feature was price, with 84% of respondents saying that this feature was very or somewhat important to them, including 76% who said very important. The second most important feature was information provided to help make a decision, with 71% of respondents rating this as very or somewhat important. The third most important feature was simplicity of terms and conditions, with 71% rating this as very or somewhat important, but with a lower top box score. Length of term was the least important of the factors included, with 61% of respondents rating this as very or somewhat important.

6.8 Importance of features of rate options (%)
(Base 1610)

	Not at all important 1	Not very important 2	Somewhat important 3	Very important 4	NA
Price	1.7	0.8	7.5	76.2	13.8
Length of term	6.7	13.1	34.4	26.2	19.6
Simplicity of terms and conditions	4.1	6.7	25.5	45.0	18.7
Information provided to help make decision	3.8	5.7	19.1	52.0	19.4

6.2 Products and Services

BC Gas wishes to understand customers' potential interest in a variety of products and services. The share of customers indicating that they were very or somewhat interested in eight products and service are shown in Exhibit 6.9. The most popular products and services were furnace tune up (65%), home energy audit (59%), online audit (47%), and improved draft proofing (42%). Lesser but still significant support was shown for high efficiency furnace upgrades (39%), high efficiency water heater upgrades (38%), ceiling and wall insulation upgrade (30%), and high efficiency natural gas fireplace insert (24%).

6.9 Interest in products and services (%)
(Base 1610)

	Not at all interested 1	Not very interested 2	Somewhat interested 3	Very interested 4	NA
Home energy audit to determine main energy uses / opportunities to save energy	17.4	12.5	33.3	25.3	11.6
Do it yourself online energy audit	24.1	15.0	28.8	18.5	13.6
Furnace tune up to ensure that the furnace is working safely and efficiently	14.2	9.6	32.8	32.2	11.1
Furnace upgrade to replace old furnace with new high efficiency furnace	31.3	17.9	23.7	14.9	12.2
Hot water heater upgrade to replace old heater with new high efficiency water heater	30.8	18.8	23.8	14.2	12.4
Building improvement to upgrade ceiling and wall insulation	33.6	23.6	19.0	10.9	13.0
Building improvement to improve draft proofing	26.5	18.9	26.7	15.6	12.3
Upgrade to high efficiency natural gas fireplace insert	46.9	16.0	14.2	10.1	12.7

Looking at the demographics of the respondents in Exhibit 6.10a, it is clear that people 65 and over are significantly less interested in all the offerings and generally, younger customers are the most interested. When income is considered, it is the higher income groups that have indicated the most interested in the programs, which may indicate that they have more disposable income to pay their share of the costs of the projects. When education is considered (Exhibit 6.10b) the group with Post Graduate degrees are consistently less interested in the programs, although the group with university or college have generally a higher level of interest, but only by a small margin. Somewhat surprisingly, renters appear generally more interested than owners, although they may be assuming that the owners will pay the cost of the upgrades.

6.10a Interest in products & services (Demographics)
(Base 1610)

	Age of Respondent					Income		
	Under 35	35 to 44	45 to 54	55 to 64	65 +	< $40k	$40k <$80k	$80k +
Unweighted base	139	284	390	328	351	384	533	386
Home energy audit to determine main energy uses / opportunities to save energy	72.5	71.7	60.4	62.4	46.8	56.8	60.6	66.8
Do it yourself online energy audit	71.9	67.6	55.9	48.5	21.6	32.5	51.1	68.8
Furnace tune up to ensure that the furnace is working safely and efficiently	76.4	75.4	70.8	69.7	53.5	62.4	70.9	72.2
Furnace upgrade to replace old furnace with new high efficiency furnace	51.2	52.2	45.8	39.6	21.8	36.3	42.9	44.7
Hot water heater upgrade to replace old heater with new high efficiency water heater	49.2	44.1	41.7	42.5	26.6	37.2	41.9	42.4
Building improvement to upgrade ceiling and wall insulation	46.0	42.2	37.5	26.8	14.7	29.0	34.8	34.4
Building improvement to improve draft proofing	56.4	60.8	50.4	42.3	21.7	38.3	49.1	49.7
Upgrade to high efficiency natural gas fireplace insert	33.3	32.5	27.7	23.0	15.1	20.1	27.7	28.2

6.10b Interest in products & services (Demographics)
(Base 1610)

	Education				Ownership	
	High school	Trade/ tech	Univ/ college	Post Grad	Rent	Own
Unweighted base	375	508	477	104	102	1475
Home energy audit to determine main energy uses / opportunities to save energy	64.1	59.1	63.6	48.2	63.2	58.6
Do it yourself online energy audit	55.0	44.9	57.6	24.0	45.6	47.5
Furnace tune up to ensure that the furnace is working safely and efficiently	66.5	68.1	70.5	59.7	67.7	65.0
Furnace upgrade to replace old furnace with new high efficiency furnace	39.7	38.5	44.3	31.7	50.8	37.8
Hot water heater upgrade to replace old heater with new high efficiency water heater	42.8	35.4	41.2	37.4	41.3	38.1
Building improvement to upgrade ceiling and wall insulation	32.1	30.8	34.8	18.0	40.3	29.4
Building improvement to improve draft proofing	45.0	43.1	48.7	29.3	59.8	41.4
Upgrade to high efficiency natural gas fireplace insert	24.7	23.5	27.0	21.8	23.6	24.7

The following table looks at the products and services, but from the perspective of level of interest in the Lower Mainland relative to the Interior. Again, the reported numbers combine those who are "Very Interested" and "Somewhat Interested". The table shows a slightly higher level of interest in the Interior for the Home Energy Audit (but not the online audit, which may reflect a lower level of interest in Internet based services in the Interior), Furnace Tune-up and building shell improvements. However the Lower Mainland shows a higher interest in equipment upgrades, including furnaces, water heaters and natural gas fireplace inserts. This may reflect a lower saturation of high efficiency equipment in the Lower Mainland than in the Interior.

6.11 Interest in products and services by region (%)
(Base 1610)

Action	LM	Int.	BC Gas
Unweighted base	855	755	1610
Home energy audit to determine main energy uses / opportunities save energy	57.1	61.9	58.6
Do it yourself online energy audit	47.6	46.4	47.2
Furnace tune up to ensure that the furnace is working safely and efficiently	63.9	67.8	65.1
Furnace upgrade to replace old furnace with new high efficiency furnace	40.4	34.3	38.6
Hot water heater upgrade to replace old heater with new high efficiency water heater	38.7	36.3	38.0
Building improvement to upgrade ceiling and wall insulation	29.3	31.1	29.8
Building improvement to improve draft proofing	40.8	45.9	42.3
Upgrade to high efficiency natural gas fireplace insert	26.6	19.2	24.3

Finally, customers were asked where they would go for information on products and services. Exhibit 6.12 shows that Lower Mainland customers are more interested in Internet / web-based communications, while respondents in the Interior are more interested in people-based communications (contractors, home shows) and written materials. Other mentions include: friends and family (1.5%); home improvement stores (1.2%); and personal experience (0.3%).

6.12 Where Customers would go for information on products and services (%) (Base 1610)

	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas
Unweighted base	249	308	298	368	387	855	755	1610
BC Gas bill inserts	59.4	57.5	55.4	59.8	59.4	57.3	59.6	58.0
BC gas brochures	59.0	59.7	57.7	62.0	58.1	58.7	59.6	59.0
Contractors	40.2	31.8	26.2	41.3	40.8	32.5	41.0	35.1
Newspaper advertisements	30.5	30.8	24.8	32.1	26.6	28.3	28.7	28.4
Magazine advertisements	24.5	22.4	17.8	22.3	21.7	21.3	21.9	21.5
BC Gas web site	49.0	46.4	41.9	44.8	37.5	45.5	40.3	43.9
Other web sites	29.7	29.2	24.8	26.1	21.4	27.6	23.2	26.3
Radio	24.1	23.4	14.1	20.7	18.1	19.9	19.1	19.7
Television	33.3	33.8	20.8	32.6	30.0	28.4	31.0	29.2
Booths/displays at home shows	36.9	42.5	40.3	48.6	40.6	39.7	43.7	40.9

7 CUSTOMER COMMUNICATIONS WITH BC GAS

Providing superior customer service is critical in retaining those customers who have a choice of service provider and in increasing the number of products purchased by customers. The consensus among market researchers looking at banking services, for example, is that those customers who carry three or more products from a specific financial institution are much more likely to be loyal to that institution, and that it is typically five to ten times more expensive to attract a new customer than to retain an exiting customer. Understanding how and when customers want to have contact with a company is a key element in the customer loyalty and profitability equation.

This section deals with issues related to customers' relationships with BC Gas, particularly those dealing with frequency of contact, reasons for contact, preferred means of contact and sources of customer information on BC Gas.

In British Columbia's multicultural society, one question of interest is the language used by customers. This survey asked respondents the language in which they would prefer to be contacted by BC Gas. The overwhelming majority (89%) specified English while 2% specified Cantonese. All other languages were less than 1% and about 8% did not respond. However, it must be remembered that this was a written survey done only in English, so care should be taken when generalizing this result.

Exhibit 7.1 provides information on customer contact in the past year. About 26% of customers surveyed had contacted BC Gas in the previous year, with an average of about 2.2 contacts for those who made any contact. There were some differences by region, with about 28% of Interior customers contacting BC Gas for an average of 2.3 contacts, compared with about 25% of Lower Mainland customers contacting BC Gas for an average of 2.2 contacts. By zone, this varied from a contact rate low of 22% in Zone 3 to a high of 31% in Zone 1 with an average of 2.6 contacts in Zone 1 and 1.9 contacts in Zone 3.

7.1 Contacted BC Gas in past year.

	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas
Unweighted base	249	308	298	368	387	855	755	1610
Contacted in the past year (%)	30.9	24.0	21.5	28.8	28.2	25.4	28.4	26.3
Unweighted base	77	74	64	106	109	215	215	430
If yes, average number of contacts	2.55	1.93	1.86	2.50	2.22	2.18	2.33	2.23

Table 7.2a and 7.2b show the same information, but related to demographics. Renters are more than 50% more likely to contact BC Gas than owners (likely related to moving and change of service) but the average number of contacts is very similar. Similarly and probably related, a higher proportion of younger people indicated that they have contacted BC Gas. People 65 and over are much less likely to call BC Gas, and the average number of calls is less. There are no strong differences between levels of education and income and propensity to call BC Gas.

7.2a Contacted BC Gas in past year (Demographics)

	Age of Respondent					Income		
	Under 35	35 to 44	45 to 54	55 to 64	65 +	< $40k	$40k <$80k	$80k +
Unweighted base	131	293	382	323	362	377	524	400
Contacted in the past year (%)	44.6	32.9	27.1	27.6	17.1	27.8	28.7	27.6
Unweighted base	59	96	103	89	62	105	150	110
If yes, average number of contacts	2.66	2.71	1.98	1.90	1.61	2.21	2.42	1.85

7.2b Contacted BC Gas in past year (Demographics)

	Education				Ownership	
	High school	Trade/ tech	Univ/ college	Post Grad	Rent	Own
Unweighted base	380	488	499	98	105	1473
Contacted in the past year (%)	27.1	26.3	31.0	18.6	41.1	25.4
Unweighted base	103	128	155	18	43	375
If yes, average number of contacts	2.30	2.35	1.98	2.36	2.40	2.18

Surveyed customers were asked the reason for their most recent contact as shown in Exhibit 7.3. Billing information or concern was cited by 25% of all BC Gas customers and varied little by region at 26% for the Interior and 25% for the Lower Mainland. Request for new service was cited by 10% of BC Gas customers but was substantially higher for Interior customers at 13% than for Lower Mainland customers at 9%. Reporting a gas odour or emergency situation was cited by 7% of BC Gas customers including about 6% of Interior customers and just over 7% of Lower Mainland customers. Obtaining information on products and services was cited by about 5.5% percent of BC Gas customers with almost no difference between the Interior and the Lower Mainland. Cancelling existing service was cited by some 4% of BC Gas customers and again varied little between the Interior and the Lower Mainland. Obtaining information on an offer or a marketing program was cited by about 4% of customers with almost no difference between the Lower Mainland and the Interior. Finally, reporting problems with current natural gas service was cited by just 2% of all customers with essentially no difference between Interior and Lower Mainland customers.

7.3 Reason for the most recent contact (%)

	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas
Unweighted base	249	308	298	368	387	855	755	1610
Billing information or concern	28.1	25.0	22.5	29.1	24.3	25.1	26.1	25.4
Requested new service	7.6	7.5	10.1	12.5	13.7	8.6	13.2	10.0
Cancelled existing service	2.8	2.3	5.4	4.1	4.1	3.7	4.1	3.8
Reported problems with current n. gas service	3.2	2.3	1.7	1.9	3.1	2.4	2.6	2.4
Reported a gas odour or an emergency situation	7.6	7.5	6.4	5.4	5.9	7.1	5.7	6.7
Obtained information on products / services	7.6	4.9	4.0	5.2	5.9	5.5	5.6	5.5
Obtained information on offer or mktg programs	4.8	4.5	2.0	1.6	4.1	3.6	3.2	3.5
NR	53.0	56.8	59.4	50.3	52.2	56.5	51.5	55.0

Looking at the demographics for people who have contacted BC Gas in the last year, Table 7.3a shows that younger people (less than 45) are more likely to contact BC Gas for billing information, to request or cancel a service. Reporting a gas odours or emergency is constant over all age groups. Again, people 65 and over are generally less likely to contact BC Gas. Higher income people appear to move more often, as they show higher levels of requesting a new service or cancelling an existing service. They also appear to request information about marketing program more frequently. Not surprisingly, renters request service connections and disconnections more frequently, but also report problems with the natural gas service at about twice the rate of owners. Renters are also less likely to have contacted BC Gas for information on products and services or marketing programs, as might be expected as they will not obtain the longer term benefit of retrofits or upgrades.

7.3a Reason for the most recent contact by Demographics (%)

	Age of Respondent					Income		
	Under 35	35 to 44	45 to 54	55 to 64	65 +	< $40k	$40k <$80k	$80k +
Unweighted base	139	284	390	328	351	384	533	386
Billing information or concern	39.5	35.0	26.2	27.3	12.9	28.7	29.1	22.7
Requested new service	22.7	14.4	11.4	8.5	3.1	8.0	11.6	12.5
Cancelled existing service	7.7	6.7	3.5	3.4	1.4	3.0	4.2	5.3
Reported problems with current n. gas service	4.1	1.3	4.4	1.4	2.6	3.8	2.1	2.4
Reported a gas odour or an emergency situation	5.5	6.7	6.7	9.5	6.5	7.8	6.7	7.5
Obtained information on products / services	9.9	6.3	6.4	5.8	3.3	6.2	5.6	6.3
Obtained information on offer or mktg programs	4.8	2.9	3.2	4.4	3.7	2.7	2.8	5.1
NR	35.6	41.6	52.6	52.4	70.4	53.9	51.5	51.0

7.3b Reason for the most recent contact by Demographics (%)

	Education				Ownership	
	High school	Trade/ tech	Univ/ college	Post Grad	Rent	Own
Unweighted base	375	508	477	104	103	1475
Billing information or concern	24.1	26.8	27.6	27.5	39.9	24.5
Requested new service	9.0	10.3	12.1	8.7	15.6	9.8
Cancelled existing service	3.1	3.7	5.5	1.3	4.5	3.9
Reported problems with current n. gas service	3.0	3.3	1.4	2.3	5.0	2.3
Reported a gas odour or an emergency situation	7.8	8.1	6.3	3.2	1.0	7.2
Obtained information on products / services	6.2	6.1	5.9	3.9	3.8	5.5
Obtained information on offer or mktg programs	4.1	2.4	4.6	3.9	0.9	3.5
NR	55.8	52.2	51.3	54.9	43.4	55.5

Surveyed customers were also asked for their preferred method of contacting BC Gas as indicated in Exhibit 7.4. The overwhelming preference was for telephone contact with 83% of respondents choosing this option, including 80% of Interior customers and 85% of Lower Mainland customers. About 24% of customers preferred E-mail contact, 19% in the Interior and 26% in the Lower Mainland. Web site contact was similar as the preferred choice of 21% of customers, but regional differences were greater with just 14% of Interior customers preferring web site contact while 25% of Lower Mainland customers preferred the web. In person contact was preferred by 16% of customers including 26% of Interior customers and 12 % of Lower Mainland customers. Mail contact was the preferred choice of 9% of all customers with little difference between the Interior and the Lower Mainland.

7.4 Preferred method of contacting BC Gas (%)

	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas
Unweighted base	249	308	298	368	387	855	755	1610
Telephone	83.9	88.0	83.6	82.3	78.6	84.8	80.0	83.3
E-mail	26.5	25.6	26.2	20.4	17.6	26.2	18.7	23.9
Web site	25.3	26.0	22.8	17.1	12.7	24.5	14.4	21.4
In person	12.9	9.4	12.4	29.3	24.3	11.8	26.2	16.2
Mail	7.6	12.0	9.4	9.0	8.8	9.4	8.9	9.3
NR	6.0	4.2	5.4	5.4	8.8	5.3	7.5	6.0

Looking at the demographics of age, it is apparent that younger people are more interested in electronic communications including telephone, email and web while older homeowners prefer the more traditional approaches such as in-person and mail. When looking at income level, higher income people are more interested in electronic communications than the lower income groups. When looking at education level, it is somewhat surprising to see that those with postgraduate degrees have the lowest level of interest in electronic communications.

7.4a Preferred method of contacting BC Gas by Demographics (%)

	Age of Respondent					Income		
	Under 35	35 to 44	45 to 54	55 to 64	65 +	< $40k	$40k <$80k	$80k +
Unweighted base	139	284	390	328	351	384	533	386
Telephone	93.5	85.1	88.2	82.2	83.5	84.8	88.0	84.7
E-mail	39.7	33.3	29.5	24.7	9.4	14.8	22.3	40.5
Web site	32.1	33.6	27.9	20.1	6.9	12.0	24.2	32.7
In person	12.2	15.2	18.1	19.9	16.0	18.2	17.7	15.4
Mail	5.6	10.0	11.2	7.8	11.2	11.9	9.1	7.1
NR	1.1	1.5	1.7	4.0	7.0	4.0	2.4	1.7

7.4b Preferred method of contacting BC Gas by Demographics (%)

	Education				Ownership	
	High school	Trade/ tech	Univ/ college	Post Grad	Rent	Own
Unweighted base	375	508	477	104	103	1475
Telephone	86.5	86.7	85.6	83.8	80.0	84.1
E-mail	26.9	23.2	31.2	5.1	27.6	23.7
Web site	25.3	19.6	28.0	6.6	26.5	21.0
In person	18.6	16.7	13.9	19.9	10.8	16.6
Mail	10.8	9.5	8.1	13.1	10.3	9.3
NR	2.4	2.3	3.3	8.7	8.2	5.4

Finally, surveyed customers were asked for their preferred means of learning about BC Gas and the products and services it offers as shown in Exhibit 7.5. The most preferred choice was BC Gas bill inserts selected by 68% of respondents with little difference between the Interior and the Lower Mainland. The second most preferred choice was BC Gas brochures selected by 47% of respondents with again little regional difference. The third most preferred choice was BC Gas direct mail at 33% with little regional difference. The fourth most preferred choice was the BC Gas web site at 33%, with a stronger preference in the Lower Mainland. The fifth most preferred choice was booths and displays at home shows at 19%, with a stronger preference for this option in the Interior. The sixth most preferred choice was television at 17%, slightly more highly preferred in the Lower Mainland. The seventh most preferred choice was newspaper advertisements at 15%, with support evenly balanced across the two regions. The eighth most preferred choice was radio at 9%, fairly balanced across the regions. The ninth most preferred choice was contactors at 9% with substantially more support for contractors as a choice in the Interior. The tenth most preferred choice was magazine advertisements at 7% again with little regional difference.

7.5 Preferred means of learning abut BC Gas and the products and services it offers. (%)

	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	LM	Int.	BC Gas
Unweighted base	249	308	298	368	387	855	755	1610
BC Gas bill inserts	65.5	69.2	67.1	67.4	70.0	67.0	69.0	67.6
BC Gas brochures	44.6	49.4	46.6	50.0	45.0	46.6	46.9	46.7
BC Gas direct mail	36.1	35.7	31.2	29.3	32.8	34.1	31.5	33.3
Contractors	8.0	8.1	6.7	13.0	11.9	7.5	12.3	9.0
Newspaper advertisements	15.7	18.2	11.1	15.8	14.5	14.4	15.0	14.6
Magazine advertisements	8.4	10.4	4.7	8.2	6.5	7.4	7.1	7.3
BC Gas web site	37.8	36.0	32.6	34.2	24.5	35.2	28.3	33.1
Other web sites	5.6	8.8	7.4	7.1	5.2	7.1	5.9	6.7
Radio	12.0	11.7	6.7	9.5	7.5	9.8	8.3	9.3
Television	22.1	18.2	14.1	14.9	14.5	17.9	14.7	16.9
Booths/displays at home shows	16.9	17.9	17.8	26.6	19.1	17.5	22.0	18.9
Other (telephone)	-	-	0.3	0.3	-	0.1	0.1	0.1
NR	7.2	6.2	8.7	6.2	10.1	7.6	8.6	7.9

The demographics section shows basically the same trends as the previous section that older people seem to be significantly less interested in electronic communications. They also show that those under 35 year olds are less interested in newspaper as a medium. Lower income groups are less likely to seek information from contractors (perhaps because they are less likely to use contractors).

7.5a Preferred means of learning about BC Gas and the products and services it offers by Demographics (%)

	Age of Respondent					Income		
	Under 35	35 to 44	45 to 54	55 to 64	65 +	< $40k	$40k <$80k	$80k +
Unweighted base	139	284	390	328	351	384	533	386
BC Gas bill inserts	75.9	71.0	68.4	67.7	70.2	68.2	70.0	70.8
BC Gas brochures	48.8	50.2	45.9	50.0	48.3	46.9	51.7	43.7
BC Gas direct mail	38.5	40.0	34.4	37.0	29.2	32.0	36.9	35.8
Contractors	11.5	8.8	9.4	12.6	5.4	5.2	10.0	11.7
Newspaper advertisements	7.1	20.6	18.0	12.1	13.0	12.6	16.9	15.3
Magazine advertisements	5.1	10.3	9.9	6.0	5.2	4.8	9.0	8.3
BC Gas web site	49.3	47.3	39.7	35.2	15.2	24.2	34.4	49.3
Other web sites	10.4	9.9	9.7	5.0	2.7	3.4	7.7	9.3
Radio	8.5	12.7	10.3	7.9	8.3	8.4	10.0	11.3
Television	23.4	20.1	19.3	13.8	13.7	18.4	17.6	16.3
Booths/displays at home shows	17.7	23.5	19.1	23.1	15.0	14.8	21.3	22.2
Other (telephone)	-	0.2	0.4	-	-	-	0.4	-
NR	-	2.8	3.3	5.1	9.5	5.5	4.1	2.7

7.5b Preferred method of learning about BC Gas and the products and services it offers by Demographics (%)

	Education				Ownership	
	High school	Trade/ tech	Univ/ college	Post Grad	Rent	Own
Unweighted base	375	508	477	104	103	1475
BC Gas bill inserts	74.7	67.5	70.5	61.1	62.3	68.5
BC Gas brochures	49.4	48.2	48.3	47.9	49.0	46.7
BC Gas direct mail	37.8	35.0	36.1	22.6	34.2	33.3
Contractors	9.6	8.2	10.1	10.5	11.1	8.9
Newspaper advertisements	12.8	15.1	17.8	14.5	17.2	14.4
Magazine advertisements	7.3	7.9	7.9	5.9	11.4	6.9
BC Gas web site	38.1	31.8	42.0	13.0	37.4	32.9
Other web sites	10.2	5.9	7.0	2.9	9.6	6.5
Radio	9.2	9.9	10.4	8.2	14.6	8.9
Television	16.2	18.2	17.3	20.8	25.6	16.2
Booths/displays at home shows	24.2	18.1	18.3	19.4	17.8	18.9
Other (telephone)	-	-	0.4	-	-	0.1
NR	1.9	5.5	4.2	7.9	9.6	7.4

8 USE RATE, ELASTICITIES AND CONDITIONAL DEMAND ANALYSIS

8.1 Use Rates and Elasticities

In order to understand the nature of and reasons for changes in natural gas use rates, we begin with a look at trends in weather normalized use rates as shown in Exhibit 8.1. Weather normalization simplifies the comparison of use rates over time by removing the effects of year-to-year changes in weather. Information for the Lower Mainland, Interior and Columbia are weather normalized actuals, the system average is a weighted average of these three regions using the share of accounts by region for 2002.

Focusing on the system average, consumption per residential account changed relatively little from 1992 through 1998. However, beginning in 1999 there were a series of significant prices changes for natural gas that have been associated with declining use rate per account. For this reason we use 1998 as the base year for subsequent analysis, with an emphasis on the declining use rate in 1999, 2000, 2001 and 2002.

8.1 Weather normalized use rates (GJ)

	Lower Mainland	Interior	Columbia	System average (weighted)
1992	122.0	108.0	119.0	118.0
1993	120.0	104.0	116.0	115.4
1994	124.0	104.0	118.0	118.2
1995	126.0	106.0	116.0	120.1
1996	123.0	104.0	115.0	117.4
1997	123.0	103.0	112.0	117.1
1998	122.8	102.1	109.6	116.6
1999	121.8	103.8	113.3	116.5
2000	116.9	98.8	107.9	111.6
2001	108.8	85.7	95.6	101.9
2002	113.0	88.1	95.3	105.5

We assume that the demand for natural gas can be approximated by a Cobb-Douglas function as follows where consumption is measured in weather normalized GJs, gas price is in constant 1992 dollars per GJ and real income is proxied by the real wage measured in constant 1992 dollars.

The reason for using a system weighted average use rate rather than the system actual average use rate is that we need to remove the impact of changes in regional shares of residential customers from the analysis period. If we instead used the system actual average use rate, this use rate would reflect:

a. Natural gas price changes
b. Real income changes
c. Changes in customer share by region

In order to obtain accurate estimates of the effects of a and b, we need to remove the impact of c. We do this by using historic region shares of: Lower Mainland 69%, Interior

28%; and Columbia 3%; to calculate the system weighted average.

(1) GJ = CONSTANT * REALGASPRICE$^{\alpha}$ * REALWAGE$^{\beta}$

Taking logs yields

(2) LogGJ = logCONSTANT + α*logREALGASPRICE + β*logREALWAGE.

This form of the equation can be readily estimated and has the advantage that the coefficient on the log of price and the log of income are the price and income elasticities respectively. Exhibit 8.2 shows the estimated long-run demand curves for residential natural gas consumption using ordinary least squares regression. Although the regressions have generally good statistics, the low values of the Durbin-Watson statistics suggest the presence of autocorrelation in the residuals. For this reason, the demand curves were re-estimated using maximum likelihood estimation and a first-order auto-regressive scheme. The results are significantly better in terms of autocorrelation and are thus used here.

8.2. Long-term demand curves: OLS regressions (outcome is consumption in GJ)

	Lower Mainland	Interior	Columbia
Constant	3.610 (2.760)	1.012 (3.131)	-2.788 (3.692)
Log of real gas price	-0.139* (0.043)	-0.243* (0.049)	-0.196* (0.057)
Log of real wage	0.222 (0.427)	0.631* (0.484)	1.232* (0.571)
Adjusted R^2	0.669	0.852	0.808
F(2,8)	11.11 (0.005)	29.87 (0.000)	22.03 (0.001)
Dubin-Watson	1.260	1.792	1.576
Estimated autocorrelation	0.370	0.104	0.212
Log likelihood	-	-	-

Note: Standard errors in parentheses and * indicates coefficient significant at 10% level.

In Exhibit 8.3, the coefficients on the logs of price and income have the expected signs, reasonable magnitudes and are statistically significant at the 5% level.

8.3. Long-term demand curves: ML regressions (outcome is consumption in GJ)

	Lower Mainland	Interior	Columbia
Constant	0.809 (3.322)	1.545 (2.881)	-2.567 (3.553)
Log of real gas price	-0.090* (0.039)	-0.253* (0.046)	-0.202* (0.056)
Log of real income	0.650* (0.508)	0.550* (0.426)	1.198* (0.055)
Adjusted R^2	-	-	-
F(2,8)	-	-	-
Dubin-Watson	1.764	1.903	1.624
Estimated autocorrelation	0.118	-0.088	-0.085
Log likelihood	27.65	-25.18	23.32

Note: Standard errors in parentheses and * indicates coefficient significant at 10% level.

Exhibit 8.4 provides a summary of the preferred estimates for long-term estimates of the elasticities. These are the estimates from the maximum likelihood regressions. The system average is a weighted average of the three regions.

8.4. Summary of best estimates for long-term elasticities

	Lower Mainland	Interior	Columbia	System average
Gas price	-0.090	-0.253	-0.202	-0.139
Income	0.650	0.550	1.198	0.638

Using the definition of price elasticity of demand we have the price effect:

(3) $\Delta GJ = \varepsilon * GJ * \Delta P/P$,

where ε is the price elasticity, GJ is initial consumption and P is initial price.

Using the definition of income elasticity of demand we have the income effect:

(4) $\Delta GJ = \eta * GJ * \Delta Y/Y$,

where η is the income elasticity, GJ is initial consumption and Y is initial income.

Exhibit 8.5 provides an analysis of the impact of price and income impacts on the residential use rate. In particular, the second last column provides the predicted sum of the price and income effects that can be compared to the change in weighted actual use rate in the last column.

Four features of this exhibit are worth noting:

- First, with the exception of 2001, when there was a very large price shock, the predicted actual effect on the residential use rate is close to the change in the

weighted actual residential use rate;.

- Second, the sum of the predicted changes over the four years is 39.3GJ compared to the weighted actual of 30.9GJ;
- Third, natural gas price and income changes essentially explain the change in the residential use rate;
- Fourth, about 90% of the predicted change is due to natural gas price changes and 10% is due to income changes.

8.5. Price and income impacts on use rate

	ΔP/P compared to 1998	ΔY/Y compared to 1998	Price effect (GJ)	Income effect (GJ)	Predicted total effect (GJ)	Change in weighted actual (GJ)
1999	0.073	-0.0063	-1.2	-0.5	-1.7	-0.1
2000	0.269	-0.0149	-4.4	-1.1	-5.5	-5.0
2001	1.182	-0.026	-19.2	-1.9	-21.1	-14.7
2002	0.609	-0.015	-9.9	-1.1	-11.0	-11.1

8.2 Conditional Demand Analysis

Natural gas space heating fuel consumption (GJ per day) is modelled as a function of the following variables: have gas heat; heating degree-days per day; ceiling insulation level; area of ceiling in square feet; wall insulation level; estimated area of wall in square feet; type of window glazing; estimated area of windows in square feet; type of outside door; thermostat setback; use of a secondary fuel; dwelling age; type of dwelling including duplex, row or mobile home with single family dwelling as the base; furnace efficiency; use of woodstove; use of non-gas fireplace; use of electric baseboard heat; use of portable electric heater; use of gas wall heater; use of natural gas insert; use of natural gas fire logs; respondent income normalized by average income; and natural gas price normalized by average price.

(5) SPACE = (HaveGasHeat) *avgDD *[SHceil*sqft/levels*r_ceil**Rceil
+SHwall*(1-0.35)*bldgside*r_wall**Rwall+SHwall*0.35*bldgside*
(1-Pane2*(double glaze)-Pane3*(triple glaze or double glaze low e)]
*(1-OutsideDoor*doorInsulation)
*(1-LowerTherm*turnBackTherm)*(1-SecondaryFuel*(gas secondary heatl))
*(1-Buildage*dwellAge)*(1-SHmfDup*(duplex))
(1-SHmfRow(row)*(1-SHmfMob*(mobile)
(1-SHmidEff(mid efficiency)*(1-ShhighEff
(high efficiency)(1-SHwood*(woodstove))
(1-SHfirepl(fireplAdditionalHeat) *(nonGasFireplaces))
(1-SHelectric(electricBaseboard))*(1-SHportableElectric*(portableElectric))
(1-SHgaswall(gaswallHeater))*(1-SHfplgas*(fireplAdditionalHeat)
((fireplGasInsert) + fireplGasLog))(avgIncome/50)**incElasticity
*(price/6.67)**priceElasticity

Natural gas fire log fuel consumption (GJ per day) is modelled as a function of number of natural gas fireplace logs and heating degree-days per day.

(6) FIRELOG = FPlog*(fireplGasLog)*avgDD

Natural gas fireplace insert consumption (GJ per day) is modelled as a function of number of natural gas fire place insert (dummy) and heating degree-days per day.

(7) INSERT = FPinsert*(fireplGasInsert)*avgDD

Natural gas water heating consumption (GJ per day) is modelled as a function of the following variables: number of natural gas water tanks; dishwasher loads per day; laundry loads per day; baths per day; showers per day.

(8) WATER = WHstandby*((wtrgastank1) + (wtrgastank2))
+ Wwasher*watergasheat*(nwashloads+ndishloads)
+ Wshower*watergasheat*(nbaths+nshowers)

Natural gas dryer consumption (GJ per day) is modelled as a function of presence of natural gas dryer.

(9) DRYER = DryerGas*Ngdryer

Pool heater consumption (GJ per day) is modelled as a function of presence of indoor pool or outdoor pool, presence of natural gas pool heater in single family dwellings.

(10) POOL = Pool*(indoorPool or outdoorPool)*(poolGasHeat)

Hot tub consumption (GJ per day) is modelled as a function of presence of indoor hot tub or outdoor hot tub, presence of natural gas hot tub heater in single family dwellings.

(11) HOTTUB = HotTub*(indoorHottub or outdoorHottub)*(hottubGasHeat)

Natural gas cooking consumption is modelled as a function of the presence of a natural gas range or a natural gas cook top or both and the number of people.

(12) COOKING = Cook*(NGcooktop or NGrange)*people

Natural gas barbequing is modelled as a function of the presence of a natural gas barbeque and the number of people.

(13) BARBEQUE = BBQ*(NGbbq)*people

Natural gas wall heater is modelled as a function of the presence of a natural gas wall heater and the number of heating degree-days.

(!4) WALLHEAT = Wallgasheat*(gaswallHeater)*avgDD

The model was based on 1462 dwellings. The model was estimated by Marquardt's method. All

coefficients are significant at the 95% level except for mobile homes.

8.6. Conditional Demand Model

Parameter	Estimate	Standard error
DryerGas	0.0120	0.00363
Cook	0.00816	0.000680
BBQ	0.00319	0.000847
Pool	0.1599	0.00460
HotTub	0.0534	0.00819
Whstandby	0.0408	0.0218
Wshower	0.00696	0.000771
Wwashwr	0.00255	0.00133
Fpinsert	0.00427	0.000137
Fplog	0.00464	0.000148
SecondaryFuel	0.2137	0.0180
Shceil	9.611E-6	6.003E-7
Shwall	0.000015	3.092E-7
Rceil	-0.3759	0.0450
Rwall	-0.1019	0.0246
Lowertherm	0.0614	0.00261
Pane2	0.4822	0.0260
Pane3	0.5814	0.0384
OutsideDoor	0.0503	0.00317
ShmfDup	0.1463	0.0159
ShmfRow	0.3245	0.0140
ShfmMob	0.0129	0.0187
Shwood	0.1512	0.0119
Shfirepl	-0.1287	0.00929
Shgaswall	0.2214	0.0320
Shelectric	0.0440	0.00866
SHportabaleElectric	0.0552	0.00819
Shfplgas	0.0776	0.00683
Buildage	0.0279	0.00301
ShmidEff	0.1045	0.00670
ShhighEff	0.2337	0.00836
Wallgasheat	0.00630	0.000748
IncomeElasticity	0.0227	0.00431
PriceElasticity	-0.2981	0.0124

Exhibit 8.7 provides estimated unit energy consumption for major natural gas end uses. At the system level, consumption estimates are as follows: water heating 20.8GJ: clothes drying 4.0GJ; cooking 8.5GJ: barbecuing 3.1GJ: pool heating 53.5GJ: hot tub 17.9GJ: wall gas heater 18.0GJ: gas fireplace insert 15.8GJ: gas fireplace logs 16.8GJ: and space heating 67.8GJ. The total UEC of 96.1GJ is calculated by multiplying each end use by its penetration rate and summing. The total UEC is the average consumption of a home in BC Gas' service territory. The individual end use UEC is applicable to a customer who has that end use.

8.7. Unit energy consumption (GJ)

	Interior	Lower Mainland	BC Gas
Water heating	20.3	21.0	20.8
Clothes drying	4.0	4.0	4.0
Cooking	7.8	8.6	8.5
Barbequing	2.8	3.4	3.1
Pool	53.3	53.6	53.5
Hot tub	17.9	17.8	17.9
Wall gas heating	22.2	16.0	18.0
Gas fireplace insert	18.3	14.9	15.8
Gas fireplace logs	18.6	16.2	16.8
Space heating	74.1	65.3	67.8

9 TRENDS AND IMPLICATIONS

In this section we examine key trends and assess the implications of these trends for BC Gas's residential natural gas market. Some of these trends include:

- Changes in the housing market with, on the one hand, a trend towards larger single-family dwellings, and, on the other hand, a trend towards a higher share of apartment type units particularly in the Lower Mainland.
- Improvements in insulation levels, draft proofing, door and windows with implications for residential heat loss rates
- Some improvements in water heater efficiency combined with an increased energy efficiency ethic with impacts on water heating.
- Changes in family size and in eating out, including the average number of households with children at home, with implications for water heating and cooking natural gas use.
- Major increases in furnace efficiency, with impacts on residential natural gas consumption and peak.
- Some signs of increased penetration of electric heat and heat pumps, with implications for the key residential natural gas space heating load.
- Reduced use rate largely in response to higher natural gas prices and falling real incomes.

The unweighted base on all tables is 1610 in 2002 and 4814 in 1993 unless otherwise noted.

Exhibit 9.1 shows the trends in overall use, gas price (in constant 1992 dollars) and the real wage (in constant 1992 dollars). Although the use rate showed some fluctuations in the period 1992-1997, there was no particular trend, but from 1997-2002 there has been a pronounced downward trend in consumption. Natural gas prices exhibit substantial year-to-year changes while the real wage has shown a slow decline.

9.1 Residential customers and consumption

Year	Use rate (GJ)	Gas price	Weekly wage
1992	118.9	4.336	598.50
1993	114.7	4.314	587.92
1994	119.0	5.345	592.55
1995	120.5	5.236	580.23
1996	117.6	4.703	570.92
1997	117.3	5.119	567.77
1998	116.9	4.473	569.38
1999	116.7	4.883	565.81
2000	111.7	5.676	561.30
2001	100.5	9.759	554.73
2002	105.6	7.196	560.93

Exhibit 9.2 shows the distribution of houses by dwelling type. The main trends have included a decline in the share of single family dwellings, a modest increase in the share of duplexes and a substantial increase in the share of row house/townhouse dwellings.

9.2 Dwelling type (%)

	Dec. 1993	Dec. 2002
Single family dwelling	84.4	78.6
Duplex	3.0	4.4
Row house or townhouse	5.8	10.2
Apartment	0.7	0.4
Mobile home or other	5.0	3.7
DK/NR	1.1	2.6

Exhibit 9.3 summarizes two key housing characteristics: dwelling size and number of stories. Between 1993 and 2002, average dwelling size increased by about 4% while the average number of stories increased from 1.6 to 1.8.

9.3 House characteristics

	Dec. 1993	Dec.2002
Dwelling size (square feet)	2107	2199
Number of stories	1.6	1.8

Home ownership status is shown in Exhibit 9.4. In 1993, about 93% of respondents indicated they were home owners compared with 92% in 2002.

9.4 Home ownership (%)

	Dec. 1993	Dec.2002
Ownership share	92.7	91.5
Rental share	6.6	6.5
DK/NR	0.7	2.0

Main space heating fuel is shown in Exhibit 9.5. In 1993, about 93% of respondents had natural gas as their main space hating fuel with 3% using electricity and 1% using wood. In 2002, about 93% of respondents had natural gas as their main space hating fuel with 3.5% using electricity and 1% using wood.

9.5 Main space heating fuel (%)

	Dec. 1993	Dec.2002
Electricity	3.1	3.5
Natural gas	93.1	92.9
Wood	1.0	1.4

Exhibit 9.6 shows the main space heating methods. The most significant change is the increase in fireplaces as a main heating source and the increase in hot water in-floor radiant systems. Overall, the possible declining use of forced air furnaces is more than offset by the increase in natural gas boilers (from 8.2% to 11.3%).

9.6 Main space heating method (%)

	Dec. 1993	Dec. 2002
Central forced air furnace	81.5	79.1
Wire-in electric heater (baseboards)	1.7	3.7
Hot water baseboards	5.7	5.0
Hot water in-floor radiant	2.5	6.3
Radiant electric cables	0.3	0.3
Natural gas wall heater	NA	2.2
Portable electric heaters	NA	0.8
Wood stove	0.9	1.6
Heat pump	0.2	0.6
Fireplace	0.7	5.8
Other	2.3	0.4
NR	4.3	2.0

Exhibit 9.7 shows the other space heating methods. The most significant change is the increase in central natural gas systems (both forced air and hot water) being listed as a secondary method. The reported use of portable electric heaters as a secondary method has increased only slightly. However if all electric methods are summed, the use of electricity as a supplementary heating source has increased from about 30% to about 35%.

9.7 Other space heating method (%)

	Dec. 1993	Dec. 2002
Central forced air furnace	2.5	19.7
Wire-in electric heater (baseboards)	14.2	16.6
Hot water baseboards	1.0	2.5
Hot water in-floor radiant	0.9	2.9
Radiant electric cables	0.2	1.1
Natural gas wall heater	3.4	3.6
Portable electric heaters	15.8	16.8
Wood stove	7.5	5.0
Heat pump	0.2	0.6
Fireplace	39.2	37.1
Other	5.4	2.3
NR	-	23.7

Main water heating fuel is shown in Exhibit 9.8 and shows that there has been almost no change in water heating fuel since 1993.

9.8 Main water heating fuel (%)

	Dec. 1993	Dec.2002
Electricity	14.3	14.3
Natural gas	84.3	84.7
Piped propane	-	0.2

Exhibit 9.9 shows the change in hot water usage between 1993 and 2002, and indicates an increase in all usages. As noted in the previous section, the estimated consumption of natural gas for water heating has only increased slightly, which supports the increase in efficiency of hot water tanks over the past decade.

9.9 Hot water usage

Per week	Dec. 1993	Dec. 2002
Dishwasher loads	3.32	4.29
Laundry loads	5.16	5.75
Number of baths	4.11	4.42
Number of showers	11.53	13.08

Fireplace penetration increased from 77% in 1993 to 81% in 2002 as shown in Exhibit 9.10. Those having one or more fireplaces were also asked about the type of fireplace(s) they have. Of note is the significant increase reported for the incidence of natural gas heater inserts and fire logs.

9.10 Fireplaces (%)

	Dec. 1993	Dec.2002
Have one or more	76.7	81.0
If have one or more:	-	-
Natural gas heater insert	16.5	28.6
Natural gas fire logs	18.2	28.2
Wood burning insert	15.0	5.3
Wood burning	30.1	30.9

Swimming pool and hot tub ownership is shown in Exhibit 9.11. The proportion of respondents with a swimming pool increased from 5% in 1993 to 7% in 2002. The proportion of respondents with a hot tub increased from 8% in 1993 to 11% in 2002. While the proportion of pools heated by natural gas has increased, the proportion of hot tubs heated by natural gas has declined, with that load moving to electricity.

9.11 Pools and hot tubs (%)

	Dec. 1993	Dec.2002
Have one or more pools	5.2	6.6
Share of pools heated with natural gas	49.1	56.0
Have one or more hot tubs	8.2	10.8
Share of hot tubs heated with natural gas	21.8	13.1

Natural Gas appliance penetration levels are shown in Exhibit 9.12. Appliances with an increase of penetration of at least 5 percentage points include natural gas ranges, microwave ovens, propane barbeque, dishwashers, front loading clothes washers and electric wall unit air conditioners. Other appliances had modest growth or modest declines in penetration.

Of particular interest is the increase in natural gas using appliances. For cooking, natural gas ranges and cooktops have increased from 12.2% to 22.7%. Natural gas clothes dryers have increased from 3.9% to 5.3%. However the increase in front loading clothes washers will have an impact on both hot water usage and potentially clothes drying as they use less hot water to wash, and extract more water from the clothes during the spin cycle, which will reduce the energy consumption for drying. Natural gas barbeques has increased from 4.5% to 9.7% and natural gas patio heaters now have a penetration of slightly less than 1%.

9.12 Appliance penetration (%)

	Dec. 1993	Dec.2002
Electric range	77.9	81.8
Natural gas range	9.1	15.7
Electric cook top	11.8	16.6
Natural gas cook top	3.1	7.0
Microwave oven	79.4	92.7
Propane barbeque	51.7	63.0
Natural gas barbeque	4.5	9.7
Dishwasher	68.2	81.2
Top loading clothes washer	95.2	88.3
Front loading clothes washer	na	9.4
Electric clothes dryer	90.8	89.6
Gas clothes dryer	3.9	5.3
Central electric air conditioning	18.4	15.1
Electric wall unit air conditioner	4.0	9.1
Humidifier	9.6	7.0
Heat pump	1.0	2.3

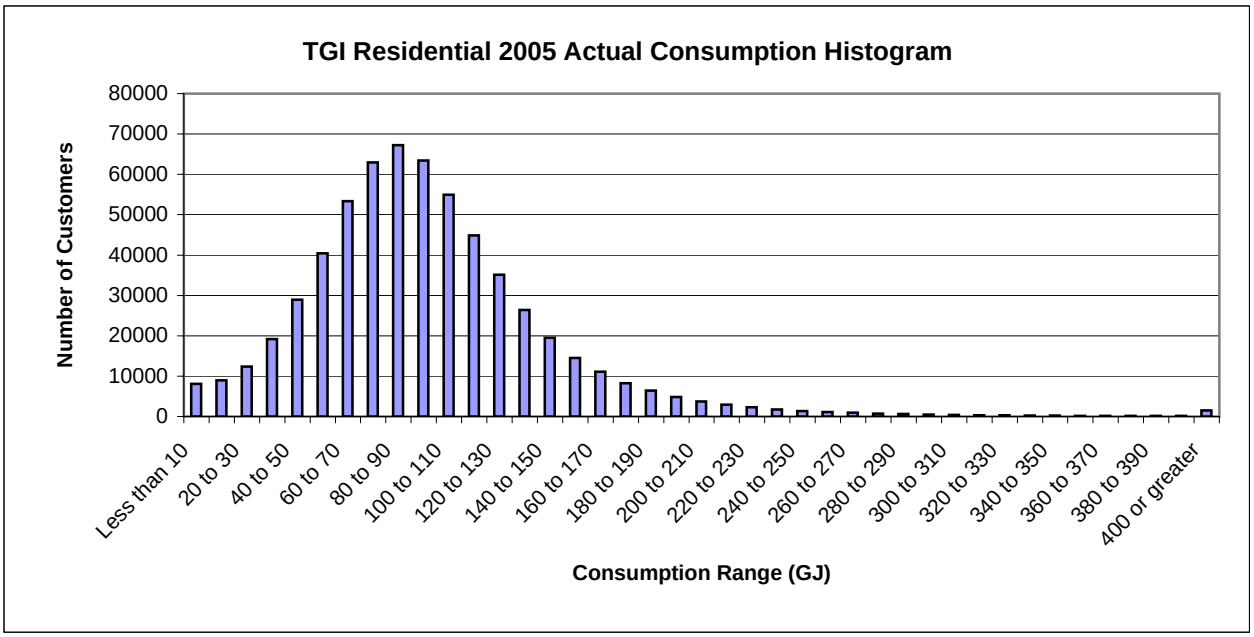
Unit energy consumption for various end uses is shown in Exhibit 9.13. Key points include: space heating use dropped substantially; fire place log consumption fell sharply; fireplace insert consumption rose modestly; and water heating consumption was essentially unchanged.

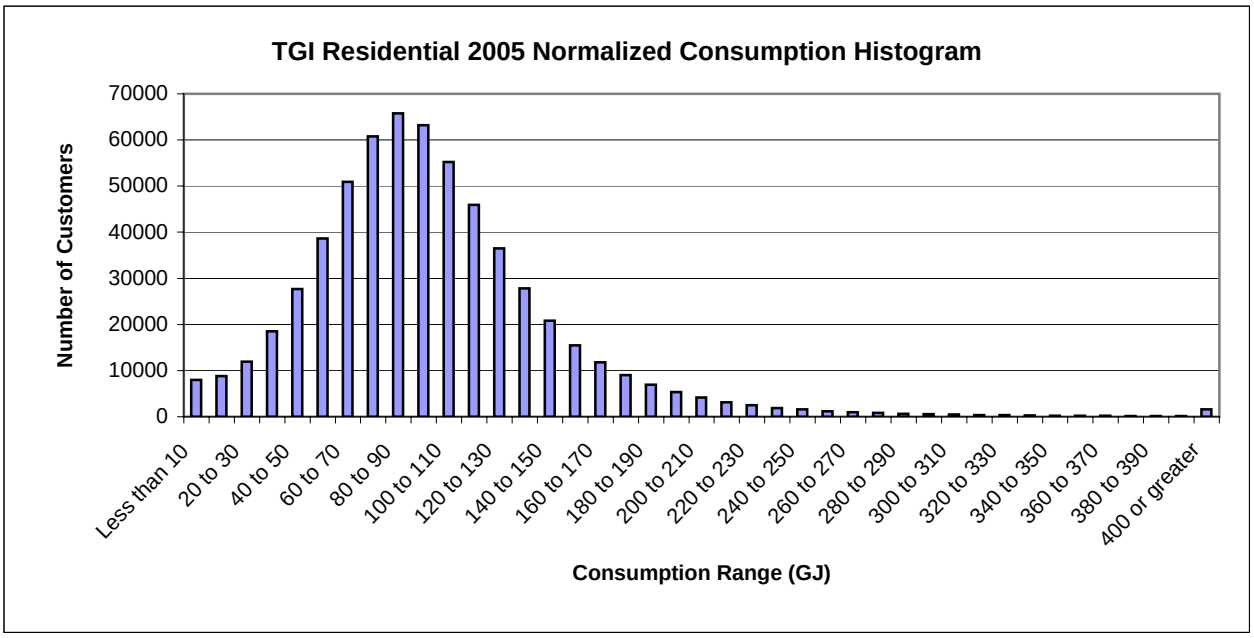
9.13 Unit energy consumption (GJ)

	GJ per year in 1993[5]	GJ per year in 2002
Main space heating	77.1	67.8
Secondary space heating	12.1	na
Fire place logs	23.3	16.8
Fire place insert	15.6	15.8
Water heating	21.3	20.8
Clothes drying	4.9	4.0
Indoor pool heating	192.2	na
Outdoor pool heating	68.0	na
Pool heating	na	53.5
Hot tub	17.2	17.9
Cooking	10.4	8.5
Barbequing	na	3.1
Wall gas heater	na	18.0
Total	102.1	96.1
Average use rate	114.7	105.6

[5] NATURAL GAS CONSUMPTION PER HOUSEHOLD APPLIANCE DERIVED FROM THE 1994 RESIDENTIAL SURVEY, George M McCollister, September 19, 1995

Attachment 15.1


TGI Residential 2005 Actual Consumption Histogram
Number of Customers
80000
70000
60000
50000
40000
30000
20000
10000
0
Less than 10
20 to 30
40 to 50
60 to 70
80 to 90
100 to 110
120 to 130
140 to 150
160 to 170
180 to 190
200 to 210
220 to 230
240 to 250
260 to 270
280 to 290
300 to 310
320 to 330
340 to 350
360 to 370
380 to 390
400 or greater
Consumption Range (GJ)


TGI Residential 2005 Normalized Consumption Histogram
Number of Customers
70000
60000
50000
40000
30000
20000
10000
0
Less than 10
20 to 30
40 to 50
60 to 70
80 to 90
100 to 110
120 to 130
140 to 150
160 to 170
180 to 190
200 to 210
220 to 230
240 to 250
260 to 270
280 to 290
300 to 310
320 to 330
340 to 350
360 to 370
380 to 390
400 or greater
Consumption Range (GJ)

TGI Residential = Rate 1 Customers

12 Months consumption is required to be included in this analysis

2005 Actuals - TGI Residential	
Range (GJ)	**Customers**
Less than 10	8,117
10 to 20	8,970
20 to 30	12,371
30 to 40	19,174
40 to 50	28,914
50 to 60	40,453
60 to 70	53,341
70 to 80	62,993
80 to 90	67,230
90 to 100	63,407
100 to 110	54,968
110 to 120	44,898
120 to 130	35,101
130 to 140	26,381
140 to 150	19,530
150 to 160	14,499
160 to 170	11,070
170 to 180	8,232
180 to 190	6,418
190 to 200	4,876
200 to 210	3,726
210 to 220	2,906
220 to 230	2,279
230 to 240	1,722
240 to 250	1,378
250 to 260	1,087
260 to 270	916
270 to 280	689
280 to 290	599
290 to 300	496
300 to 310	392
310 to 320	341
320 to 330	313
330 to 340	253
340 to 350	217
350 to 360	189
360 to 370	166
370 to 380	147
380 to 390	153
390 to 400	121
400 to 410	95
410 to 420	87
420 to 430	104
430 to 440	76
440 to 450	65

2005 Normalized TGI - Residential	
Range (GJ)	**Customers**
Less than 10	7,987
10 to 20	8,783
20 to 30	11,967
30 to 40	18,518
40 to 50	27,710
50 to 60	38,674
60 to 70	50,895
70 to 80	60,748
80 to 90	65,751
90 to 100	63,189
100 to 110	55,249
110 to 120	45,907
120 to 130	36,477
130 to 140	27,814
140 to 150	20,802
150 to 160	15,477
160 to 170	11,766
170 to 180	8,987
180 to 190	6,938
190 to 200	5,327
200 to 210	4,142
210 to 220	3,155
220 to 230	2,498
230 to 240	1,900
240 to 250	1,589
250 to 260	1,169
260 to 270	1,000
270 to 280	808
280 to 290	639
290 to 300	552
300 to 310	469
310 to 320	352
320 to 330	324
330 to 340	280
340 to 350	241
350 to 360	212
360 to 370	181
370 to 380	155
380 to 390	147
390 to 400	147
400 to 410	111
410 to 420	98
420 to 430	82
430 to 440	101
440 to 450	77

450 to 460	87
460 to 470	69
470 to 480	63
480 to 490	51
490 to 500	46
500 to 510	41
510 to 520	43
520 to 530	35
530 to 540	32
540 to 550	34
550 to 560	23
560 to 570	31
570 to 580	21
580 to 590	26
590 to 600	22
600 to 610	24
610 to 620	31
620 to 630	17
630 to 640	35
640 to 650	22
650 to 660	18
660 to 670	13
670 to 680	12
680 to 690	17
690 to 700	14
700 to 710	9
710 to 720	5
720 to 730	13
730 to 740	13
740 to 750	3
750 to 760	10
760 to 770	5
770 to 780	5
780 to 790	8
790 to 800	9
800 to 810	5
810 to 820	6
820 to 830	4
830 to 840	9
840 to 850	7
850 to 860	6
860 to 870	5
870 to 880	4
880 to 890	4
890 to 900	1
900 to 910	2
910 to 920	4
920 to 930	3
930 to 940	3
940 to 950	5
950 to 960	3
960 to 970	6

450 to 460	62
460 to 470	76
470 to 480	76
480 to 490	56
490 to 500	57
500 to 510	48
510 to 520	45
520 to 530	35
530 to 540	42
540 to 550	29
550 to 560	29
560 to 570	31
570 to 580	28
580 to 590	21
590 to 600	18
600 to 610	26
610 to 620	26
620 to 630	28
630 to 640	23
640 to 650	21
650 to 660	33
660 to 670	16
670 to 680	21
680 to 690	10
690 to 700	10
700 to 710	17
710 to 720	10
720 to 730	9
730 to 740	5
740 to 750	14
750 to 760	11
760 to 770	4
770 to 780	9
780 to 790	5
790 to 800	6
800 to 810	9
810 to 820	8
820 to 830	3
830 to 840	6
840 to 850	5
850 to 860	7
860 to 870	7
870 to 880	4
880 to 890	8
890 to 900	3
900 to 910	4
910 to 920	1
920 to 930	4
930 to 940	3
940 to 950	4
950 to 960	2
960 to 970	3

970 to 980	4
980 to 990	4
990 to 1000	1
1000 to 1010	2
1010 to 1020	6
1020 to 1030	3
1030 to 1040	2
1040 to 1050	3
1050 to 1060	4
1060 to 1070	2
1070 to 1080	3
1080 to 1090	3
1090 to 1100	3
1100 to 1110	1
1110 to 1120	1
1120 to 1130	4
1130 to 1140	2
1140 to 1150	1
1150 to 1160	2
1160 to 1170	1
1170 to 1180	2
1180 to 1190	2
1190 to 1200	1
1200 to 1210	0
1210 to 1220	0
1220 to 1230	2
1230 to 1240	2
1240 to 1250	0
1250 to 1260	1
1260 to 1270	1
1270 to 1280	2
1280 to 1290	1
1290 to 1300	0
1300 to 1310	0
1310 to 1320	1
1320 to 1330	1
1330 to 1340	0
1340 to 1350	0
1350 to 1360	1
1360 to 1370	1
1370 to 1380	1
1380 to 1390	1
1390 to 1400	2
1400 to 1410	1
1410 to 1420	0
1420 to 1430	0
1430 to 1440	0
1440 to 1450	1
1450 to 1460	0
1460 to 1470	1
1470 to 1480	1
1480 to 1490	2

970 to 980	3
980 to 990	5
990 to 1000	4
1000 to 1010	5
1010 to 1020	2
1020 to 1030	1
1030 to 1040	6
1040 to 1050	5
1050 to 1060	2
1060 to 1070	2
1070 to 1080	3
1080 to 1090	2
1090 to 1100	3
1100 to 1110	3
1110 to 1120	3
1120 to 1130	3
1130 to 1140	0
1140 to 1150	1
1150 to 1160	4
1160 to 1170	2
1170 to 1180	1
1180 to 1190	3
1190 to 1200	2
1200 to 1210	2
1210 to 1220	1
1220 to 1230	0
1230 to 1240	0
1240 to 1250	1
1250 to 1260	1
1260 to 1270	2
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1280 to 1290	1
1290 to 1300	1
1300 to 1310	1
1310 to 1320	2
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1350 to 1360	1
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1380 to 1390	1
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1570 to 1580	1
1580 to 1590	1
1590 to 1600	0
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1640 to 1650	0
1650 to 1660	1
1660 to 1670	0
1670 to 1680	1
1680 to 1690	1
1690 to 1700	0
1700 to 1710	0
1710 to 1720	2
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1780 to 1790	0
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1940 to 1950	0
1950 to 1960	0
1960 to 1970	0
1970 to 1980	0
1980 to 1990	0
1990 to 2000	0
2000 to 2010	0

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1580 to 1590	0
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1640 to 1650	0
1650 to 1660	2
1660 to 1670	0
1670 to 1680	0
1680 to 1690	0
1690 to 1700	1
1700 to 1710	0
1710 to 1720	1
1720 to 1730	1
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1760 to 1770	1
1770 to 1780	0
1780 to 1790	0
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1800 to 1810	0
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1820 to 1830	0
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1840 to 1850	0
1850 to 1860	0
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1880 to 1890	1
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1900 to 1910	1
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1920 to 1930	0
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1950 to 1960	0
1960 to 1970	0
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1980 to 1990	0
1990 to 2000	0
2000 to 2010	0

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2190 to 2200	0
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2280 to 2290	0
2290 to 2300	0
2300 to 2310	0
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2380 to 2390	0
2390 to 2400	0
2400 to 2410	0
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2430 to 2440	0
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2450 to 2460	0
2460 to 2470	0
2470 to 2480	1
2480 to 2490	0
2490 to 2500	0
2500 to 2510	0
2510 to 2520	0
2520 to 2530	0

2010 to 2020	0
2020 to 2030	0
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2070 to 2080	0
2080 to 2090	0
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2150 to 2160	0
2160 to 2170	0
2170 to 2180	0
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2890 to 2900	0
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2970 to 2980	0
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3990 to 4000	0
4000 to 4010	0
4010 to 4020	0
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4060 to 4070	0
4070 to 4080	0
4080 to 4090	0

3570 to 3580	0
3580 to 3590	0
3590 to 3600	0
3600 to 3610	0
3610 to 3620	0
3620 to 3630	0
3630 to 3640	0
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3650 to 3660	0
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3700 to 3710	0
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3990 to 4000	0
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4070 to 4080	0
4080 to 4090	0

4090 to 4100	0
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4110 to 4120	0
4120 to 4130	0
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4150 to 4160	0
4160 to 4170	0
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4290 to 4300	0
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4530 to 4540	0
4540 to 4550	0
4550 to 4560	0
4560 to 4570	0
4570 to 4580	0
4580 to 4590	0
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4600 to 4610	0

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4100 to 4110	0
4110 to 4120	0
4120 to 4130	0
4130 to 4140	0
4140 to 4150	0
4150 to 4160	0
4160 to 4170	0
4170 to 4180	0
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4190 to 4200	0
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4290 to 4300	0
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4680 to 4690	0
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5100 to 5110	0
5110 to 5120	0
5120 to 5130	0

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4660 to 4670	0
4670 to 4680	0
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4940 to 4950	0
4950 to 4960	0
4960 to 4970	0
4970 to 4980	0
4980 to 4990	0
4990 to 5000	0
5000 to 5010	0
5010 to 5020	0
5020 to 5030	0
5030 to 5040	0
5040 to 5050	0
5050 to 5060	0
5060 to 5070	0
5070 to 5080	0
5080 to 5090	0
5090 to 5100	0
5100 to 5110	0
5110 to 5120	0
5120 to 5130	0

5130 to 5140	0
5140 to 5150	0
5150 to 5160	0
5160 to 5170	0
5170 to 5180	0
5180 to 5190	0
5190 to 5200	0
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5210 to 5220	0
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5450 to 5460	0
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5480 to 5490	0
5490 to 5500	0
5500 to 5510	0
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5570 to 5580	0
5580 to 5590	0
5590 to 5600	0
5600 to 5610	0
5610 to 5620	0
5620 to 5630	0
5630 to 5640	0
5640 to 5650	0

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5140 to 5150	0
5150 to 5160	0
5160 to 5170	0
5170 to 5180	0
5180 to 5190	0
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5210 to 5220	0
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5290 to 5300	0
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5700 to 5710	0
5710 to 5720	0
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5730 to 5740	0
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5790 to 5800	0
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5920 to 5930	0
5930 to 5940	0
5940 to 5950	0
5950 to 5960	0
5960 to 5970	0
5970 to 5980	0
5980 to 5990	0
5990 to 6000	0
6000 or greater	0

5650 to 5660	0
5660 to 5670	0
5670 to 5680	0
5680 to 5690	0
5690 to 5700	0
5700 to 5710	0
5710 to 5720	0
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5730 to 5740	0
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5880 to 5890	0
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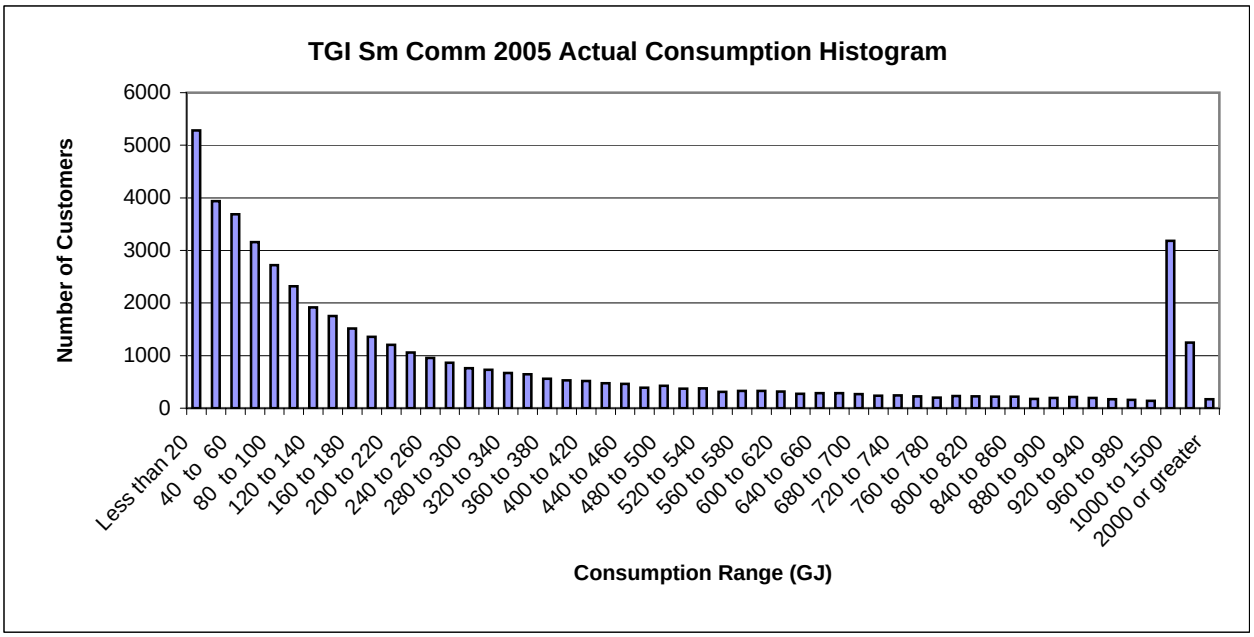
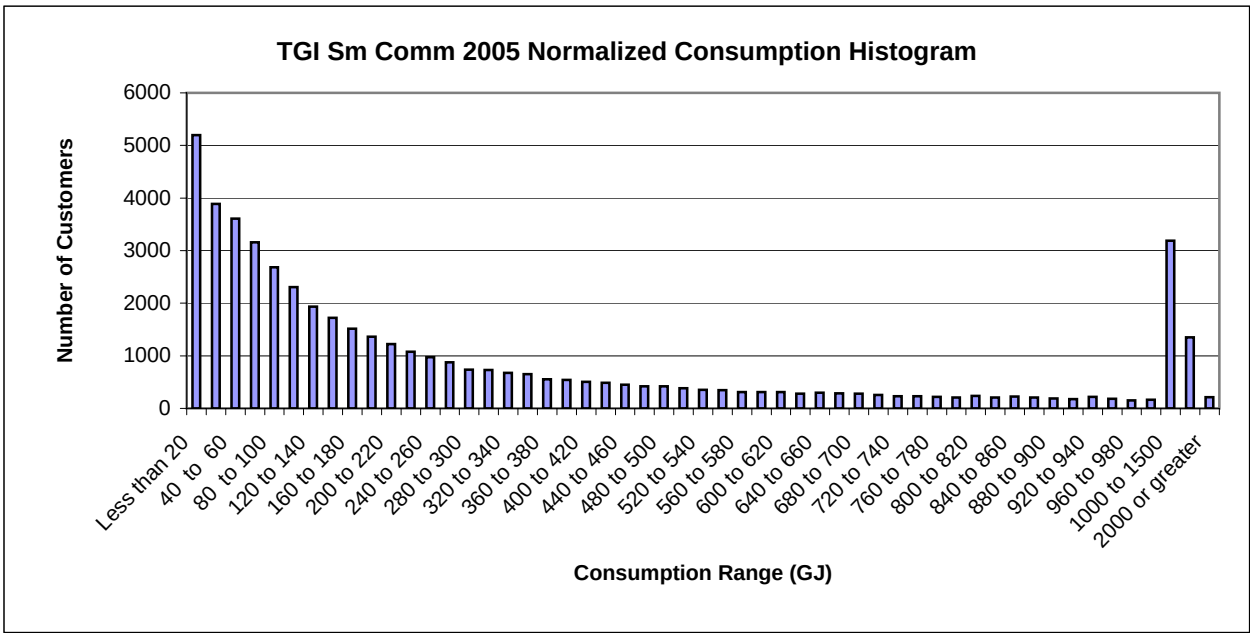
5920 to 5930	0
5930 to 5940	0
5940 to 5950	0
5950 to 5960	0
5960 to 5970	0
5970 to 5980	0
5980 to 5990	0
5990 to 6000	0
6000 or greater	0


TGI Sm Comm 2005 Actual Consumption Histogram
Number of Customers
6000
5000
4000
3000
2000
1000
0
Less than 20
40 to 60
80 to 100
120 to 140
160 to 180
200 to 220
240 to 260
280 to 300
320 to 340
360 to 380
400 to 420
440 to 460
480 to 500
520 to 540
560 to 580
600 to 620
640 to 660
680 to 700
720 to 740
760 to 780
800 to 820
840 to 860
880 to 900
920 to 940
960 to 980
1000 to 1500
2000 or greater
Consumption Range (GJ)


TGI Sm Comm 2005 Normalized Consumption Histogram
Number of Customers
6000
5000
4000
3000
2000
1000
0
Less than 20
40 to 60
80 to 100
120 to 140
160 to 180
200 to 220
240 to 260
280 to 300
320 to 340
360 to 380
400 to 420
440 to 460
480 to 500
520 to 540
560 to 580
600 to 620
640 to 660
680 to 700
720 to 740
760 to 780
800 to 820
840 to 860
880 to 900
920 to 940
960 to 980
1000 to 1500
2000 or greater
Consumption Range (GJ)

TGI Small Commercial = Rate 2 Customers

12 Months consumption is required to be included in this analysis

2005 Actuals - TGI Small Commercial	
Range (GJ)	**Customers**
Less than 10	3,173
10 to 20	2,108
20 to 30	1,995
30 to 40	1,942
40 to 50	1,849
50 to 60	1,837
60 to 70	1,647
70 to 80	1,511
80 to 90	1,377
90 to 100	1,346
100 to 110	1,200
110 to 120	1,118
120 to 130	954
130 to 140	961
140 to 150	871
150 to 160	881
160 to 170	779
170 to 180	737
180 to 190	679
190 to 200	676
200 to 210	639
210 to 220	568
220 to 230	535
230 to 240	522
240 to 250	505
250 to 260	451
260 to 270	448
270 to 280	417
280 to 290	375
290 to 300	386
300 to 310	368
310 to 320	363
320 to 330	324
330 to 340	344
340 to 350	341
350 to 360	305
360 to 370	276
370 to 380	285
380 to 390	277
390 to 400	254
400 to 410	261
410 to 420	259
420 to 430	230
430 to 440	244
440 to 450	231

2005 Normalized TGI Sm Comm	
Range (GJ)	**Customers**
Less than 10	3,123
10 to 20	2,072
20 to 30	1,970
30 to 40	1,920
40 to 50	1,819
50 to 60	1,790
60 to 70	1,653
70 to 80	1,508
80 to 90	1,374
90 to 100	1,311
100 to 110	1,220
110 to 120	1,084
120 to 130	997
130 to 140	939
140 to 150	890
150 to 160	834
160 to 170	807
170 to 180	708
180 to 190	716
190 to 200	646
200 to 210	658
210 to 220	563
220 to 230	527
230 to 240	552
240 to 250	506
250 to 260	467
260 to 270	445
270 to 280	430
280 to 290	354
290 to 300	385
300 to 310	369
310 to 320	364
320 to 330	339
330 to 340	339
340 to 350	333
350 to 360	318
360 to 370	283
370 to 380	273
380 to 390	275
390 to 400	269
400 to 410	254
410 to 420	250
420 to 430	251
430 to 440	234
440 to 450	225

450 to 460	232
460 to 470	192
470 to 480	199
480 to 490	206
490 to 500	221
500 to 510	209
510 to 520	162
520 to 530	181
530 to 540	197
540 to 550	155
550 to 560	157
560 to 570	175
570 to 580	156
580 to 590	165
590 to 600	164
600 to 610	156
610 to 620	162
620 to 630	128
630 to 640	146
640 to 650	151
650 to 660	137
660 to 670	139
670 to 680	144
680 to 690	129
690 to 700	141
700 to 710	119
710 to 720	121
720 to 730	111
730 to 740	135
740 to 750	116
750 to 760	112
760 to 770	102
770 to 780	98
780 to 790	107
790 to 800	125
800 to 810	105
810 to 820	119
820 to 830	116
830 to 840	106
840 to 850	106
850 to 860	115
860 to 870	86
870 to 880	90
880 to 890	104
890 to 900	91
900 to 910	113
910 to 920	99
920 to 930	92
930 to 940	102
940 to 950	77
950 to 960	94
960 to 970	84

450 to 460	224
460 to 470	230
470 to 480	189
480 to 490	200
490 to 500	218
500 to 510	190
510 to 520	196
520 to 530	178
530 to 540	177
540 to 550	189
550 to 560	158
560 to 570	150
570 to 580	159
580 to 590	159
590 to 600	154
600 to 610	163
610 to 620	146
620 to 630	145
630 to 640	135
640 to 650	162
650 to 660	135
660 to 670	142
670 to 680	146
680 to 690	129
690 to 700	149
700 to 710	123
710 to 720	130
720 to 730	127
730 to 740	106
740 to 750	103
750 to 760	127
760 to 770	109
770 to 780	110
780 to 790	104
790 to 800	100
800 to 810	102
810 to 820	134
820 to 830	102
830 to 840	104
840 to 850	109
850 to 860	114
860 to 870	91
870 to 880	116
880 to 890	95
890 to 900	92
900 to 910	83
910 to 920	94
920 to 930	108
930 to 940	114
940 to 950	90
950 to 960	93
960 to 970	81

970 to 980	77
980 to 990	68
990 to 1000	70
1000 to 1010	74
1010 to 1020	85
1020 to 1030	86
1030 to 1040	73
1040 to 1050	82
1050 to 1060	84
1060 to 1070	69
1070 to 1080	90
1080 to 1090	73
1090 to 1100	73
1100 to 1110	72
1110 to 1120	85
1120 to 1130	65
1130 to 1140	65
1140 to 1150	75
1150 to 1160	86
1160 to 1170	72
1170 to 1180	62
1180 to 1190	68
1190 to 1200	61
1200 to 1210	59
1210 to 1220	77
1220 to 1230	55
1230 to 1240	67
1240 to 1250	66
1250 to 1260	70
1260 to 1270	56
1270 to 1280	51
1280 to 1290	63
1290 to 1300	53
1300 to 1310	66
1310 to 1320	64
1320 to 1330	66
1330 to 1340	49
1340 to 1350	70
1350 to 1360	60
1360 to 1370	59
1370 to 1380	49
1380 to 1390	51
1390 to 1400	55
1400 to 1410	51
1410 to 1420	55
1420 to 1430	47
1430 to 1440	51
1440 to 1450	51
1450 to 1460	46
1460 to 1470	42
1470 to 1480	50
1480 to 1490	44

970 to 980	73
980 to 990	95
990 to 1000	68
1000 to 1010	73
1010 to 1020	64
1020 to 1030	69
1030 to 1040	74
1040 to 1050	82
1050 to 1060	92
1060 to 1070	84
1070 to 1080	79
1080 to 1090	75
1090 to 1100	70
1100 to 1110	91
1110 to 1120	75
1120 to 1130	69
1130 to 1140	60
1140 to 1150	78
1150 to 1160	69
1160 to 1170	74
1170 to 1180	73
1180 to 1190	76
1190 to 1200	73
1200 to 1210	65
1210 to 1220	59
1220 to 1230	55
1230 to 1240	59
1240 to 1250	69
1250 to 1260	65
1260 to 1270	67
1270 to 1280	57
1280 to 1290	63
1290 to 1300	54
1300 to 1310	48
1310 to 1320	61
1320 to 1330	57
1330 to 1340	59
1340 to 1350	71
1350 to 1360	57
1360 to 1370	61
1370 to 1380	54
1380 to 1390	65
1390 to 1400	59
1400 to 1410	48
1410 to 1420	51
1420 to 1430	50
1430 to 1440	49
1440 to 1450	43
1450 to 1460	52
1460 to 1470	42
1470 to 1480	54
1480 to 1490	47

1490 to 1500	42
1500 to 1510	51
1510 to 1520	52
1520 to 1530	36
1530 to 1540	39
1540 to 1550	32
1550 to 1560	43
1560 to 1570	30
1570 to 1580	28
1580 to 1590	43
1590 to 1600	45
1600 to 1610	44
1610 to 1620	38
1620 to 1630	41
1630 to 1640	38
1640 to 1650	33
1650 to 1660	29
1660 to 1670	31
1670 to 1680	37
1680 to 1690	27
1690 to 1700	19
1700 to 1710	25
1710 to 1720	21
1720 to 1730	24
1730 to 1740	25
1740 to 1750	31
1750 to 1760	24
1760 to 1770	26
1770 to 1780	18
1780 to 1790	26
1790 to 1800	11
1800 to 1810	18
1810 to 1820	29
1820 to 1830	18
1830 to 1840	26
1840 to 1850	14
1850 to 1860	14
1860 to 1870	20
1870 to 1880	9
1880 to 1890	9
1890 to 1900	13
1900 to 1910	14
1910 to 1920	12
1920 to 1930	15
1930 to 1940	11
1940 to 1950	10
1950 to 1960	12
1960 to 1970	11
1970 to 1980	8
1980 to 1990	11
1990 to 2000	5
2000 to 2010	8

1490 to 1500	45
1500 to 1510	47
1510 to 1520	51
1520 to 1530	42
1530 to 1540	41
1540 to 1550	47
1550 to 1560	48
1560 to 1570	33
1570 to 1580	34
1580 to 1590	33
1590 to 1600	35
1600 to 1610	42
1610 to 1620	32
1620 to 1630	41
1630 to 1640	46
1640 to 1650	36
1650 to 1660	28
1660 to 1670	37
1670 to 1680	44
1680 to 1690	28
1690 to 1700	30
1700 to 1710	32
1710 to 1720	34
1720 to 1730	27
1730 to 1740	24
1740 to 1750	24
1750 to 1760	22
1760 to 1770	18
1770 to 1780	24
1780 to 1790	29
1790 to 1800	23
1800 to 1810	24
1810 to 1820	23
1820 to 1830	20
1830 to 1840	20
1840 to 1850	13
1850 to 1860	18
1860 to 1870	24
1870 to 1880	13
1880 to 1890	26
1890 to 1900	14
1900 to 1910	16
1910 to 1920	19
1920 to 1930	14
1930 to 1940	7
1940 to 1950	11
1950 to 1960	10
1960 to 1970	9
1970 to 1980	15
1980 to 1990	15
1990 to 2000	8
2000 to 2010	13

2010 to 2020	6
2020 to 2030	4
2030 to 2040	3
2040 to 2050	11
2050 to 2060	7
2060 to 2070	3
2070 to 2080	3
2080 to 2090	2
2090 to 2100	3
2100 to 2110	3
2110 to 2120	3
2120 to 2130	1
2130 to 2140	7
2140 to 2150	3
2150 to 2160	2
2160 to 2170	3
2170 to 2180	6
2180 to 2190	6
2190 to 2200	3
2200 to 2210	4
2210 to 2220	2
2220 to 2230	4
2230 to 2240	4
2240 to 2250	2
2250 to 2260	0
2260 to 2270	3
2270 to 2280	1
2280 to 2290	1
2290 to 2300	2
2300 to 2310	0
2310 to 2320	2
2320 to 2330	1
2330 to 2340	0
2340 to 2350	1
2350 to 2360	1
2360 to 2370	0
2370 to 2380	1
2380 to 2390	0
2390 to 2400	2
2400 to 2410	2
2410 to 2420	0
2420 to 2430	0
2430 to 2440	0
2440 to 2450	2
2450 to 2460	1
2460 to 2470	0
2470 to 2480	0
2480 to 2490	1
2490 to 2500	0
2500 to 2510	1
2510 to 2520	2
2520 to 2530	1

2010 to 2020	14
2020 to 2030	6
2030 to 2040	7
2040 to 2050	6
2050 to 2060	9
2060 to 2070	6
2070 to 2080	6
2080 to 2090	4
2090 to 2100	11
2100 to 2110	5
2110 to 2120	2
2120 to 2130	1
2130 to 2140	3
2140 to 2150	4
2150 to 2160	1
2160 to 2170	3
2170 to 2180	2
2180 to 2190	5
2190 to 2200	4
2200 to 2210	5
2210 to 2220	4
2220 to 2230	2
2230 to 2240	4
2240 to 2250	5
2250 to 2260	3
2260 to 2270	1
2270 to 2280	2
2280 to 2290	4
2290 to 2300	4
2300 to 2310	1
2310 to 2320	0
2320 to 2330	4
2330 to 2340	0
2340 to 2350	1
2350 to 2360	1
2360 to 2370	0
2370 to 2380	2
2380 to 2390	0
2390 to 2400	0
2400 to 2410	1
2410 to 2420	2
2420 to 2430	0
2430 to 2440	1
2440 to 2450	1
2450 to 2460	2
2460 to 2470	1
2470 to 2480	0
2480 to 2490	0
2490 to 2500	0
2500 to 2510	1
2510 to 2520	3
2520 to 2530	0

2530 to 2540	1
2540 to 2550	3
2550 to 2560	0
2560 to 2570	1
2570 to 2580	0
2580 to 2590	1
2590 to 2600	1
2600 to 2610	1
2610 to 2620	0
2620 to 2630	0
2630 to 2640	0
2640 to 2650	1
2650 to 2660	0
2660 to 2670	1
2670 to 2680	0
2680 to 2690	1
2690 to 2700	0
2700 to 2710	1
2710 to 2720	2
2720 to 2730	1
2730 to 2740	0
2740 to 2750	0
2750 to 2760	1
2760 to 2770	0
2770 to 2780	0
2780 to 2790	0
2790 to 2800	0
2800 to 2810	0
2810 to 2820	1
2820 to 2830	0
2830 to 2840	0
2840 to 2850	0
2850 to 2860	0
2860 to 2870	0
2870 to 2880	0
2880 to 2890	0
2890 to 2900	0
2900 to 2910	0
2910 to 2920	0
2920 to 2930	0
2930 to 2940	1
2940 to 2950	2
2950 to 2960	0
2960 to 2970	0
2970 to 2980	0
2980 to 2990	0
2990 to 3000	0
3000 to 3010	0
3010 to 3020	0
3020 to 3030	0
3030 to 3040	0
3040 to 3050	0

2530 to 2540	0
2540 to 2550	0
2550 to 2560	1
2560 to 2570	1
2570 to 2580	0
2580 to 2590	3
2590 to 2600	0
2600 to 2610	1
2610 to 2620	3
2620 to 2630	0
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2640 to 2650	0
2650 to 2660	1
2660 to 2670	0
2670 to 2680	1
2680 to 2690	0
2690 to 2700	0
2700 to 2710	0
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2950 to 2960	0
2960 to 2970	0
2970 to 2980	0
2980 to 2990	0
2990 to 3000	1
3000 to 3010	0
3010 to 3020	1
3020 to 3030	2
3030 to 3040	0
3040 to 3050	0

3050 to 3060	1
3060 to 3070	0
3070 to 3080	1
3080 to 3090	0
3090 to 3100	0
3100 to 3110	1
3110 to 3120	0
3120 to 3130	0
3130 to 3140	0
3140 to 3150	0
3150 to 3160	0
3160 to 3170	0
3170 to 3180	1
3180 to 3190	0
3190 to 3200	0
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3250 to 3260	0
3260 to 3270	0
3270 to 3280	1
3280 to 3290	0
3290 to 3300	0
3300 to 3310	0
3310 to 3320	0
3320 to 3330	1
3330 to 3340	0
3340 to 3350	0
3350 to 3360	0
3360 to 3370	0
3370 to 3380	1
3380 to 3390	0
3390 to 3400	0
3400 to 3410	0
3410 to 3420	1
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3430 to 3440	0
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3450 to 3460	0
3460 to 3470	1
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3490 to 3500	0
3500 to 3510	0
3510 to 3520	0
3520 to 3530	0
3530 to 3540	0
3540 to 3550	0
3550 to 3560	0
3560 to 3570	0

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3060 to 3070	0
3070 to 3080	0
3080 to 3090	0
3090 to 3100	0
3100 to 3110	0
3110 to 3120	0
3120 to 3130	0
3130 to 3140	1
3140 to 3150	0
3150 to 3160	0
3160 to 3170	1
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3180 to 3190	0
3190 to 3200	1
3200 to 3210	0
3210 to 3220	0
3220 to 3230	0
3230 to 3240	0
3240 to 3250	0
3250 to 3260	1
3260 to 3270	0
3270 to 3280	0
3280 to 3290	0
3290 to 3300	0
3300 to 3310	0
3310 to 3320	0
3320 to 3330	0
3330 to 3340	0
3340 to 3350	0
3350 to 3360	0
3360 to 3370	1
3370 to 3380	0
3380 to 3390	0
3390 to 3400	0
3400 to 3410	0
3410 to 3420	2
3420 to 3430	0
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3440 to 3450	0
3450 to 3460	0
3460 to 3470	2
3470 to 3480	0
3480 to 3490	0
3490 to 3500	0
3500 to 3510	0
3510 to 3520	0
3520 to 3530	0
3530 to 3540	0
3540 to 3550	0
3550 to 3560	0
3560 to 3570	0

3570 to 3580	1
3580 to 3590	0
3590 to 3600	0
3600 to 3610	0
3610 to 3620	0
3620 to 3630	0
3630 to 3640	0
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3660 to 3670	0
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3870 to 3880	0
3880 to 3890	1
3890 to 3900	0
3900 to 3910	0
3910 to 3920	1
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3930 to 3940	0
3940 to 3950	0
3950 to 3960	0
3960 to 3970	0
3970 to 3980	0
3980 to 3990	0
3990 to 4000	0
4000 to 4010	0
4010 to 4020	1
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4030 to 4040	0
4040 to 4050	1
4050 to 4060	0
4060 to 4070	0
4070 to 4080	0
4080 to 4090	0

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3580 to 3590	0
3590 to 3600	0
3600 to 3610	0
3610 to 3620	0
3620 to 3630	0
3630 to 3640	0
3640 to 3650	0
3650 to 3660	0
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3860 to 3870	0
3870 to 3880	0
3880 to 3890	1
3890 to 3900	0
3900 to 3910	0
3910 to 3920	1
3920 to 3930	0
3930 to 3940	0
3940 to 3950	0
3950 to 3960	0
3960 to 3970	0
3970 to 3980	0
3980 to 3990	0
3990 to 4000	0
4000 to 4010	0
4010 to 4020	0
4020 to 4030	0
4030 to 4040	0
4040 to 4050	0
4050 to 4060	0
4060 to 4070	0
4070 to 4080	0
4080 to 4090	0

4090 to 4100	0
4100 to 4110	0
4110 to 4120	0
4120 to 4130	0
4130 to 4140	0
4140 to 4150	0
4150 to 4160	0
4160 to 4170	0
4170 to 4180	0
4180 to 4190	0
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4200 to 4210	0
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4240 to 4250	0
4250 to 4260	0
4260 to 4270	0
4270 to 4280	0
4280 to 4290	0
4290 to 4300	0
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4530 to 4540	0
4540 to 4550	0
4550 to 4560	0
4560 to 4570	0
4570 to 4580	0
4580 to 4590	0
4590 to 4600	0
4600 to 4610	0

4090 to 4100	0
4100 to 4110	0
4110 to 4120	1
4120 to 4130	0
4130 to 4140	0
4140 to 4150	1
4150 to 4160	0
4160 to 4170	0
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4550 to 4560	0
4560 to 4570	0
4570 to 4580	0
4580 to 4590	0
4590 to 4600	0
4600 to 4610	0

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4670 to 4680	0
4680 to 4690	0
4690 to 4700	0
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4970 to 4980	0
4980 to 4990	0
4990 to 5000	0
5000 to 5010	0
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5100 to 5110	0
5110 to 5120	0
5120 to 5130	0

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4640 to 4650	0
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4670 to 4680	0
4680 to 4690	0
4690 to 4700	0
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4940 to 4950	1
4950 to 4960	0
4960 to 4970	0
4970 to 4980	0
4980 to 4990	0
4990 to 5000	0
5000 to 5010	0
5010 to 5020	0
5020 to 5030	0
5030 to 5040	0
5040 to 5050	0
5050 to 5060	0
5060 to 5070	0
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5080 to 5090	0
5090 to 5100	0
5100 to 5110	0
5110 to 5120	0
5120 to 5130	0

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5140 to 5150	0
5150 to 5160	0
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5170 to 5180	0
5180 to 5190	0
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5210 to 5220	0
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5230 to 5240	0
5240 to 5250	0
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5260 to 5270	0
5270 to 5280	0
5280 to 5290	0
5290 to 5300	0
5300 to 5310	0
5310 to 5320	0
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5490 to 5500	0
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5570 to 5580	0
5580 to 5590	0
5590 to 5600	0
5600 to 5610	0
5610 to 5620	0
5620 to 5630	0
5630 to 5640	0
5640 to 5650	0

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5140 to 5150	0
5150 to 5160	0
5160 to 5170	0
5170 to 5180	0
5180 to 5190	0
5190 to 5200	0
5200 to 5210	0
5210 to 5220	0
5220 to 5230	0
5230 to 5240	0
5240 to 5250	0
5250 to 5260	1
5260 to 5270	0
5270 to 5280	0
5280 to 5290	0
5290 to 5300	0
5300 to 5310	0
5310 to 5320	0
5320 to 5330	0
5330 to 5340	1
5340 to 5350	0
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5570 to 5580	0
5580 to 5590	0
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5600 to 5610	0
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5620 to 5630	0
5630 to 5640	0
5640 to 5650	0

5650 to 5660	0
5660 to 5670	0
5670 to 5680	0
5680 to 5690	1
5690 to 5700	0
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5920 to 5930	0
5930 to 5940	0
5940 to 5950	0
5950 to 5960	0
5960 to 5970	0
5970 to 5980	0
5980 to 5990	0
5990 to 6000	0
6000 or greater	1

5650 to 5660	0
5660 to 5670	0
5670 to 5680	0
5680 to 5690	0
5690 to 5700	1
5700 to 5710	0
5710 to 5720	0
5720 to 5730	0
5730 to 5740	0
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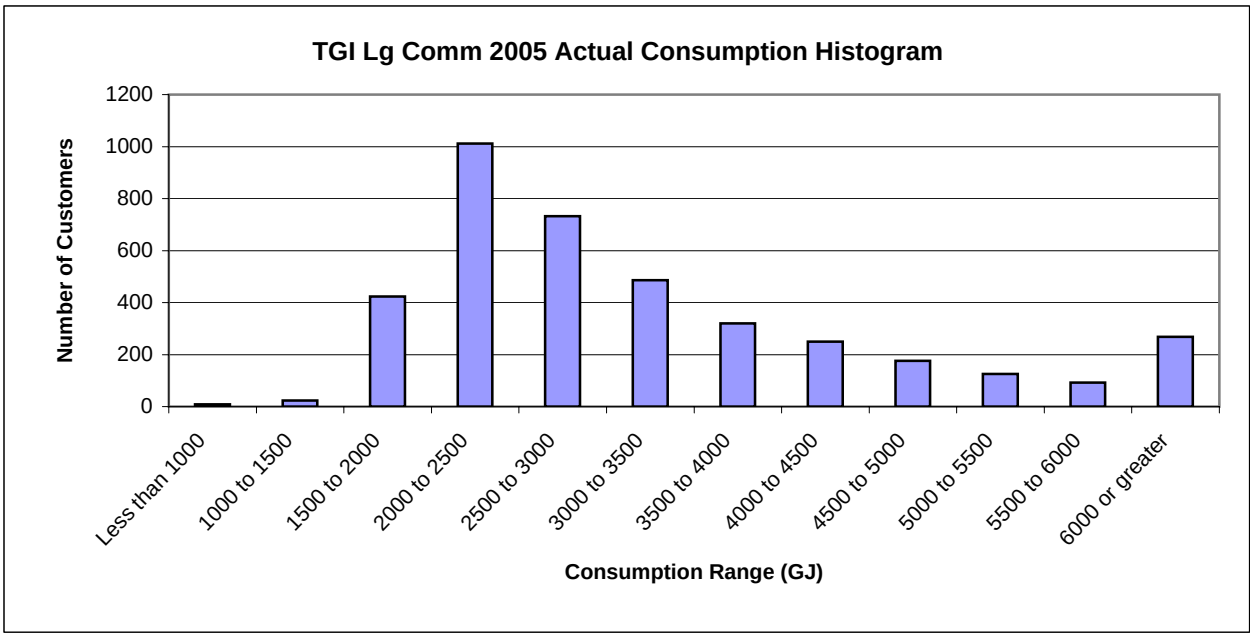
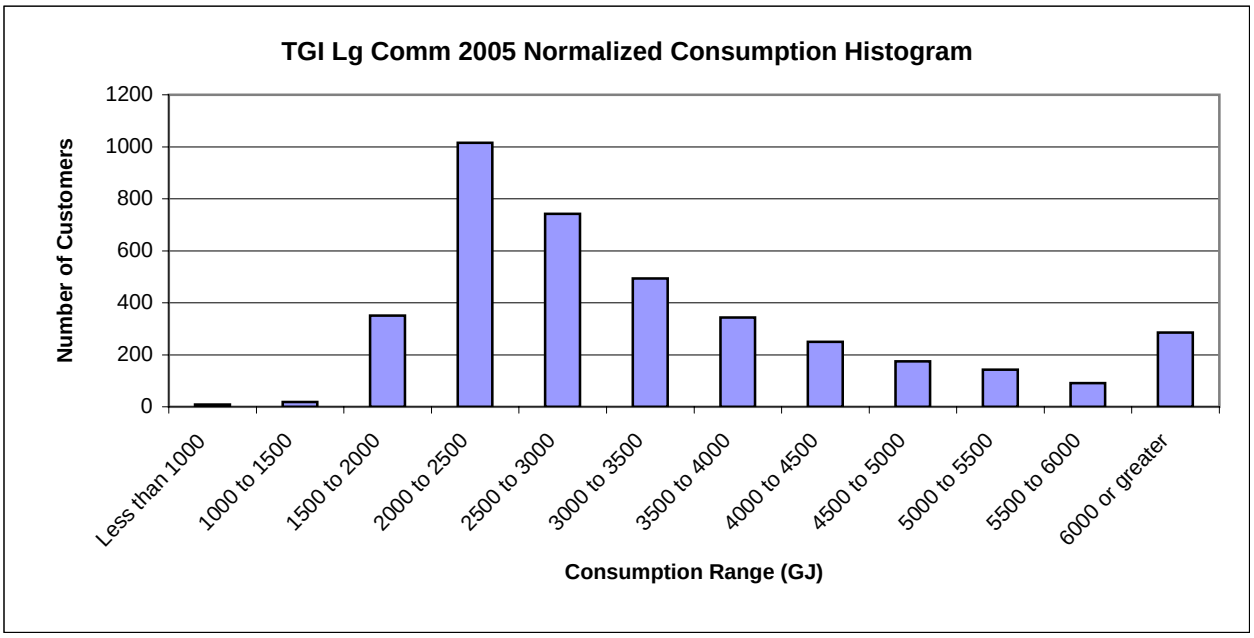
5920 to 5930	0
5930 to 5940	0
5940 to 5950	0
5950 to 5960	0
5960 to 5970	0
5970 to 5980	0
5980 to 5990	0
5990 to 6000	0
6000 or greater	1


TGI Lg Comm 2005 Actual Consumption Histogram
Number of Customers
1200
1000
800
600
400
200
0
Less than 1000
1000 to 1500
1500 to 2000
2000 to 2500
2500 to 3000
3000 to 3500
3500 to 4000
4000 to 4500
4500 to 5000
5000 to 5500
5500 to 6000
6000 or greater
Consumption Range (GJ)


TGI Lg Comm 2005 Normalized Consumption Histogram
Number of Customers
1200
1000
800
600
400
200
0
Less than 1000
1000 to 1500
1500 to 2000
2000 to 2500
2500 to 3000
3000 to 3500
3500 to 4000
4000 to 4500
4500 to 5000
5000 to 5500
5500 to 6000
6000 or greater
Consumption Range (GJ)

TGI Large Commercial = Rate 3 Customers

12 Months consumption is required to be included in this analysis

2005 Actuals - TGI Large Commercial	
Range (GJ)	**Customers**
Less than 10	3
10 to 20	0
20 to 30	1
30 to 40	0
40 to 50	0
50 to 60	0
60 to 70	0
70 to 80	0
80 to 90	0
90 to 100	0
100 to 110	0
110 to 120	0
120 to 130	0
130 to 140	0
140 to 150	0
150 to 160	0
160 to 170	0
170 to 180	0
180 to 190	0
190 to 200	0
200 to 210	0
210 to 220	0
220 to 230	0
230 to 240	0
240 to 250	0
250 to 260	0
260 to 270	0
270 to 280	0
280 to 290	0
290 to 300	0
300 to 310	0
310 to 320	0
320 to 330	0
330 to 340	0
340 to 350	0
350 to 360	0
360 to 370	0
370 to 380	0
380 to 390	0
390 to 400	0
400 to 410	1
410 to 420	0
420 to 430	0
430 to 440	0
440 to 450	0

2005 Normalized TGI Lg Comm	
Range (GJ)	**Customers**
Less than 10	3
10 to 20	0
20 to 30	1
30 to 40	0
40 to 50	0
50 to 60	0
60 to 70	0
70 to 80	0
80 to 90	0
90 to 100	0
100 to 110	0
110 to 120	0
120 to 130	0
130 to 140	0
140 to 150	0
150 to 160	0
160 to 170	0
170 to 180	0
180 to 190	0
190 to 200	0
200 to 210	0
210 to 220	0
220 to 230	0
230 to 240	0
240 to 250	0
250 to 260	0
260 to 270	0
270 to 280	0
280 to 290	0
290 to 300	0
300 to 310	0
310 to 320	0
320 to 330	0
330 to 340	0
340 to 350	0
350 to 360	0
360 to 370	0
370 to 380	0
380 to 390	0
390 to 400	0
400 to 410	0
410 to 420	1
420 to 430	0
430 to 440	0
440 to 450	0

450 to 460	0
460 to 470	0
470 to 480	0
480 to 490	0
490 to 500	0
500 to 510	0
510 to 520	0
520 to 530	0
530 to 540	0
540 to 550	0
550 to 560	0
560 to 570	0
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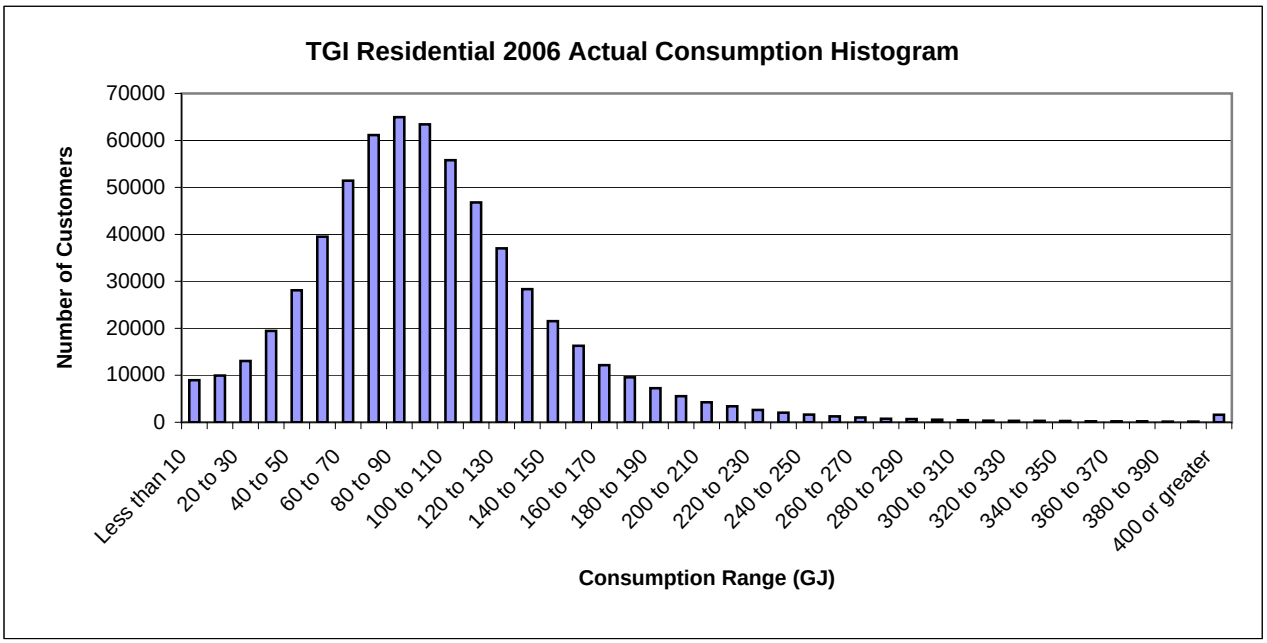
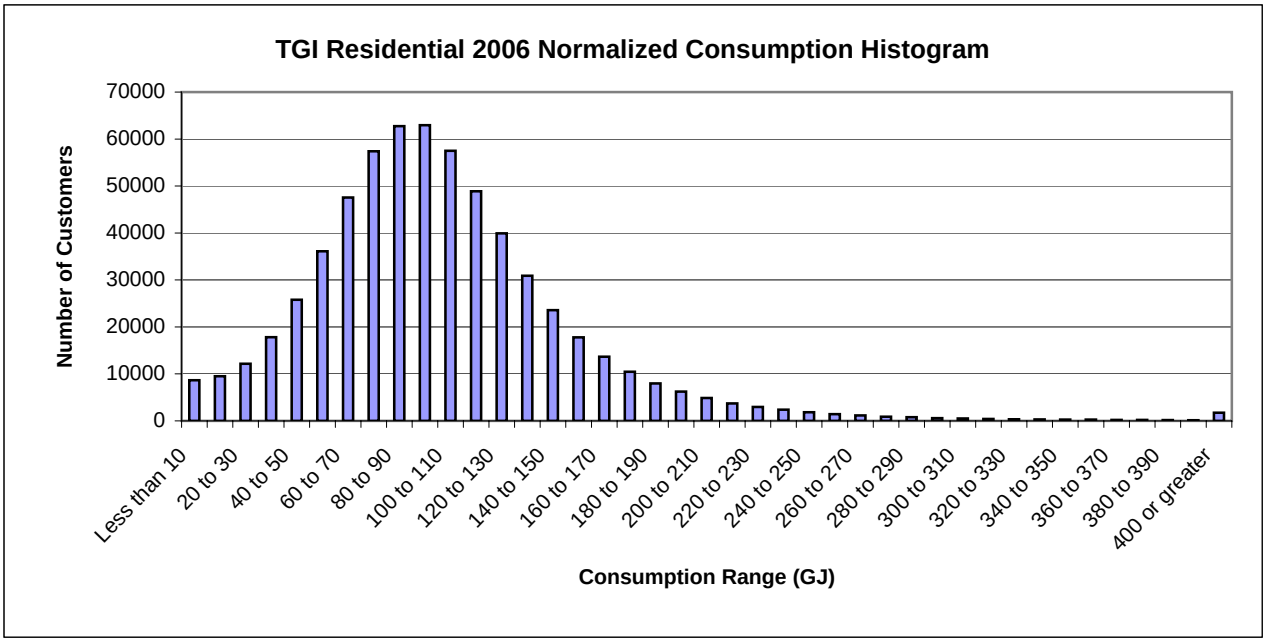
5280 to 5290	1
5290 to 5300	7
5300 to 5310	0
5310 to 5320	2
5320 to 5330	4
5330 to 5340	1
5340 to 5350	1
5350 to 5360	2
5360 to 5370	2
5370 to 5380	2
5380 to 5390	1
5390 to 5400	3
5400 to 5410	1
5410 to 5420	1
5420 to 5430	2
5430 to 5440	2
5440 to 5450	0
5450 to 5460	1
5460 to 5470	0
5470 to 5480	2
5480 to 5490	1
5490 to 5500	2
5500 to 5510	1
5510 to 5520	1
5520 to 5530	1
5530 to 5540	2
5540 to 5550	2
5550 to 5560	2
5560 to 5570	2
5570 to 5580	2
5580 to 5590	3
5590 to 5600	3
5600 to 5610	3
5610 to 5620	1
5620 to 5630	6
5630 to 5640	1
5640 to 5650	4

5130 to 5140	4
5140 to 5150	4
5150 to 5160	1
5160 to 5170	5
5170 to 5180	3
5180 to 5190	4
5190 to 5200	2
5200 to 5210	0
5210 to 5220	3
5220 to 5230	1
5230 to 5240	5
5240 to 5250	3
5250 to 5260	2
5260 to 5270	3
5270 to 5280	2
5280 to 5290	1
5290 to 5300	6
5300 to 5310	1
5310 to 5320	2
5320 to 5330	2
5330 to 5340	1
5340 to 5350	6
5350 to 5360	2
5360 to 5370	6
5370 to 5380	0
5380 to 5390	6
5390 to 5400	1
5400 to 5410	5
5410 to 5420	0
5420 to 5430	2
5430 to 5440	2
5440 to 5450	1
5450 to 5460	2
5460 to 5470	1
5470 to 5480	3
5480 to 5490	1
5490 to 5500	2
5500 to 5510	2
5510 to 5520	3
5520 to 5530	2
5530 to 5540	2
5540 to 5550	1
5550 to 5560	2
5560 to 5570	0
5570 to 5580	2
5580 to 5590	0
5590 to 5600	3
5600 to 5610	2
5610 to 5620	0
5620 to 5630	1
5630 to 5640	1
5640 to 5650	4

5650 to 5660	1
5660 to 5670	2
5670 to 5680	3
5680 to 5690	1
5690 to 5700	1
5700 to 5710	0
5710 to 5720	2
5720 to 5730	4
5730 to 5740	3
5740 to 5750	2
5750 to 5760	1
5760 to 5770	1
5770 to 5780	2
5780 to 5790	2
5790 to 5800	4
5800 to 5810	1
5810 to 5820	1
5820 to 5830	1
5830 to 5840	2
5840 to 5850	1
5850 to 5860	0
5860 to 5870	0
5870 to 5880	1
5880 to 5890	1
5890 to 5900	3
5900 to 5910	0
5910 to 5920	2
5920 to 5930	3
5930 to 5940	1
5940 to 5950	1
5950 to 5960	1
5960 to 5970	4
5970 to 5980	2
5980 to 5990	3
5990 to 6000	1
6000 or greater	268

5650 to 5660	1
5660 to 5670	1
5670 to 5680	3
5680 to 5690	2
5690 to 5700	2
5700 to 5710	5
5710 to 5720	1
5720 to 5730	2
5730 to 5740	2
5740 to 5750	5
5750 to 5760	1
5760 to 5770	4
5770 to 5780	1
5780 to 5790	2
5790 to 5800	2
5800 to 5810	0
5810 to 5820	1
5820 to 5830	0
5830 to 5840	0
5840 to 5850	5
5850 to 5860	2
5860 to 5870	3
5870 to 5880	0
5880 to 5890	2
5890 to 5900	4
5900 to 5910	3
5910 to 5920	3
5920 to 5930	2
5930 to 5940	1
5940 to 5950	0
5950 to 5960	4
5960 to 5970	0
5970 to 5980	1
5980 to 5990	0
5990 to 6000	1
6000 or greater	285


TGI Residential 2006 Actual Consumption Histogram
Number of Customers
70000
60000
50000
40000
30000
20000
10000
0
Less than 10
20 to 30
40 to 50
60 to 70
80 to 90
100 to 110
120 to 130
140 to 150
160 to 170
180 to 190
200 to 210
220 to 230
240 to 250
260 to 270
280 to 290
300 to 310
320 to 330
340 to 350
360 to 370
380 to 390
400 or greater
Consumption Range (GJ)


TGI Residential 2006 Normalized Consumption Histogram
Number of Customers
70000
60000
50000
40000
30000
20000
10000
0
Less than 10
20 to 30
40 to 50
60 to 70
80 to 90
100 to 110
120 to 130
140 to 150
160 to 170
180 to 190
200 to 210
220 to 230
240 to 250
260 to 270
280 to 290
300 to 310
320 to 330
340 to 350
360 to 370
380 to 390
400 or greater
Consumption Range (GJ)

TGI Residential = Rate 1 Customers

12 Months consumption is required to be included in this analysis

2006 Actuals - TGI Residential	
Range (GJ)	**Customers**
Less than 10	8,965
10 to 20	9,962
20 to 30	13,053
30 to 40	19,439
40 to 50	28,112
50 to 60	39,526
60 to 70	51,422
70 to 80	61,128
80 to 90	64,967
90 to 100	63,430
100 to 110	55,796
110 to 120	46,799
120 to 130	37,028
130 to 140	28,344
140 to 150	21,529
150 to 160	16,270
160 to 170	12,147
170 to 180	9,573
180 to 190	7,261
190 to 200	5,564
200 to 210	4,274
210 to 220	3,393
220 to 230	2,639
230 to 240	2,055
240 to 250	1,620
250 to 260	1,253
260 to 270	1,015
270 to 280	756
280 to 290	679
290 to 300	533
300 to 310	436
310 to 320	349
320 to 330	290
330 to 340	294
340 to 350	268
350 to 360	206
360 to 370	215
370 to 380	191
380 to 390	144
390 to 400	126
400 to 410	123
410 to 420	123
420 to 430	104
430 to 440	67

2006 Normalized TGI - Residential	
Range (GJ)	**Customers**
Less than 10	8,646
10 to 20	9,505
20 to 30	12,148
30 to 40	17,801
40 to 50	25,773
50 to 60	36,097
60 to 70	47,564
70 to 80	57,391
80 to 90	62,757
90 to 100	62,965
100 to 110	57,512
110 to 120	48,893
120 to 130	39,925
130 to 140	30,908
140 to 150	23,580
150 to 160	17,793
160 to 170	13,651
170 to 180	10,445
180 to 190	7,960
190 to 200	6,236
200 to 210	4,883
210 to 220	3,709
220 to 230	2,960
230 to 240	2,377
240 to 250	1,831
250 to 260	1,424
260 to 270	1,160
270 to 280	873
280 to 290	776
290 to 300	584
300 to 310	501
310 to 320	402
320 to 330	328
330 to 340	291
340 to 350	277
350 to 360	258
360 to 370	213
370 to 380	208
380 to 390	184
390 to 400	137
400 to 410	119
410 to 420	123
420 to 430	119
430 to 440	103

440 to 450	71
450 to 460	73
460 to 470	83
470 to 480	54
480 to 490	59
490 to 500	43
500 to 510	52
510 to 520	44
520 to 530	37
530 to 540	39
540 to 550	31
550 to 560	34
560 to 570	28
570 to 580	30
580 to 590	19
590 to 600	26
600 to 610	35
610 to 620	21
620 to 630	23
630 to 640	20
640 to 650	20
650 to 660	20
660 to 670	10
670 to 680	16
680 to 690	14
690 to 700	16
700 to 710	14
710 to 720	7
720 to 730	14
730 to 740	6
740 to 750	9
750 to 760	12
760 to 770	11
770 to 780	5
780 to 790	9
790 to 800	9
800 to 810	8
810 to 820	11
820 to 830	6
830 to 840	7
840 to 850	4
850 to 860	4
860 to 870	7
870 to 880	3
880 to 890	4
890 to 900	2
900 to 910	3
910 to 920	6
920 to 930	2
930 to 940	1
940 to 950	3

440 to 450	70
450 to 460	67
460 to 470	75
470 to 480	75
480 to 490	60
490 to 500	56
500 to 510	48
510 to 520	39
520 to 530	52
530 to 540	38
540 to 550	40
550 to 560	32
560 to 570	30
570 to 580	32
580 to 590	28
590 to 600	22
600 to 610	29
610 to 620	29
620 to 630	22
630 to 640	17
640 to 650	22
650 to 660	25
660 to 670	19
670 to 680	15
680 to 690	13
690 to 700	17
700 to 710	11
710 to 720	15
720 to 730	12
730 to 740	7
740 to 750	13
750 to 760	9
760 to 770	9
770 to 780	12
780 to 790	8
790 to 800	7
800 to 810	8
810 to 820	11
820 to 830	7
830 to 840	10
840 to 850	5
850 to 860	8
860 to 870	2
870 to 880	3
880 to 890	8
890 to 900	3
900 to 910	6
910 to 920	2
920 to 930	3
930 to 940	5
940 to 950	2

950 to 960	0
960 to 970	5
970 to 980	3
980 to 990	2
990 to 1000	1
1000 to 1010	2
1010 to 1020	5
1020 to 1030	0
1030 to 1040	2
1040 to 1050	1
1050 to 1060	1
1060 to 1070	2
1070 to 1080	4
1080 to 1090	4
1090 to 1100	2
1100 to 1110	1
1110 to 1120	2
1120 to 1130	2
1130 to 1140	2
1140 to 1150	3
1150 to 1160	0
1160 to 1170	3
1170 to 1180	5
1180 to 1190	0
1190 to 1200	2
1200 to 1210	1
1210 to 1220	1
1220 to 1230	1
1230 to 1240	1
1240 to 1250	1
1250 to 1260	0
1260 to 1270	1
1270 to 1280	2
1280 to 1290	0
1290 to 1300	2
1300 to 1310	0
1310 to 1320	1
1320 to 1330	1
1330 to 1340	0
1340 to 1350	0
1350 to 1360	0
1360 to 1370	1
1370 to 1380	0
1380 to 1390	1
1390 to 1400	2
1400 to 1410	1
1410 to 1420	1
1420 to 1430	1
1430 to 1440	0
1440 to 1450	0
1450 to 1460	1

950 to 960	2
960 to 970	2
970 to 980	1
980 to 990	1
990 to 1000	6
1000 to 1010	2
1010 to 1020	1
1020 to 1030	1
1030 to 1040	5
1040 to 1050	2
1050 to 1060	1
1060 to 1070	2
1070 to 1080	1
1080 to 1090	0
1090 to 1100	6
1100 to 1110	3
1110 to 1120	1
1120 to 1130	3
1130 to 1140	1
1140 to 1150	2
1150 to 1160	1
1160 to 1170	3
1170 to 1180	2
1180 to 1190	1
1190 to 1200	4
1200 to 1210	3
1210 to 1220	1
1220 to 1230	2
1230 to 1240	0
1240 to 1250	1
1250 to 1260	1
1260 to 1270	1
1270 to 1280	1
1280 to 1290	0
1290 to 1300	1
1300 to 1310	2
1310 to 1320	0
1320 to 1330	2
1330 to 1340	0
1340 to 1350	1
1350 to 1360	0
1360 to 1370	1
1370 to 1380	0
1380 to 1390	0
1390 to 1400	0
1400 to 1410	1
1410 to 1420	1
1420 to 1430	2
1430 to 1440	1
1440 to 1450	1
1450 to 1460	1

1460 to 1470	2
1470 to 1480	1
1480 to 1490	1
1490 to 1500	0
1500 to 1510	0
1510 to 1520	0
1520 to 1530	1
1530 to 1540	1
1540 to 1550	0
1550 to 1560	1
1560 to 1570	0
1570 to 1580	0
1580 to 1590	1
1590 to 1600	0
1600 to 1610	1
1610 to 1620	0
1620 to 1630	0
1630 to 1640	0
1640 to 1650	0
1650 to 1660	0
1660 to 1670	1
1670 to 1680	0
1680 to 1690	0
1690 to 1700	0
1700 to 1710	0
1710 to 1720	0
1720 to 1730	0
1730 to 1740	0
1740 to 1750	1
1750 to 1760	0
1760 to 1770	0
1770 to 1780	1
1780 to 1790	1
1790 to 1800	0
1800 to 1810	0
1810 to 1820	0
1820 to 1830	1
1830 to 1840	1
1840 to 1850	0
1850 to 1860	0
1860 to 1870	0
1870 to 1880	0
1880 to 1890	0
1890 to 1900	1
1900 to 1910	0
1910 to 1920	0
1920 to 1930	0
1930 to 1940	0
1940 to 1950	1
1950 to 1960	0
1960 to 1970	0

1460 to 1470	0
1470 to 1480	0
1480 to 1490	1
1490 to 1500	1
1500 to 1510	2
1510 to 1520	0
1520 to 1530	1
1530 to 1540	0
1540 to 1550	0
1550 to 1560	1
1560 to 1570	0
1570 to 1580	1
1580 to 1590	0
1590 to 1600	1
1600 to 1610	0
1610 to 1620	0
1620 to 1630	1
1630 to 1640	1
1640 to 1650	0
1650 to 1660	0
1660 to 1670	0
1670 to 1680	0
1680 to 1690	0
1690 to 1700	0
1700 to 1710	1
1710 to 1720	0
1720 to 1730	0
1730 to 1740	0
1740 to 1750	0
1750 to 1760	0
1760 to 1770	0
1770 to 1780	0
1780 to 1790	1
1790 to 1800	0
1800 to 1810	0
1810 to 1820	1
1820 to 1830	0
1830 to 1840	1
1840 to 1850	0
1850 to 1860	0
1860 to 1870	0
1870 to 1880	2
1880 to 1890	0
1890 to 1900	0
1900 to 1910	0
1910 to 1920	0
1920 to 1930	0
1930 to 1940	1
1940 to 1950	0
1950 to 1960	0
1960 to 1970	0

1970 to 1980	0
1980 to 1990	0
1990 to 2000	0
2000 to 2010	0
2010 to 2020	0
2020 to 2030	0
2030 to 2040	0
2040 to 2050	0
2050 to 2060	0
2060 to 2070	0
2070 to 2080	0
2080 to 2090	0
2090 to 2100	0
2100 to 2110	0
2110 to 2120	0
2120 to 2130	0
2130 to 2140	0
2140 to 2150	0
2150 to 2160	0
2160 to 2170	0
2170 to 2180	0
2180 to 2190	0
2190 to 2200	0
2200 to 2210	0
2210 to 2220	0
2220 to 2230	0
2230 to 2240	0
2240 to 2250	0
2250 to 2260	0
2260 to 2270	1
2270 to 2280	0
2280 to 2290	0
2290 to 2300	0
2300 to 2310	0
2310 to 2320	1
2320 to 2330	0
2330 to 2340	0
2340 to 2350	0
2350 to 2360	1
2360 to 2370	0
2370 to 2380	0
2380 to 2390	0
2390 to 2400	0
2400 to 2410	0
2410 to 2420	0
2420 to 2430	0
2430 to 2440	0
2440 to 2450	1
2450 to 2460	0
2460 to 2470	0
2470 to 2480	1

1970 to 1980	0
1980 to 1990	1
1990 to 2000	0
2000 to 2010	0
2010 to 2020	0
2020 to 2030	0
2030 to 2040	0
2040 to 2050	0
2050 to 2060	0
2060 to 2070	0
2070 to 2080	0
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2110 to 2120	0
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2140 to 2150	0
2150 to 2160	0
2160 to 2170	0
2170 to 2180	0
2180 to 2190	0
2190 to 2200	0
2200 to 2210	0
2210 to 2220	0
2220 to 2230	0
2230 to 2240	0
2240 to 2250	0
2250 to 2260	0
2260 to 2270	0
2270 to 2280	0
2280 to 2290	0
2290 to 2300	0
2300 to 2310	0
2310 to 2320	0
2320 to 2330	1
2330 to 2340	0
2340 to 2350	0
2350 to 2360	0
2360 to 2370	1
2370 to 2380	0
2380 to 2390	0
2390 to 2400	0
2400 to 2410	0
2410 to 2420	1
2420 to 2430	0
2430 to 2440	0
2440 to 2450	0
2450 to 2460	0
2460 to 2470	0
2470 to 2480	0

2480 to 2490	0
2490 to 2500	0
2500 to 2510	0
2510 to 2520	0
2520 to 2530	1
2530 to 2540	0
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2550 to 2560	0
2560 to 2570	0
2570 to 2580	0
2580 to 2590	0
2590 to 2600	0
2600 to 2610	0
2610 to 2620	0
2620 to 2630	0
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2650 to 2660	0
2660 to 2670	0
2670 to 2680	0
2680 to 2690	0
2690 to 2700	0
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2750 to 2760	0
2760 to 2770	0
2770 to 2780	0
2780 to 2790	0
2790 to 2800	0
2800 to 2810	0
2810 to 2820	0
2820 to 2830	0
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2930 to 2940	0
2940 to 2950	0
2950 to 2960	0
2960 to 2970	0
2970 to 2980	0
2980 to 2990	0

2480 to 2490	0
2490 to 2500	0
2500 to 2510	1
2510 to 2520	0
2520 to 2530	1
2530 to 2540	0
2540 to 2550	0
2550 to 2560	0
2560 to 2570	0
2570 to 2580	0
2580 to 2590	1
2590 to 2600	0
2600 to 2610	1
2610 to 2620	0
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2650 to 2660	0
2660 to 2670	0
2670 to 2680	0
2680 to 2690	0
2690 to 2700	0
2700 to 2710	0
2710 to 2720	0
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2730 to 2740	0
2740 to 2750	0
2750 to 2760	0
2760 to 2770	0
2770 to 2780	1
2780 to 2790	0
2790 to 2800	0
2800 to 2810	0
2810 to 2820	0
2820 to 2830	0
2830 to 2840	0
2840 to 2850	0
2850 to 2860	0
2860 to 2870	0
2870 to 2880	0
2880 to 2890	0
2890 to 2900	0
2900 to 2910	0
2910 to 2920	0
2920 to 2930	0
2930 to 2940	0
2940 to 2950	0
2950 to 2960	0
2960 to 2970	0
2970 to 2980	0
2980 to 2990	0

2990 to 3000	0
3000 to 3010	0
3010 to 3020	0
3020 to 3030	0
3030 to 3040	0
3040 to 3050	0
3050 to 3060	0
3060 to 3070	0
3070 to 3080	0
3080 to 3090	0
3090 to 3100	0
3100 to 3110	0
3110 to 3120	0
3120 to 3130	0
3130 to 3140	0
3140 to 3150	0
3150 to 3160	0
3160 to 3170	0
3170 to 3180	0
3180 to 3190	0
3190 to 3200	0
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3230 to 3240	0
3240 to 3250	0
3250 to 3260	0
3260 to 3270	0
3270 to 3280	0
3280 to 3290	0
3290 to 3300	0
3300 to 3310	0
3310 to 3320	0
3320 to 3330	0
3330 to 3340	0
3340 to 3350	0
3350 to 3360	0
3360 to 3370	0
3370 to 3380	0
3380 to 3390	0
3390 to 3400	0
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3420 to 3430	0
3430 to 3440	0
3440 to 3450	0
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3480 to 3490	0
3490 to 3500	0

2990 to 3000	0
3000 to 3010	0
3010 to 3020	0
3020 to 3030	0
3030 to 3040	0
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3420 to 3430	0
3430 to 3440	0
3440 to 3450	0
3450 to 3460	0
3460 to 3470	0
3470 to 3480	0
3480 to 3490	0
3490 to 3500	0

3500 to 3510	0
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3550 to 3560	0
3560 to 3570	0
3570 to 3580	0
3580 to 3590	0
3590 to 3600	0
3600 to 3610	0
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3990 to 4000	0
4000 to 4010	0

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4990 to 5000	0
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4990 to 5000	0
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5490 to 5500	0
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5530 to 5540	0

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5990 to 6000	0
6000 or greater	0

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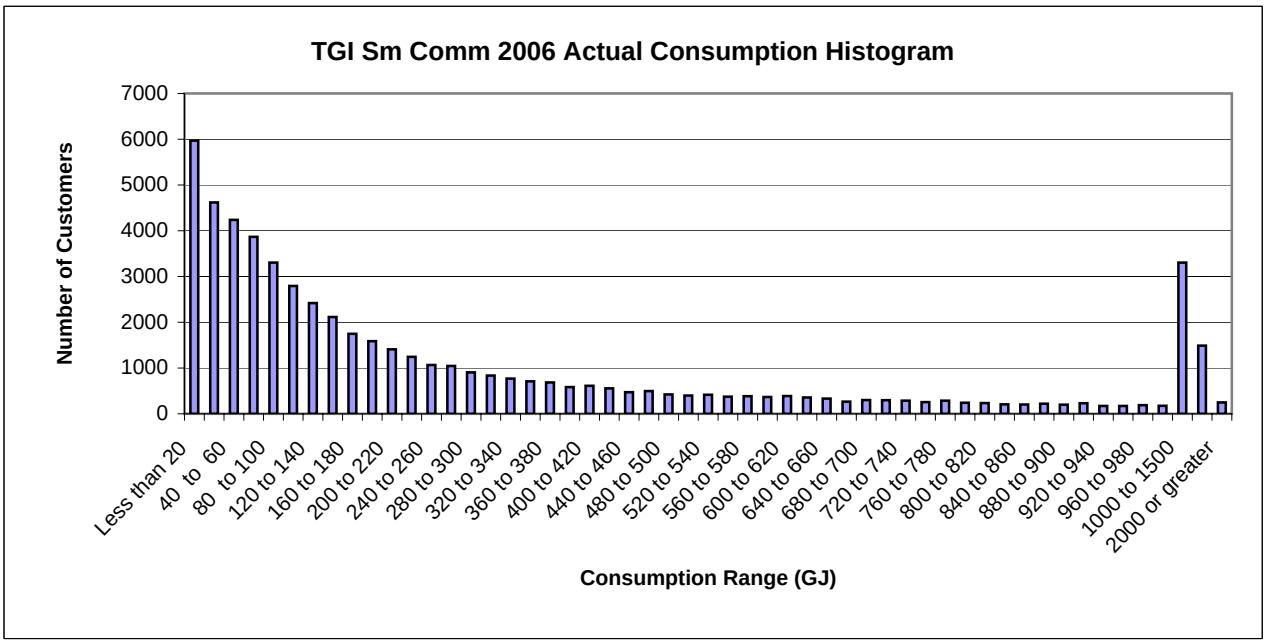
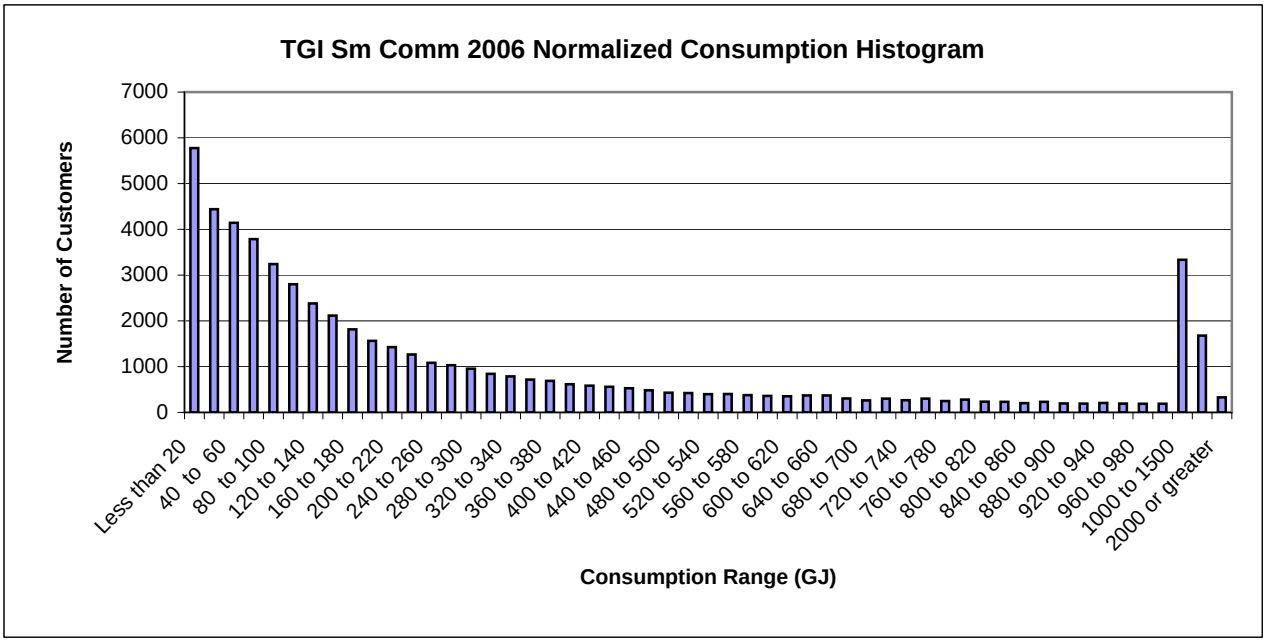
5960 to 5970	0
5970 to 5980	0
5980 to 5990	0
5990 to 6000	0
6000 or greater	0


TGI Sm Comm 2006 Actual Consumption Histogram
Number of Customers
7000
6000
5000
4000
3000
2000
1000
0
Less than 20
40 to 60
80 to 100
120 to 140
160 to 180
200 to 220
240 to 260
280 to 300
320 to 340
360 to 380
400 to 420
440 to 460
480 to 500
520 to 540
560 to 580
600 to 620
640 to 660
680 to 700
720 to 740
760 to 780
800 to 820
840 to 860
880 to 900
920 to 940
960 to 980
1000 to 1500
2000 or greater
Consumption Range (GJ)


TGI Sm Comm 2006 Normalized Consumption Histogram
Number of Customers
7000
6000
5000
4000
3000
2000
1000
0
Less than 20
40 to 60
80 to 100
120 to 140
160 to 180
200 to 220
240 to 260
280 to 300
320 to 340
360 to 380
400 to 420
440 to 460
480 to 500
520 to 540
560 to 580
600 to 620
640 to 660
680 to 700
720 to 740
760 to 780
800 to 820
840 to 860
880 to 900
920 to 940
960 to 980
1000 to 1500
2000 or greater
Consumption Range (GJ)

TGI Small Commercial = Rate 2 Customers

12 Months consumption is required to be included in this analysis

2006 Actuals - TGI Small Commercial	
Range (GJ)	**Customers**
Less than 10	3,638
10 to 20	2,331
20 to 30	2,354
30 to 40	2,266
40 to 50	2,162
50 to 60	2,077
60 to 70	1,997
70 to 80	1,871
80 to 90	1,715
90 to 100	1,589
100 to 110	1,443
110 to 120	1,350
120 to 130	1,262
130 to 140	1,158
140 to 150	1,056
150 to 160	1,061
160 to 170	910
170 to 180	837
180 to 190	838
190 to 200	751
200 to 210	736
210 to 220	674
220 to 230	611
230 to 240	635
240 to 250	512
250 to 260	554
260 to 270	544
270 to 280	500
280 to 290	462
290 to 300	442
300 to 310	437
310 to 320	399
320 to 330	385
330 to 340	384
340 to 350	355
350 to 360	354
360 to 370	354
370 to 380	330
380 to 390	300
390 to 400	285
400 to 410	320
410 to 420	292
420 to 430	280
430 to 440	277

2006 Normalized TGI Sm Comm	
Range (GJ)	**Customers**
Less than 10	3,557
10 to 20	2,220
20 to 30	2,281
30 to 40	2,161
40 to 50	2,101
50 to 60	2,041
60 to 70	1,904
70 to 80	1,882
80 to 90	1,664
90 to 100	1,576
100 to 110	1,459
110 to 120	1,343
120 to 130	1,245
130 to 140	1,135
140 to 150	1,102
150 to 160	1,012
160 to 170	992
170 to 180	823
180 to 190	812
190 to 200	750
200 to 210	735
210 to 220	692
220 to 230	664
230 to 240	601
240 to 250	567
250 to 260	516
260 to 270	524
270 to 280	507
280 to 290	517
290 to 300	436
300 to 310	440
310 to 320	404
320 to 330	401
330 to 340	386
340 to 350	387
350 to 360	331
360 to 370	336
370 to 380	352
380 to 390	335
390 to 400	281
400 to 410	279
410 to 420	306
420 to 430	275
430 to 440	285

440 to 450	252
450 to 460	219
460 to 470	258
470 to 480	237
480 to 490	214
490 to 500	209
500 to 510	197
510 to 520	201
520 to 530	207
530 to 540	210
540 to 550	196
550 to 560	179
560 to 570	207
570 to 580	178
580 to 590	192
590 to 600	175
600 to 610	192
610 to 620	196
620 to 630	198
630 to 640	158
640 to 650	171
650 to 660	162
660 to 670	121
670 to 680	145
680 to 690	140
690 to 700	161
700 to 710	156
710 to 720	141
720 to 730	149
730 to 740	138
740 to 750	133
750 to 760	123
760 to 770	134
770 to 780	151
780 to 790	119
790 to 800	123
800 to 810	112
810 to 820	124
820 to 830	104
830 to 840	104
840 to 850	107
850 to 860	95
860 to 870	106
870 to 880	115
880 to 890	104
890 to 900	94
900 to 910	108
910 to 920	123
920 to 930	92
930 to 940	81
940 to 950	93

440 to 450	287
450 to 460	241
460 to 470	219
470 to 480	262
480 to 490	237
490 to 500	194
500 to 510	223
510 to 520	199
520 to 530	209
530 to 540	188
540 to 550	187
550 to 560	214
560 to 570	183
570 to 580	193
580 to 590	181
590 to 600	179
600 to 610	190
610 to 620	163
620 to 630	181
630 to 640	191
640 to 650	201
650 to 660	171
660 to 670	168
670 to 680	137
680 to 690	129
690 to 700	134
700 to 710	147
710 to 720	153
720 to 730	142
730 to 740	123
740 to 750	161
750 to 760	139
760 to 770	126
770 to 780	121
780 to 790	144
790 to 800	136
800 to 810	121
810 to 820	114
820 to 830	112
830 to 840	118
840 to 850	112
850 to 860	91
860 to 870	121
870 to 880	110
880 to 890	101
890 to 900	96
900 to 910	101
910 to 920	92
920 to 930	95
930 to 940	111
940 to 950	102

950 to 960	77
960 to 970	99
970 to 980	89
980 to 990	88
990 to 1000	88
1000 to 1010	87
1010 to 1020	76
1020 to 1030	75
1030 to 1040	73
1040 to 1050	78
1050 to 1060	86
1060 to 1070	73
1070 to 1080	85
1080 to 1090	77
1090 to 1100	86
1100 to 1110	71
1110 to 1120	76
1120 to 1130	82
1130 to 1140	84
1140 to 1150	75
1150 to 1160	64
1160 to 1170	62
1170 to 1180	72
1180 to 1190	81
1190 to 1200	54
1200 to 1210	50
1210 to 1220	80
1220 to 1230	82
1230 to 1240	76
1240 to 1250	77
1250 to 1260	61
1260 to 1270	63
1270 to 1280	71
1280 to 1290	65
1290 to 1300	59
1300 to 1310	56
1310 to 1320	61
1320 to 1330	54
1330 to 1340	63
1340 to 1350	48
1350 to 1360	68
1360 to 1370	71
1370 to 1380	61
1380 to 1390	50
1390 to 1400	50
1400 to 1410	59
1410 to 1420	46
1420 to 1430	58
1430 to 1440	54
1440 to 1450	55
1450 to 1460	44

950 to 960	89
960 to 970	92
970 to 980	97
980 to 990	86
990 to 1000	102
1000 to 1010	91
1010 to 1020	76
1020 to 1030	84
1030 to 1040	79
1040 to 1050	76
1050 to 1060	75
1060 to 1070	66
1070 to 1080	80
1080 to 1090	78
1090 to 1100	75
1100 to 1110	83
1110 to 1120	74
1120 to 1130	79
1130 to 1140	69
1140 to 1150	79
1150 to 1160	66
1160 to 1170	82
1170 to 1180	76
1180 to 1190	70
1190 to 1200	56
1200 to 1210	83
1210 to 1220	64
1220 to 1230	73
1230 to 1240	51
1240 to 1250	53
1250 to 1260	85
1260 to 1270	76
1270 to 1280	67
1280 to 1290	74
1290 to 1300	51
1300 to 1310	73
1310 to 1320	80
1320 to 1330	57
1330 to 1340	55
1340 to 1350	59
1350 to 1360	61
1360 to 1370	53
1370 to 1380	52
1380 to 1390	49
1390 to 1400	71
1400 to 1410	64
1410 to 1420	50
1420 to 1430	47
1430 to 1440	52
1440 to 1450	59
1450 to 1460	53

1460 to 1470	54
1470 to 1480	39
1480 to 1490	60
1490 to 1500	53
1500 to 1510	58
1510 to 1520	39
1520 to 1530	44
1530 to 1540	37
1540 to 1550	48
1550 to 1560	35
1560 to 1570	44
1570 to 1580	50
1580 to 1590	46
1590 to 1600	36
1600 to 1610	40
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1620 to 1630	39
1630 to 1640	38
1640 to 1650	39
1650 to 1660	43
1660 to 1670	30
1670 to 1680	43
1680 to 1690	36
1690 to 1700	40
1700 to 1710	31
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1720 to 1730	30
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1740 to 1750	27
1750 to 1760	30
1760 to 1770	42
1770 to 1780	31
1780 to 1790	24
1790 to 1800	30
1800 to 1810	23
1810 to 1820	23
1820 to 1830	25
1830 to 1840	26
1840 to 1850	21
1850 to 1860	20
1860 to 1870	28
1870 to 1880	24
1880 to 1890	19
1890 to 1900	16
1900 to 1910	17
1910 to 1920	22
1920 to 1930	10
1930 to 1940	10
1940 to 1950	14
1950 to 1960	11
1960 to 1970	13

1460 to 1470	58
1470 to 1480	65
1480 to 1490	48
1490 to 1500	40
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1540 to 1550	63
1550 to 1560	41
1560 to 1570	47
1570 to 1580	37
1580 to 1590	43
1590 to 1600	28
1600 to 1610	40
1610 to 1620	47
1620 to 1630	47
1630 to 1640	42
1640 to 1650	32
1650 to 1660	39
1660 to 1670	50
1670 to 1680	40
1680 to 1690	43
1690 to 1700	53
1700 to 1710	35
1710 to 1720	37
1720 to 1730	37
1730 to 1740	38
1740 to 1750	28
1750 to 1760	30
1760 to 1770	32
1770 to 1780	28
1780 to 1790	33
1790 to 1800	30
1800 to 1810	39
1810 to 1820	41
1820 to 1830	38
1830 to 1840	23
1840 to 1850	31
1850 to 1860	20
1860 to 1870	24
1870 to 1880	25
1880 to 1890	25
1890 to 1900	21
1900 to 1910	17
1910 to 1920	25
1920 to 1930	26
1930 to 1940	20
1940 to 1950	16
1950 to 1960	18
1960 to 1970	17

1970 to 1980	11
1980 to 1990	12
1990 to 2000	6
2000 to 2010	10
2010 to 2020	15
2020 to 2030	9
2030 to 2040	5
2040 to 2050	12
2050 to 2060	7
2060 to 2070	7
2070 to 2080	11
2080 to 2090	6
2090 to 2100	4
2100 to 2110	8
2110 to 2120	3
2120 to 2130	4
2130 to 2140	6
2140 to 2150	2
2150 to 2160	0
2160 to 2170	5
2170 to 2180	5
2180 to 2190	2
2190 to 2200	5
2200 to 2210	2
2210 to 2220	1
2220 to 2230	7
2230 to 2240	4
2240 to 2250	3
2250 to 2260	2
2260 to 2270	2
2270 to 2280	5
2280 to 2290	2
2290 to 2300	0
2300 to 2310	2
2310 to 2320	1
2320 to 2330	0
2330 to 2340	6
2340 to 2350	1
2350 to 2360	1
2360 to 2370	2
2370 to 2380	2
2380 to 2390	4
2390 to 2400	2
2400 to 2410	1
2410 to 2420	0
2420 to 2430	0
2430 to 2440	1
2440 to 2450	0
2450 to 2460	1
2460 to 2470	0
2470 to 2480	0

1970 to 1980	15
1980 to 1990	15
1990 to 2000	12
2000 to 2010	12
2010 to 2020	12
2020 to 2030	18
2030 to 2040	7
2040 to 2050	14
2050 to 2060	6
2060 to 2070	11
2070 to 2080	15
2080 to 2090	9
2090 to 2100	3
2100 to 2110	9
2110 to 2120	9
2120 to 2130	6
2130 to 2140	12
2140 to 2150	7
2150 to 2160	5
2160 to 2170	8
2170 to 2180	5
2180 to 2190	9
2190 to 2200	6
2200 to 2210	1
2210 to 2220	3
2220 to 2230	4
2230 to 2240	5
2240 to 2250	3
2250 to 2260	5
2260 to 2270	2
2270 to 2280	1
2280 to 2290	5
2290 to 2300	3
2300 to 2310	3
2310 to 2320	4
2320 to 2330	1
2330 to 2340	5
2340 to 2350	2
2350 to 2360	0
2360 to 2370	1
2370 to 2380	2
2380 to 2390	0
2390 to 2400	1
2400 to 2410	4
2410 to 2420	2
2420 to 2430	0
2430 to 2440	3
2440 to 2450	2
2450 to 2460	3
2460 to 2470	5
2470 to 2480	0

2480 to 2490	2
2490 to 2500	1
2500 to 2510	0
2510 to 2520	0
2520 to 2530	1
2530 to 2540	2
2540 to 2550	1
2550 to 2560	0
2560 to 2570	1
2570 to 2580	1
2580 to 2590	1
2590 to 2600	0
2600 to 2610	0
2610 to 2620	1
2620 to 2630	0
2630 to 2640	2
2640 to 2650	0
2650 to 2660	1
2660 to 2670	0
2670 to 2680	0
2680 to 2690	0
2690 to 2700	0
2700 to 2710	1
2710 to 2720	0
2720 to 2730	3
2730 to 2740	0
2740 to 2750	1
2750 to 2760	0
2760 to 2770	1
2770 to 2780	0
2780 to 2790	0
2790 to 2800	0
2800 to 2810	0
2810 to 2820	1
2820 to 2830	0
2830 to 2840	1
2840 to 2850	3
2850 to 2860	0
2860 to 2870	0
2870 to 2880	1
2880 to 2890	0
2890 to 2900	1
2900 to 2910	0
2910 to 2920	0
2920 to 2930	0
2930 to 2940	2
2940 to 2950	1
2950 to 2960	0
2960 to 2970	1
2970 to 2980	0
2980 to 2990	0

2480 to 2490	1
2490 to 2500	0
2500 to 2510	1
2510 to 2520	0
2520 to 2530	0
2530 to 2540	0
2540 to 2550	1
2550 to 2560	1
2560 to 2570	2
2570 to 2580	0
2580 to 2590	0
2590 to 2600	1
2600 to 2610	0
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2630 to 2640	1
2640 to 2650	1
2650 to 2660	1
2660 to 2670	0
2670 to 2680	0
2680 to 2690	0
2690 to 2700	0
2700 to 2710	2
2710 to 2720	1
2720 to 2730	1
2730 to 2740	0
2740 to 2750	0
2750 to 2760	0
2760 to 2770	0
2770 to 2780	1
2780 to 2790	1
2790 to 2800	0
2800 to 2810	2
2810 to 2820	0
2820 to 2830	1
2830 to 2840	0
2840 to 2850	1
2850 to 2860	0
2860 to 2870	0
2870 to 2880	0
2880 to 2890	0
2890 to 2900	1
2900 to 2910	1
2910 to 2920	1
2920 to 2930	2
2930 to 2940	0
2940 to 2950	1
2950 to 2960	0
2960 to 2970	0
2970 to 2980	1
2980 to 2990	0

2990 to 3000	2
3000 to 3010	0
3010 to 3020	0
3020 to 3030	0
3030 to 3040	0
3040 to 3050	1
3050 to 3060	1
3060 to 3070	0
3070 to 3080	0
3080 to 3090	1
3090 to 3100	1
3100 to 3110	0
3110 to 3120	0
3120 to 3130	1
3130 to 3140	0
3140 to 3150	0
3150 to 3160	0
3160 to 3170	0
3170 to 3180	0
3180 to 3190	1
3190 to 3200	0
3200 to 3210	0
3210 to 3220	0
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3230 to 3240	0
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3250 to 3260	1
3260 to 3270	0
3270 to 3280	0
3280 to 3290	0
3290 to 3300	0
3300 to 3310	1
3310 to 3320	0
3320 to 3330	0
3330 to 3340	2
3340 to 3350	1
3350 to 3360	0
3360 to 3370	0
3370 to 3380	0
3380 to 3390	0
3390 to 3400	0
3400 to 3410	0
3410 to 3420	0
3420 to 3430	0
3430 to 3440	0
3440 to 3450	0
3450 to 3460	1
3460 to 3470	0
3470 to 3480	1
3480 to 3490	0
3490 to 3500	0

2990 to 3000	0
3000 to 3010	0
3010 to 3020	0
3020 to 3030	3
3030 to 3040	0
3040 to 3050	1
3050 to 3060	0
3060 to 3070	0
3070 to 3080	1
3080 to 3090	2
3090 to 3100	0
3100 to 3110	0
3110 to 3120	0
3120 to 3130	0
3130 to 3140	1
3140 to 3150	1
3150 to 3160	0
3160 to 3170	1
3170 to 3180	0
3180 to 3190	1
3190 to 3200	0
3200 to 3210	0
3210 to 3220	1
3220 to 3230	0
3230 to 3240	0
3240 to 3250	0
3250 to 3260	0
3260 to 3270	0
3270 to 3280	0
3280 to 3290	0
3290 to 3300	0
3300 to 3310	0
3310 to 3320	0
3320 to 3330	0
3330 to 3340	0
3340 to 3350	1
3350 to 3360	0
3360 to 3370	0
3370 to 3380	0
3380 to 3390	0
3390 to 3400	1
3400 to 3410	1
3410 to 3420	0
3420 to 3430	2
3430 to 3440	0
3440 to 3450	0
3450 to 3460	0
3460 to 3470	1
3470 to 3480	0
3480 to 3490	0
3490 to 3500	0

3500 to 3510	0
3510 to 3520	1
3520 to 3530	1
3530 to 3540	0
3540 to 3550	0
3550 to 3560	0
3560 to 3570	0
3570 to 3580	0
3580 to 3590	0
3590 to 3600	1
3600 to 3610	1
3610 to 3620	0
3620 to 3630	0
3630 to 3640	0
3640 to 3650	0
3650 to 3660	0
3660 to 3670	0
3670 to 3680	0
3680 to 3690	0
3690 to 3700	0
3700 to 3710	0
3710 to 3720	0
3720 to 3730	0
3730 to 3740	2
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3750 to 3760	0
3760 to 3770	0
3770 to 3780	0
3780 to 3790	0
3790 to 3800	0
3800 to 3810	1
3810 to 3820	0
3820 to 3830	0
3830 to 3840	0
3840 to 3850	0
3850 to 3860	0
3860 to 3870	0
3870 to 3880	0
3880 to 3890	1
3890 to 3900	0
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3920 to 3930	0
3930 to 3940	0
3940 to 3950	0
3950 to 3960	0
3960 to 3970	0
3970 to 3980	1
3980 to 3990	0
3990 to 4000	0
4000 to 4010	0

3500 to 3510	0
3510 to 3520	0
3520 to 3530	0
3530 to 3540	0
3540 to 3550	0
3550 to 3560	1
3560 to 3570	0
3570 to 3580	1
3580 to 3590	0
3590 to 3600	0
3600 to 3610	0
3610 to 3620	1
3620 to 3630	1
3630 to 3640	0
3640 to 3650	0
3650 to 3660	0
3660 to 3670	0
3670 to 3680	0
3680 to 3690	0
3690 to 3700	1
3700 to 3710	1
3710 to 3720	0
3720 to 3730	0
3730 to 3740	0
3740 to 3750	0
3750 to 3760	0
3760 to 3770	0
3770 to 3780	0
3780 to 3790	0
3790 to 3800	0
3800 to 3810	0
3810 to 3820	0
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3870 to 3880	0
3880 to 3890	0
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3900 to 3910	0
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3930 to 3940	0
3940 to 3950	0
3950 to 3960	0
3960 to 3970	0
3970 to 3980	0
3980 to 3990	0
3990 to 4000	1
4000 to 4010	0

4010 to 4020	0
4020 to 4030	0
4030 to 4040	0
4040 to 4050	0
4050 to 4060	1
4060 to 4070	0
4070 to 4080	0
4080 to 4090	0
4090 to 4100	0
4100 to 4110	0
4110 to 4120	0
4120 to 4130	1
4130 to 4140	0
4140 to 4150	0
4150 to 4160	0
4160 to 4170	0
4170 to 4180	0
4180 to 4190	0
4190 to 4200	0
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4320 to 4330	0
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4350 to 4360	0
4360 to 4370	0
4370 to 4380	1
4380 to 4390	0
4390 to 4400	0
4400 to 4410	0
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4440 to 4450	0
4450 to 4460	0
4460 to 4470	0
4470 to 4480	0
4480 to 4490	0
4490 to 4500	0
4500 to 4510	0
4510 to 4520	0

4010 to 4020	0
4020 to 4030	0
4030 to 4040	0
4040 to 4050	0
4050 to 4060	0
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4070 to 4080	0
4080 to 4090	1
4090 to 4100	0
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4110 to 4120	0
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4130 to 4140	0
4140 to 4150	0
4150 to 4160	0
4160 to 4170	0
4170 to 4180	0
4180 to 4190	0
4190 to 4200	0
4200 to 4210	0
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4240 to 4250	0
4250 to 4260	0
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4370 to 4380	0
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4400 to 4410	1
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4440 to 4450	0
4450 to 4460	1
4460 to 4470	0
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4480 to 4490	0
4490 to 4500	0
4500 to 4510	0
4510 to 4520	0

4520 to 4530	1			4520 to 4530	0
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4540 to 4550	0			4540 to 4550	0
4550 to 4560	0			4550 to 4560	0
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4580 to 4590	0			4580 to 4590	0
4590 to 4600	0			4590 to 4600	0
4600 to 4610	0			4600 to 4610	0
4610 to 4620	0			4610 to 4620	0
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4630 to 4640	0			4630 to 4640	0
4640 to 4650	1			4640 to 4650	0
4650 to 4660	0			4650 to 4660	1
4660 to 4670	0			4660 to 4670	0
4670 to 4680	0			4670 to 4680	1
4680 to 4690	0			4680 to 4690	0
4690 to 4700	0			4690 to 4700	0
4700 to 4710	0			4700 to 4710	0
4710 to 4720	0			4710 to 4720	0
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4770 to 4780	0			4770 to 4780	1
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4860 to 4870	0			4860 to 4870	1
4870 to 4880	0			4870 to 4880	1
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4980 to 4990	0			4980 to 4990	0
4990 to 5000	0			4990 to 5000	0
5000 to 5010	0			5000 to 5010	0
5010 to 5020	0			5010 to 5020	0
5020 to 5030	0			5020 to 5030	0

5030 to 5040	0
5040 to 5050	0
5050 to 5060	0
5060 to 5070	0
5070 to 5080	0
5080 to 5090	0
5090 to 5100	0
5100 to 5110	0
5110 to 5120	0
5120 to 5130	0
5130 to 5140	0
5140 to 5150	0
5150 to 5160	0
5160 to 5170	0
5170 to 5180	0
5180 to 5190	0
5190 to 5200	0
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5240 to 5250	0
5250 to 5260	0
5260 to 5270	0
5270 to 5280	0
5280 to 5290	0
5290 to 5300	0
5300 to 5310	0
5310 to 5320	0
5320 to 5330	0
5330 to 5340	0
5340 to 5350	0
5350 to 5360	0
5360 to 5370	0
5370 to 5380	1
5380 to 5390	0
5390 to 5400	0
5400 to 5410	0
5410 to 5420	0
5420 to 5430	0
5430 to 5440	0
5440 to 5450	0
5450 to 5460	0
5460 to 5470	0
5470 to 5480	0
5480 to 5490	0
5490 to 5500	0
5500 to 5510	0
5510 to 5520	0
5520 to 5530	0
5530 to 5540	0

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5040 to 5050	0
5050 to 5060	0
5060 to 5070	0
5070 to 5080	0
5080 to 5090	0
5090 to 5100	0
5100 to 5110	0
5110 to 5120	0
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5460 to 5470	0
5470 to 5480	0
5480 to 5490	0
5490 to 5500	0
5500 to 5510	0
5510 to 5520	0
5520 to 5530	0
5530 to 5540	0

5540 to 5550	1
5550 to 5560	0
5560 to 5570	0
5570 to 5580	0
5580 to 5590	0
5590 to 5600	0
5600 to 5610	1
5610 to 5620	0
5620 to 5630	0
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5660 to 5670	0
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5690 to 5700	0
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5920 to 5930	0
5930 to 5940	0
5940 to 5950	0
5950 to 5960	0
5960 to 5970	0
5970 to 5980	0
5980 to 5990	0
5990 to 6000	0
6000 or greater	5

5540 to 5550	0
5550 to 5560	0
5560 to 5570	0
5570 to 5580	0
5580 to 5590	0
5590 to 5600	0
5600 to 5610	0
5610 to 5620	0
5620 to 5630	0
5630 to 5640	0
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5650 to 5660	0
5660 to 5670	0
5670 to 5680	0
5680 to 5690	0
5690 to 5700	0
5700 to 5710	1
5710 to 5720	0
5720 to 5730	0
5730 to 5740	1
5740 to 5750	0
5750 to 5760	0
5760 to 5770	0
5770 to 5780	0
5780 to 5790	0
5790 to 5800	0
5800 to 5810	0
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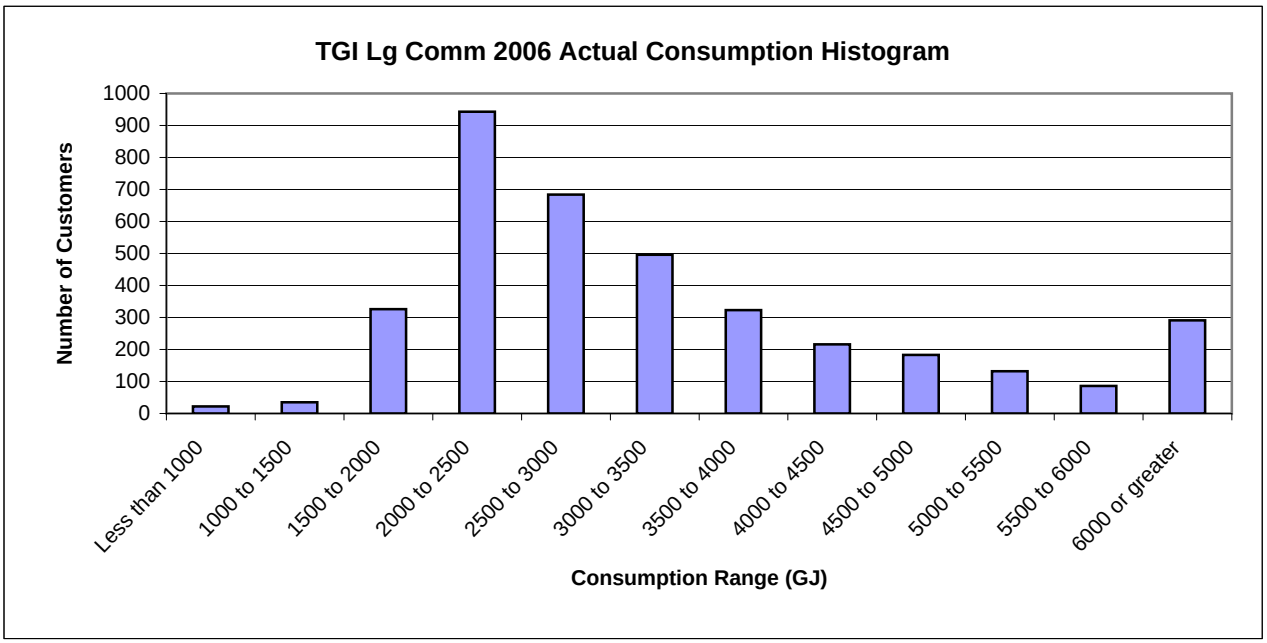
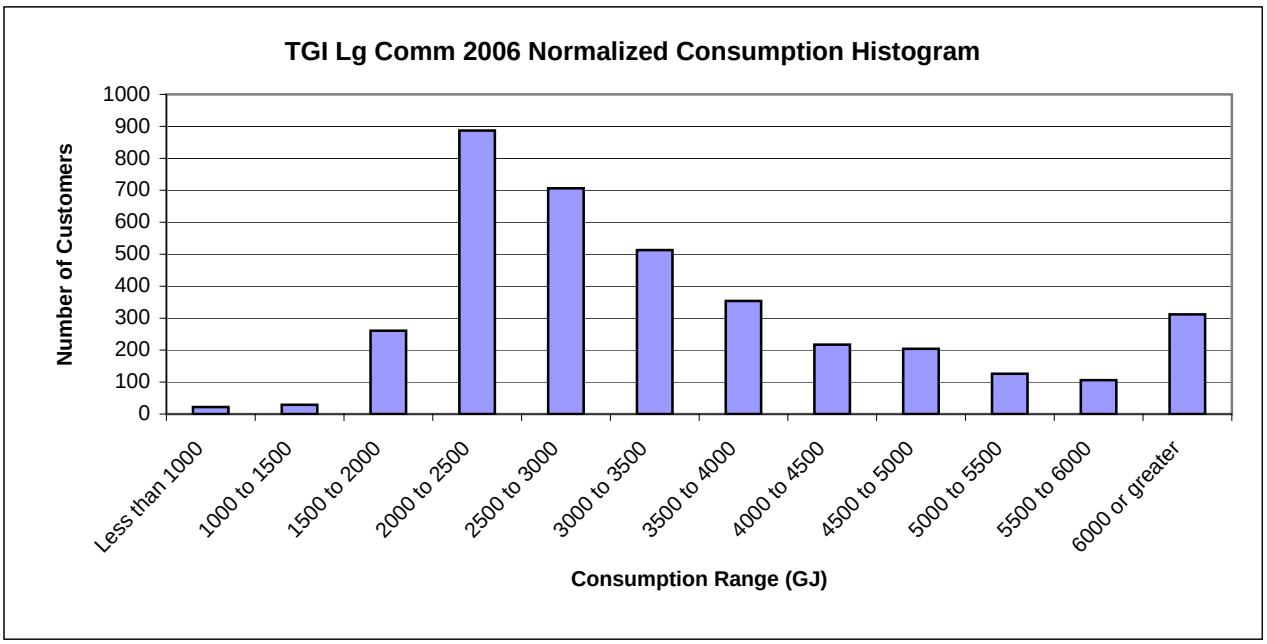
5840 to 5850	0
5850 to 5860	0
5860 to 5870	0
5870 to 5880	0
5880 to 5890	0
5890 to 5900	0
5900 to 5910	0
5910 to 5920	0
5920 to 5930	0
5930 to 5940	0
5940 to 5950	0
5950 to 5960	0
5960 to 5970	0
5970 to 5980	0
5980 to 5990	1
5990 to 6000	0
6000 or greater	5


TGI Lg Comm 2006 Actual Consumption Histogram
Number of Customers
1000
900
800
700
600
500
400
300
200
100
0
Less than 1000
1000 to 1500
1500 to 2000
2000 to 2500
2500 to 3000
3000 to 3500
3500 to 4000
4000 to 4500
4500 to 5000
5000 to 5500
5500 to 6000
6000 or greater
Consumption Range (GJ)


TGI Lg Comm 2006 Normalized Consumption Histogram
Number of Customers
1000
900
800
700
600
500
400
300
200
100
0
Less than 1000
1000 to 1500
1500 to 2000
2000 to 2500
2500 to 3000
3000 to 3500
3500 to 4000
4000 to 4500
4500 to 5000
5000 to 5500
5500 to 6000
6000 or greater
Consumption Range (GJ)

TGI Large Commercial = Rate 3 Customers

12 Months consumption is required to be included in this analysis

2006 Actuals - TGI Large Commercial	
Range (GJ)	**Customers**
Less than 10	1
10 to 20	0
20 to 30	0
30 to 40	0
40 to 50	0
50 to 60	0
60 to 70	0
70 to 80	0
80 to 90	0
90 to 100	0
100 to 110	0
110 to 120	0
120 to 130	0
130 to 140	0
140 to 150	0
150 to 160	0
160 to 170	0
170 to 180	0
180 to 190	1
190 to 200	0
200 to 210	0
210 to 220	0
220 to 230	0
230 to 240	0
240 to 250	0
250 to 260	0
260 to 270	0
270 to 280	0
280 to 290	0
290 to 300	0
300 to 310	1
310 to 320	0
320 to 330	0
330 to 340	0
340 to 350	0
350 to 360	0
360 to 370	0
370 to 380	0
380 to 390	0
390 to 400	0
400 to 410	0
410 to 420	1
420 to 430	0
430 to 440	2

2006 Normalized TGI Lg Comm	
Range (GJ)	**Customers**
Less than 10	1
10 to 20	0
20 to 30	0
30 to 40	0
40 to 50	0
50 to 60	0
60 to 70	0
70 to 80	0
80 to 90	0
90 to 100	0
100 to 110	0
110 to 120	0
120 to 130	0
130 to 140	0
140 to 150	0
150 to 160	0
160 to 170	0
170 to 180	0
180 to 190	0
190 to 200	1
200 to 210	0
210 to 220	0
220 to 230	0
230 to 240	0
240 to 250	0
250 to 260	0
260 to 270	0
270 to 280	0
280 to 290	0
290 to 300	0
300 to 310	0
310 to 320	1
320 to 330	0
330 to 340	0
340 to 350	0
350 to 360	0
360 to 370	0
370 to 380	0
380 to 390	0
390 to 400	0
400 to 410	0
410 to 420	0
420 to 430	1
430 to 440	1

440 to 450	0
450 to 460	0
460 to 470	0
470 to 480	1
480 to 490	0
490 to 500	0
500 to 510	1
510 to 520	1
520 to 530	0
530 to 540	1
540 to 550	0
550 to 560	1
560 to 570	0
570 to 580	0
580 to 590	0
590 to 600	0
600 to 610	1
610 to 620	0
620 to 630	2
630 to 640	0
640 to 650	0
650 to 660	0
660 to 670	0
670 to 680	1
680 to 690	0
690 to 700	1
700 to 710	0
710 to 720	0
720 to 730	1
730 to 740	0
740 to 750	0
750 to 760	0
760 to 770	0
770 to 780	0
780 to 790	0
790 to 800	0
800 to 810	0
810 to 820	0
820 to 830	0
830 to 840	0
840 to 850	0
850 to 860	1
860 to 870	0
870 to 880	0
880 to 890	0
890 to 900	0
900 to 910	1
910 to 920	1
920 to 930	0
930 to 940	1
940 to 950	0

440 to 450	0
450 to 460	0
460 to 470	1
470 to 480	0
480 to 490	1
490 to 500	0
500 to 510	0
510 to 520	1
520 to 530	1
530 to 540	0
540 to 550	1
550 to 560	0
560 to 570	1
570 to 580	0
580 to 590	0
590 to 600	0
600 to 610	0
610 to 620	1
620 to 630	0
630 to 640	1
640 to 650	1
650 to 660	0
660 to 670	0
670 to 680	0
680 to 690	1
690 to 700	0
700 to 710	0
710 to 720	1
720 to 730	0
730 to 740	1
740 to 750	0
750 to 760	0
760 to 770	0
770 to 780	0
780 to 790	0
790 to 800	0
800 to 810	0
810 to 820	0
820 to 830	0
830 to 840	0
840 to 850	0
850 to 860	0
860 to 870	0
870 to 880	0
880 to 890	0
890 to 900	0
900 to 910	0
910 to 920	1
920 to 930	1
930 to 940	0
940 to 950	1

950 to 960	0
960 to 970	0
970 to 980	1
980 to 990	0
990 to 1000	0
1000 to 1010	0
1010 to 1020	1
1020 to 1030	0
1030 to 1040	0
1040 to 1050	0
1050 to 1060	1
1060 to 1070	0
1070 to 1080	0
1080 to 1090	0
1090 to 1100	0
1100 to 1110	1
1110 to 1120	0
1120 to 1130	1
1130 to 1140	1
1140 to 1150	2
1150 to 1160	1
1160 to 1170	1
1170 to 1180	0
1180 to 1190	0
1190 to 1200	0
1200 to 1210	0
1210 to 1220	0
1220 to 1230	1
1230 to 1240	1
1240 to 1250	0
1250 to 1260	0
1260 to 1270	0
1270 to 1280	0
1280 to 1290	0
1290 to 1300	1
1300 to 1310	1
1310 to 1320	0
1320 to 1330	1
1330 to 1340	2
1340 to 1350	1
1350 to 1360	1
1360 to 1370	0
1370 to 1380	1
1380 to 1390	0
1390 to 1400	1
1400 to 1410	0
1410 to 1420	3
1420 to 1430	1
1430 to 1440	3
1440 to 1450	1
1450 to 1460	1

950 to 960	0
960 to 970	1
970 to 980	0
980 to 990	0
990 to 1000	1
1000 to 1010	0
1010 to 1020	0
1020 to 1030	0
1030 to 1040	1
1040 to 1050	0
1050 to 1060	0
1060 to 1070	0
1070 to 1080	1
1080 to 1090	0
1090 to 1100	0
1100 to 1110	0
1110 to 1120	0
1120 to 1130	0
1130 to 1140	0
1140 to 1150	0
1150 to 1160	2
1160 to 1170	1
1170 to 1180	1
1180 to 1190	1
1190 to 1200	1
1200 to 1210	0
1210 to 1220	0
1220 to 1230	1
1230 to 1240	0
1240 to 1250	0
1250 to 1260	1
1260 to 1270	0
1270 to 1280	0
1280 to 1290	0
1290 to 1300	0
1300 to 1310	1
1310 to 1320	0
1320 to 1330	1
1330 to 1340	0
1340 to 1350	0
1350 to 1360	3
1360 to 1370	0
1370 to 1380	1
1380 to 1390	0
1390 to 1400	2
1400 to 1410	0
1410 to 1420	0
1420 to 1430	0
1430 to 1440	1
1440 to 1450	3
1450 to 1460	1

1460 to 1470	2
1470 to 1480	2
1480 to 1490	1
1490 to 1500	1
1500 to 1510	2
1510 to 1520	1
1520 to 1530	0
1530 to 1540	2
1540 to 1550	1
1550 to 1560	3
1560 to 1570	2
1570 to 1580	3
1580 to 1590	1
1590 to 1600	2
1600 to 1610	3
1610 to 1620	0
1620 to 1630	4
1630 to 1640	1
1640 to 1650	3
1650 to 1660	3
1660 to 1670	2
1670 to 1680	3
1680 to 1690	4
1690 to 1700	1
1700 to 1710	4
1710 to 1720	10
1720 to 1730	4
1730 to 1740	6
1740 to 1750	3
1750 to 1760	4
1760 to 1770	8
1770 to 1780	3
1780 to 1790	11
1790 to 1800	5
1800 to 1810	9
1810 to 1820	6
1820 to 1830	11
1830 to 1840	7
1840 to 1850	9
1850 to 1860	13
1860 to 1870	9
1870 to 1880	11
1880 to 1890	8
1890 to 1900	12
1900 to 1910	9
1910 to 1920	14
1920 to 1930	16
1930 to 1940	13
1940 to 1950	12
1950 to 1960	12
1960 to 1970	15

1460 to 1470	2
1470 to 1480	1
1480 to 1490	1
1490 to 1500	2
1500 to 1510	2
1510 to 1520	1
1520 to 1530	1
1530 to 1540	3
1540 to 1550	1
1550 to 1560	0
1560 to 1570	3
1570 to 1580	0
1580 to 1590	0
1590 to 1600	1
1600 to 1610	2
1610 to 1620	1
1620 to 1630	1
1630 to 1640	2
1640 to 1650	2
1650 to 1660	4
1660 to 1670	4
1670 to 1680	2
1680 to 1690	5
1690 to 1700	1
1700 to 1710	3
1710 to 1720	5
1720 to 1730	1
1730 to 1740	1
1740 to 1750	9
1750 to 1760	5
1760 to 1770	2
1770 to 1780	7
1780 to 1790	2
1790 to 1800	3
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1850 to 1860	7
1860 to 1870	10
1870 to 1880	3
1880 to 1890	11
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1900 to 1910	11
1910 to 1920	10
1920 to 1930	11
1930 to 1940	14
1940 to 1950	7
1950 to 1960	14
1960 to 1970	15

1970 to 1980	14
1980 to 1990	14
1990 to 2000	13
2000 to 2010	19
2010 to 2020	17
2020 to 2030	12
2030 to 2040	19
2040 to 2050	19
2050 to 2060	16
2060 to 2070	20
2070 to 2080	19
2080 to 2090	16
2090 to 2100	28
2100 to 2110	24
2110 to 2120	19
2120 to 2130	18
2130 to 2140	24
2140 to 2150	9
2150 to 2160	19
2160 to 2170	17
2170 to 2180	14
2180 to 2190	20
2190 to 2200	12
2200 to 2210	19
2210 to 2220	19
2220 to 2230	20
2230 to 2240	15
2240 to 2250	24
2250 to 2260	20
2260 to 2270	27
2270 to 2280	17
2280 to 2290	17
2290 to 2300	17
2300 to 2310	22
2310 to 2320	15
2320 to 2330	22
2330 to 2340	12
2340 to 2350	22
2350 to 2360	23
2360 to 2370	21
2370 to 2380	27
2380 to 2390	20
2390 to 2400	16
2400 to 2410	18
2410 to 2420	21
2420 to 2430	28
2430 to 2440	15
2440 to 2450	22
2450 to 2460	15
2460 to 2470	21
2470 to 2480	15

1970 to 1980	13
1980 to 1990	13
1990 to 2000	7
2000 to 2010	14
2010 to 2020	15
2020 to 2030	12
2030 to 2040	11
2040 to 2050	21
2050 to 2060	11
2060 to 2070	13
2070 to 2080	15
2080 to 2090	20
2090 to 2100	18
2100 to 2110	14
2110 to 2120	22
2120 to 2130	11
2130 to 2140	21
2140 to 2150	23
2150 to 2160	18
2160 to 2170	14
2170 to 2180	21
2180 to 2190	19
2190 to 2200	16
2200 to 2210	20
2210 to 2220	10
2220 to 2230	19
2230 to 2240	22
2240 to 2250	15
2250 to 2260	21
2260 to 2270	21
2270 to 2280	14
2280 to 2290	14
2290 to 2300	19
2300 to 2310	18
2310 to 2320	22
2320 to 2330	18
2330 to 2340	14
2340 to 2350	24
2350 to 2360	19
2360 to 2370	19
2370 to 2380	19
2380 to 2390	15
2390 to 2400	24
2400 to 2410	20
2410 to 2420	22
2420 to 2430	19
2430 to 2440	21
2440 to 2450	16
2450 to 2460	18
2460 to 2470	22
2470 to 2480	20

2480 to 2490	12
2490 to 2500	20
2500 to 2510	16
2510 to 2520	12
2520 to 2530	19
2530 to 2540	18
2540 to 2550	23
2550 to 2560	15
2560 to 2570	14
2570 to 2580	9
2580 to 2590	17
2590 to 2600	20
2600 to 2610	10
2610 to 2620	17
2620 to 2630	12
2630 to 2640	15
2640 to 2650	21
2650 to 2660	9
2660 to 2670	9
2670 to 2680	15
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2760 to 2770	15
2770 to 2780	17
2780 to 2790	11
2790 to 2800	13
2800 to 2810	8
2810 to 2820	12
2820 to 2830	15
2830 to 2840	18
2840 to 2850	14
2850 to 2860	17
2860 to 2870	13
2870 to 2880	9
2880 to 2890	8
2890 to 2900	16
2900 to 2910	12
2910 to 2920	12
2920 to 2930	19
2930 to 2940	11
2940 to 2950	15
2950 to 2960	14
2960 to 2970	15
2970 to 2980	7
2980 to 2990	10

2480 to 2490	14
2490 to 2500	19
2500 to 2510	19
2510 to 2520	23
2520 to 2530	16
2530 to 2540	18
2540 to 2550	17
2550 to 2560	18
2560 to 2570	12
2570 to 2580	20
2580 to 2590	20
2590 to 2600	24
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2650 to 2660	14
2660 to 2670	16
2670 to 2680	16
2680 to 2690	7
2690 to 2700	21
2700 to 2710	7
2710 to 2720	12
2720 to 2730	13
2730 to 2740	10
2740 to 2750	19
2750 to 2760	11
2760 to 2770	10
2770 to 2780	13
2780 to 2790	10
2790 to 2800	17
2800 to 2810	10
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2820 to 2830	17
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2850 to 2860	13
2860 to 2870	4
2870 to 2880	11
2880 to 2890	14
2890 to 2900	15
2900 to 2910	12
2910 to 2920	15
2920 to 2930	13
2930 to 2940	8
2940 to 2950	10
2950 to 2960	16
2960 to 2970	8
2970 to 2980	11
2980 to 2990	16

2990 to 3000	11
3000 to 3010	16
3010 to 3020	8
3020 to 3030	11
3030 to 3040	14
3040 to 3050	6
3050 to 3060	8
3060 to 3070	5
3070 to 3080	10
3080 to 3090	12
3090 to 3100	11
3100 to 3110	13
3110 to 3120	14
3120 to 3130	7
3130 to 3140	12
3140 to 3150	8
3150 to 3160	10
3160 to 3170	8
3170 to 3180	17
3180 to 3190	10
3190 to 3200	6
3200 to 3210	9
3210 to 3220	10
3220 to 3230	9
3230 to 3240	9
3240 to 3250	11
3250 to 3260	8
3260 to 3270	8
3270 to 3280	9
3280 to 3290	9
3290 to 3300	13
3300 to 3310	9
3310 to 3320	10
3320 to 3330	11
3330 to 3340	10
3340 to 3350	15
3350 to 3360	7
3360 to 3370	6
3370 to 3380	10
3380 to 3390	12
3390 to 3400	9
3400 to 3410	9
3410 to 3420	10
3420 to 3430	11
3430 to 3440	8
3440 to 3450	7
3450 to 3460	10
3460 to 3470	8
3470 to 3480	15
3480 to 3490	10
3490 to 3500	8

2990 to 3000	12
3000 to 3010	17
3010 to 3020	14
3020 to 3030	14
3030 to 3040	10
3040 to 3050	8
3050 to 3060	13
3060 to 3070	16
3070 to 3080	8
3080 to 3090	9
3090 to 3100	16
3100 to 3110	8
3110 to 3120	9
3120 to 3130	8
3130 to 3140	9
3140 to 3150	11
3150 to 3160	12
3160 to 3170	15
3170 to 3180	12
3180 to 3190	12
3190 to 3200	9
3200 to 3210	8
3210 to 3220	7
3220 to 3230	7
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3250 to 3260	8
3260 to 3270	5
3270 to 3280	13
3280 to 3290	5
3290 to 3300	14
3300 to 3310	7
3310 to 3320	9
3320 to 3330	12
3330 to 3340	10
3340 to 3350	8
3350 to 3360	16
3360 to 3370	8
3370 to 3380	9
3380 to 3390	8
3390 to 3400	7
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3420 to 3430	6
3430 to 3440	7
3440 to 3450	9
3450 to 3460	10
3460 to 3470	10
3470 to 3480	8
3480 to 3490	10
3490 to 3500	9

3500 to 3510	9
3510 to 3520	13
3520 to 3530	7
3530 to 3540	5
3540 to 3550	11
3550 to 3560	3
3560 to 3570	10
3570 to 3580	11
3580 to 3590	10
3590 to 3600	7
3600 to 3610	5
3610 to 3620	9
3620 to 3630	3
3630 to 3640	5
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3650 to 3660	7
3660 to 3670	5
3670 to 3680	8
3680 to 3690	6
3690 to 3700	8
3700 to 3710	7
3710 to 3720	6
3720 to 3730	5
3730 to 3740	12
3740 to 3750	9
3750 to 3760	7
3760 to 3770	5
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3780 to 3790	5
3790 to 3800	4
3800 to 3810	6
3810 to 3820	5
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3840 to 3850	9
3850 to 3860	11
3860 to 3870	8
3870 to 3880	1
3880 to 3890	8
3890 to 3900	5
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3920 to 3930	1
3930 to 3940	2
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3950 to 3960	9
3960 to 3970	9
3970 to 3980	5
3980 to 3990	6
3990 to 4000	3
4000 to 4010	3

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3510 to 3520	6
3520 to 3530	11
3530 to 3540	10
3540 to 3550	17
3550 to 3560	10
3560 to 3570	10
3570 to 3580	10
3580 to 3590	12
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3640 to 3650	10
3650 to 3660	7
3660 to 3670	9
3670 to 3680	7
3680 to 3690	5
3690 to 3700	3
3700 to 3710	5
3710 to 3720	8
3720 to 3730	8
3730 to 3740	4
3740 to 3750	8
3750 to 3760	5
3760 to 3770	6
3770 to 3780	7
3780 to 3790	5
3790 to 3800	5
3800 to 3810	9
3810 to 3820	14
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3830 to 3840	9
3840 to 3850	2
3850 to 3860	2
3860 to 3870	6
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3920 to 3930	12
3930 to 3940	11
3940 to 3950	7
3950 to 3960	2
3960 to 3970	8
3970 to 3980	1
3980 to 3990	7
3990 to 4000	2
4000 to 4010	1

4010 to 4020	5
4020 to 4030	4
4030 to 4040	5
4040 to 4050	0
4050 to 4060	2
4060 to 4070	3
4070 to 4080	2
4080 to 4090	7
4090 to 4100	4
4100 to 4110	4
4110 to 4120	5
4120 to 4130	6
4130 to 4140	2
4140 to 4150	9
4150 to 4160	8
4160 to 4170	3
4170 to 4180	3
4180 to 4190	3
4190 to 4200	4
4200 to 4210	7
4210 to 4220	4
4220 to 4230	2
4230 to 4240	3
4240 to 4250	6
4250 to 4260	6
4260 to 4270	2
4270 to 4280	6
4280 to 4290	6
4290 to 4300	2
4300 to 4310	6
4310 to 4320	3
4320 to 4330	8
4330 to 4340	1
4340 to 4350	4
4350 to 4360	3
4360 to 4370	2
4370 to 4380	0
4380 to 4390	6
4390 to 4400	7
4400 to 4410	2
4410 to 4420	1
4420 to 4430	9
4430 to 4440	3
4440 to 4450	3
4450 to 4460	3
4460 to 4470	10
4470 to 4480	4
4480 to 4490	9
4490 to 4500	6
4500 to 4510	5
4510 to 4520	5

4010 to 4020	3
4020 to 4030	9
4030 to 4040	8
4040 to 4050	9
4050 to 4060	1
4060 to 4070	7
4070 to 4080	3
4080 to 4090	5
4090 to 4100	3
4100 to 4110	3
4110 to 4120	4
4120 to 4130	1
4130 to 4140	2
4140 to 4150	1
4150 to 4160	5
4160 to 4170	10
4170 to 4180	3
4180 to 4190	5
4190 to 4200	4
4200 to 4210	5
4210 to 4220	5
4220 to 4230	5
4230 to 4240	8
4240 to 4250	5
4250 to 4260	3
4260 to 4270	4
4270 to 4280	5
4280 to 4290	6
4290 to 4300	6
4300 to 4310	4
4310 to 4320	2
4320 to 4330	3
4330 to 4340	6
4340 to 4350	5
4350 to 4360	2
4360 to 4370	5
4370 to 4380	4
4380 to 4390	4
4390 to 4400	3
4400 to 4410	5
4410 to 4420	5
4420 to 4430	2
4430 to 4440	7
4440 to 4450	2
4450 to 4460	2
4460 to 4470	3
4470 to 4480	6
4480 to 4490	5
4490 to 4500	3
4500 to 4510	5
4510 to 4520	5

4520 to 4530	6
4530 to 4540	7
4540 to 4550	4
4550 to 4560	6
4560 to 4570	4
4570 to 4580	4
4580 to 4590	5
4590 to 4600	6
4600 to 4610	3
4610 to 4620	5
4620 to 4630	5
4630 to 4640	3
4640 to 4650	4
4650 to 4660	3
4660 to 4670	6
4670 to 4680	2
4680 to 4690	4
4690 to 4700	3
4700 to 4710	3
4710 to 4720	3
4720 to 4730	5
4730 to 4740	0
4740 to 4750	2
4750 to 4760	7
4760 to 4770	4
4770 to 4780	5
4780 to 4790	1
4790 to 4800	1
4800 to 4810	3
4810 to 4820	5
4820 to 4830	2
4830 to 4840	2
4840 to 4850	2
4850 to 4860	4
4860 to 4870	4
4870 to 4880	5
4880 to 4890	4
4890 to 4900	1
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4950 to 4960	2
4960 to 4970	3
4970 to 4980	2
4980 to 4990	3
4990 to 5000	2
5000 to 5010	1
5010 to 5020	4
5020 to 5030	3

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4540 to 4550	4
4550 to 4560	8
4560 to 4570	2
4570 to 4580	10
4580 to 4590	6
4590 to 4600	4
4600 to 4610	4
4610 to 4620	3
4620 to 4630	8
4630 to 4640	4
4640 to 4650	6
4650 to 4660	5
4660 to 4670	2
4670 to 4680	4
4680 to 4690	4
4690 to 4700	2
4700 to 4710	6
4710 to 4720	4
4720 to 4730	2
4730 to 4740	3
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4760 to 4770	5
4770 to 4780	5
4780 to 4790	1
4790 to 4800	3
4800 to 4810	4
4810 to 4820	3
4820 to 4830	6
4830 to 4840	3
4840 to 4850	6
4850 to 4860	2
4860 to 4870	9
4870 to 4880	1
4880 to 4890	1
4890 to 4900	2
4900 to 4910	5
4910 to 4920	5
4920 to 4930	5
4930 to 4940	1
4940 to 4950	2
4950 to 4960	5
4960 to 4970	4
4970 to 4980	4
4980 to 4990	4
4990 to 5000	2
5000 to 5010	4
5010 to 5020	2
5020 to 5030	3

5030 to 5040	6
5040 to 5050	7
5050 to 5060	3
5060 to 5070	5
5070 to 5080	2
5080 to 5090	3
5090 to 5100	1
5100 to 5110	4
5110 to 5120	4
5120 to 5130	0
5130 to 5140	1
5140 to 5150	2
5150 to 5160	4
5160 to 5170	3
5170 to 5180	3
5180 to 5190	3
5190 to 5200	1
5200 to 5210	5
5210 to 5220	1
5220 to 5230	2
5230 to 5240	1
5240 to 5250	3
5250 to 5260	2
5260 to 5270	2
5270 to 5280	0
5280 to 5290	1
5290 to 5300	2
5300 to 5310	0
5310 to 5320	0
5320 to 5330	3
5330 to 5340	6
5340 to 5350	2
5350 to 5360	2
5360 to 5370	3
5370 to 5380	2
5380 to 5390	3
5390 to 5400	1
5400 to 5410	1
5410 to 5420	2
5420 to 5430	2
5430 to 5440	2
5440 to 5450	3
5450 to 5460	6
5460 to 5470	5
5470 to 5480	3
5480 to 5490	2
5490 to 5500	5
5500 to 5510	2
5510 to 5520	0
5520 to 5530	3
5530 to 5540	3

5030 to 5040	5
5040 to 5050	4
5050 to 5060	2
5060 to 5070	3
5070 to 5080	3
5080 to 5090	3
5090 to 5100	1
5100 to 5110	0
5110 to 5120	4
5120 to 5130	3
5130 to 5140	5
5140 to 5150	7
5150 to 5160	3
5160 to 5170	2
5170 to 5180	3
5180 to 5190	4
5190 to 5200	0
5200 to 5210	2
5210 to 5220	3
5220 to 5230	1
5230 to 5240	0
5240 to 5250	1
5250 to 5260	4
5260 to 5270	1
5270 to 5280	3
5280 to 5290	5
5290 to 5300	0
5300 to 5310	3
5310 to 5320	3
5320 to 5330	1
5330 to 5340	2
5340 to 5350	1
5350 to 5360	4
5360 to 5370	1
5370 to 5380	0
5380 to 5390	3
5390 to 5400	0
5400 to 5410	3
5410 to 5420	0
5420 to 5430	1
5430 to 5440	4
5440 to 5450	7
5450 to 5460	2
5460 to 5470	4
5470 to 5480	2
5480 to 5490	1
5490 to 5500	3
5500 to 5510	1
5510 to 5520	4
5520 to 5530	0
5530 to 5540	3

5540 to 5550	2
5550 to 5560	2
5560 to 5570	0
5570 to 5580	1
5580 to 5590	2
5590 to 5600	2
5600 to 5610	1
5610 to 5620	2
5620 to 5630	2
5630 to 5640	0
5640 to 5650	2
5650 to 5660	2
5660 to 5670	4
5670 to 5680	0
5680 to 5690	4
5690 to 5700	2
5700 to 5710	2
5710 to 5720	4
5720 to 5730	2
5730 to 5740	3
5740 to 5750	4
5750 to 5760	1
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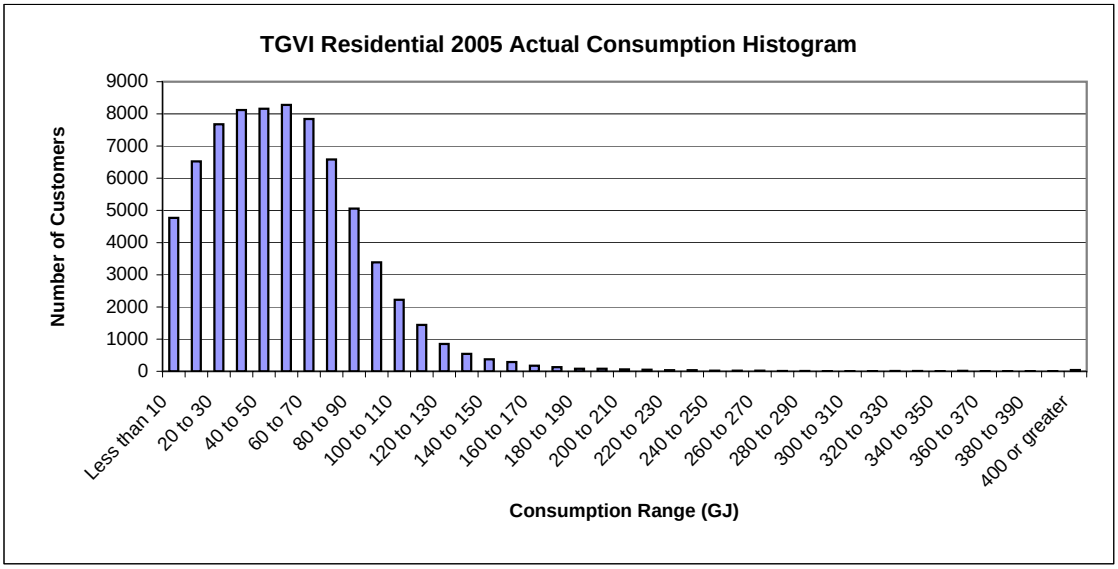
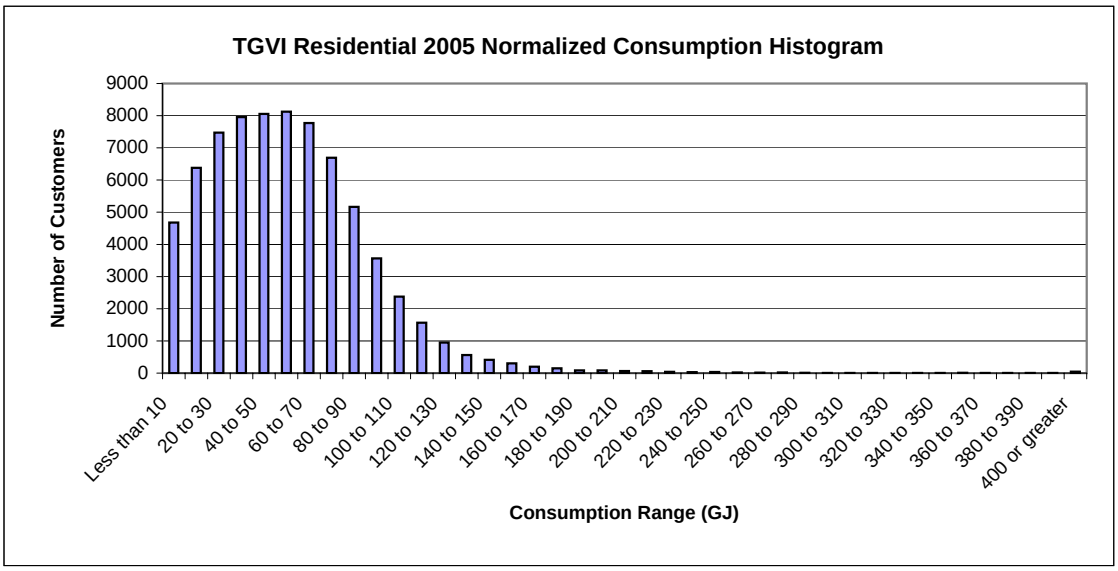
5790 to 5800	1
5800 to 5810	1
5810 to 5820	2
5820 to 5830	2
5830 to 5840	2
5840 to 5850	1
5850 to 5860	2
5860 to 5870	2
5870 to 5880	0
5880 to 5890	1
5890 to 5900	1
5900 to 5910	3
5910 to 5920	1
5920 to 5930	3
5930 to 5940	3
5940 to 5950	2
5950 to 5960	1
5960 to 5970	0
5970 to 5980	1
5980 to 5990	0
5990 to 6000	0
6000 or greater	291

5540 to 5550	2
5550 to 5560	3
5560 to 5570	7
5570 to 5580	4
5580 to 5590	5
5590 to 5600	2
5600 to 5610	2
5610 to 5620	2
5620 to 5630	0
5630 to 5640	1
5640 to 5650	4
5650 to 5660	2
5660 to 5670	2
5670 to 5680	0
5680 to 5690	1
5690 to 5700	2
5700 to 5710	0
5710 to 5720	1
5720 to 5730	3
5730 to 5740	2
5740 to 5750	1
5750 to 5760	1
5760 to 5770	4
5770 to 5780	3
5780 to 5790	1
5790 to 5800	3
5800 to 5810	3
5810 to 5820	1
5820 to 5830	1
5830 to 5840	6
5840 to 5850	2
5850 to 5860	4
5860 to 5870	4
5870 to 5880	1
5880 to 5890	2
5890 to 5900	1
5900 to 5910	2
5910 to 5920	0
5920 to 5930	3
5930 to 5940	0
5940 to 5950	1
5950 to 5960	4
5960 to 5970	1
5970 to 5980	2
5980 to 5990	2
5990 to 6000	0
6000 or greater	312


TGVI Residential 2005 Actual Consumption Histogram
Number of Customers
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
Less than 10
20 to 30
40 to 50
60 to 70
80 to 90
100 to 110
120 to 130
140 to 150
160 to 170
180 to 190
200 to 210
220 to 230
240 to 250
260 to 270
280 to 290
300 to 310
320 to 330
340 to 350
360 to 370
380 to 390
400 or greater
Consumption Range (GJ)


TGVI Residential 2005 Normalized Consumption Histogram
Number of Customers
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
Less than 10
20 to 30
40 to 50
60 to 70
80 to 90
100 to 110
120 to 130
140 to 150
160 to 170
180 to 190
200 to 210
220 to 230
240 to 250
260 to 270
280 to 290
300 to 310
320 to 330
340 to 350
360 to 370
380 to 390
400 or greater
Consumption Range (GJ)

TGVI Residential = RGS Customers

All customers included in this analysis (even if less than 12 months consumption)

2005 Actuals TGVI Residential	
Range (GJ)	**Customers**
Less than 10	4,770
10 to 20	6,524
20 to 30	7,675
30 to 40	8,120
40 to 50	8,158
50 to 60	8,281
60 to 70	7,842
70 to 80	6,583
80 to 90	5,055
90 to 100	3,386
100 to 110	2,223
110 to 120	1,442
120 to 130	851
130 to 140	544
140 to 150	373
150 to 160	290
160 to 170	174
170 to 180	131
180 to 190	79
190 to 200	80
200 to 210	62
210 to 220	52
220 to 230	33
230 to 240	36
240 to 250	21
250 to 260	21
260 to 270	20
270 to 280	11
280 to 290	11
290 to 300	6
300 to 310	5
310 to 320	5
320 to 330	8
330 to 340	9
340 to 350	5
350 to 360	13
360 to 370	3
370 to 380	5
380 to 390	3
390 to 400	6
400 to 410	1
410 to 420	3
420 to 430	2
430 to 440	1
440 to 450	3
450 to 460	4
460 to 470	3
470 to 480	1
480 to 490	5
490 to 500	0
500 to 510	1

2005 Normalized TGVI Residential	
Range (GJ)	**Customers**
Less than 10	4,678
10 to 20	6,382
20 to 30	7,471
30 to 40	7,954
40 to 50	8,057
50 to 60	8,127
60 to 70	7,774
70 to 80	6,692
80 to 90	5,168
90 to 100	3,565
100 to 110	2,375
110 to 120	1,568
120 to 130	951
130 to 140	562
140 to 150	415
150 to 160	301
160 to 170	198
170 to 180	147
180 to 190	84
190 to 200	83
200 to 210	63
210 to 220	60
220 to 230	40
230 to 240	30
240 to 250	34
250 to 260	19
260 to 270	16
270 to 280	20
280 to 290	11
290 to 300	5
300 to 310	7
310 to 320	5
320 to 330	6
330 to 340	7
340 to 350	6
350 to 360	11
360 to 370	7
370 to 380	6
380 to 390	3
390 to 400	4
400 to 410	4
410 to 420	1
420 to 430	3
430 to 440	2
440 to 450	2
450 to 460	2
460 to 470	5
470 to 480	3
480 to 490	0
490 to 500	5
500 to 510	0

510 to 520	1
520 to 530	1
530 to 540	3
540 to 550	0
550 to 560	1
560 to 570	0
570 to 580	0
580 to 590	2
590 to 600	0
600 to 610	0
610 to 620	0
620 to 630	0
630 to 640	2
640 to 650	1
650 to 660	0
660 to 670	0
670 to 680	0
680 to 690	0
690 to 700	0
700 to 710	0
710 to 720	1
720 to 730	0
730 to 740	0
740 to 750	0
750 to 760	0
760 to 770	0
770 to 780	1
780 to 790	0
790 to 800	0
800 to 810	0
810 to 820	0
820 to 830	2
830 to 840	0
840 to 850	0
850 to 860	0
860 to 870	1
870 to 880	0
880 to 890	0
890 to 900	0
900 to 910	0
910 to 920	0
920 to 930	0
930 to 940	0
940 to 950	0
950 to 960	0
960 to 970	0
970 to 980	0
980 to 990	0
990 to 1000	0
1000 to 1010	0
1010 to 1020	0
1020 to 1030	0
1030 to 1040	0
1040 to 1050	0
1050 to 1060	0
1060 to 1070	0
1070 to 1080	0
1080 to 1090	0

510 to 520	1
520 to 530	1
530 to 540	1
540 to 550	3
550 to 560	0
560 to 570	1
570 to 580	0
580 to 590	0
590 to 600	1
600 to 610	1
610 to 620	0
620 to 630	0
630 to 640	0
640 to 650	1
650 to 660	2
660 to 670	0
670 to 680	0
680 to 690	0
690 to 700	0
700 to 710	0
710 to 720	0
720 to 730	1
730 to 740	0
740 to 750	0
750 to 760	0
760 to 770	0
770 to 780	0
780 to 790	1
790 to 800	0
800 to 810	0
810 to 820	0
820 to 830	0
830 to 840	2
840 to 850	0
850 to 860	0
860 to 870	0
870 to 880	0
880 to 890	1
890 to 900	0
900 to 910	0
910 to 920	0
920 to 930	0
930 to 940	0
940 to 950	0
950 to 960	0
960 to 970	0
970 to 980	0
980 to 990	0
990 to 1000	0
1000 to 1010	0
1010 to 1020	0
1020 to 1030	0
1030 to 1040	0
1040 to 1050	0
1050 to 1060	0
1060 to 1070	0
1070 to 1080	0
1080 to 1090	0

1090 to 1100	0
1100 to 1110	0
1110 to 1120	0
1120 to 1130	0
1130 to 1140	0
1140 to 1150	0
1150 to 1160	0
1160 to 1170	0
1170 to 1180	0
1180 to 1190	0
1190 to 1200	0
1200 to 1210	0
1210 to 1220	0
1220 to 1230	0
1230 to 1240	0
1240 to 1250	0
1250 to 1260	0
1260 to 1270	0
1270 to 1280	0
1280 to 1290	0
1290 to 1300	0
1300 to 1310	0
1310 to 1320	0
1320 to 1330	0
1330 to 1340	0
1340 to 1350	0
1350 to 1360	0
1360 to 1370	0
1370 to 1380	0
1380 to 1390	0
1390 to 1400	0
1400 to 1410	0
1410 to 1420	0
1420 to 1430	0
1430 to 1440	0
1440 to 1450	0
1450 to 1460	0
1460 to 1470	0
1470 to 1480	0
1480 to 1490	0
1490 to 1500	0
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1520 to 1530	0
1530 to 1540	0
1540 to 1550	0
1550 to 1560	0
1560 to 1570	0
1570 to 1580	0
1580 to 1590	0
1590 to 1600	0
1600 to 1610	0
1610 to 1620	0
1620 to 1630	0
1630 to 1640	0
1640 to 1650	0
1650 to 1660	0
1660 to 1670	0

1090 to 1100	0
1100 to 1110	0
1110 to 1120	0
1120 to 1130	0
1130 to 1140	0
1140 to 1150	0
1150 to 1160	0
1160 to 1170	0
1170 to 1180	0
1180 to 1190	0
1190 to 1200	0
1200 to 1210	0
1210 to 1220	0
1220 to 1230	0
1230 to 1240	0
1240 to 1250	0
1250 to 1260	0
1260 to 1270	0
1270 to 1280	0
1280 to 1290	0
1290 to 1300	0
1300 to 1310	0
1310 to 1320	0
1320 to 1330	0
1330 to 1340	0
1340 to 1350	0
1350 to 1360	0
1360 to 1370	0
1370 to 1380	0
1380 to 1390	0
1390 to 1400	0
1400 to 1410	0
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1590 to 1600	0
1600 to 1610	0
1610 to 1620	0
1620 to 1630	0
1630 to 1640	0
1640 to 1650	0
1650 to 1660	0
1660 to 1670	0

1670 to 1680	0
1680 to 1690	0
1690 to 1700	0
1700 to 1710	0
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1720 to 1730	0
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1750 to 1760	0
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1810 to 1820	0
1820 to 1830	0
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1850 to 1860	0
1860 to 1870	0
1870 to 1880	0
1880 to 1890	0
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1920 to 1930	0
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1960 to 1970	0
1970 to 1980	0
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2050 to 2060	0
2060 to 2070	0
2070 to 2080	0
2080 to 2090	0
2090 to 2100	0
2100 to 2110	0
2110 to 2120	0
2120 to 2130	0
2130 to 2140	0
2140 to 2150	0
2150 to 2160	0
2160 to 2170	0
2170 to 2180	0
2180 to 2190	0
2190 to 2200	0
2200 to 2210	0
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2220 to 2230	0
2230 to 2240	0
2240 to 2250	0

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1680 to 1690	0
1690 to 1700	0
1700 to 1710	0
1710 to 1720	0
1720 to 1730	0
1730 to 1740	0
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1750 to 1760	0
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2180 to 2190	0
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2220 to 2230	0
2230 to 2240	0
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2270 to 2280	0		2270 to 2280	0
2280 to 2290	0		2280 to 2290	0
2290 to 2300	0		2290 to 2300	0
2300 to 2310	0		2300 to 2310	0
2310 to 2320	0		2310 to 2320	0
2320 to 2330	0		2320 to 2330	0
2330 to 2340	0		2330 to 2340	0
2340 to 2350	0		2340 to 2350	0
2350 to 2360	0		2350 to 2360	0
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2390 to 2400	0		2390 to 2400	0
2400 to 2410	0		2400 to 2410	0
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2760 to 2770	0		2760 to 2770	0
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2790 to 2800	0		2790 to 2800	0
2800 to 2810	0		2800 to 2810	0
2810 to 2820	0		2810 to 2820	0
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2910 to 2920	0
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3160 to 3170	0
3170 to 3180	0
3180 to 3190	0
3190 to 3200	0
3200 to 3210	0
3210 to 3220	0
3220 to 3230	0
3230 to 3240	0
3240 to 3250	0
3250 to 3260	0
3260 to 3270	0
3270 to 3280	0
3280 to 3290	0
3290 to 3300	0
3300 to 3310	0
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3330 to 3340	0
3340 to 3350	0
3350 to 3360	0
3360 to 3370	0
3370 to 3380	0
3380 to 3390	0
3390 to 3400	0
3400 to 3410	0

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2850 to 2860	0
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2870 to 2880	0
2880 to 2890	0
2890 to 2900	0
2900 to 2910	0
2910 to 2920	0
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2940 to 2950	0
2950 to 2960	0
2960 to 2970	0
2970 to 2980	0
2980 to 2990	0
2990 to 3000	0
3000 to 3010	0
3010 to 3020	0
3020 to 3030	0
3030 to 3040	0
3040 to 3050	0
3050 to 3060	0
3060 to 3070	0
3070 to 3080	0
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3110 to 3120	0
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3180 to 3190	0
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3200 to 3210	0
3210 to 3220	0
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5980 to 5990	0
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6000 or greater	0

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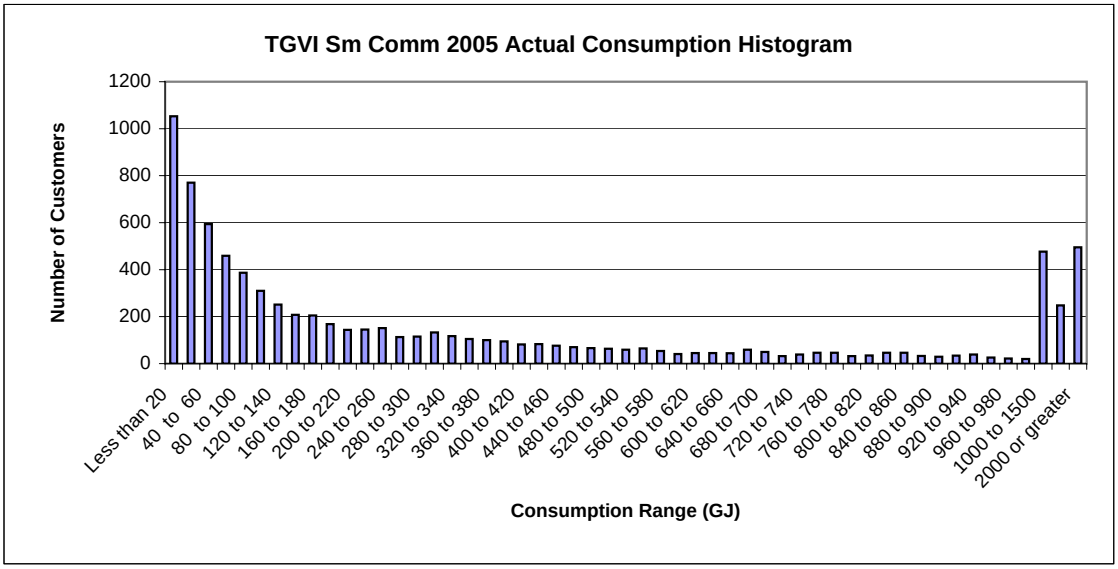
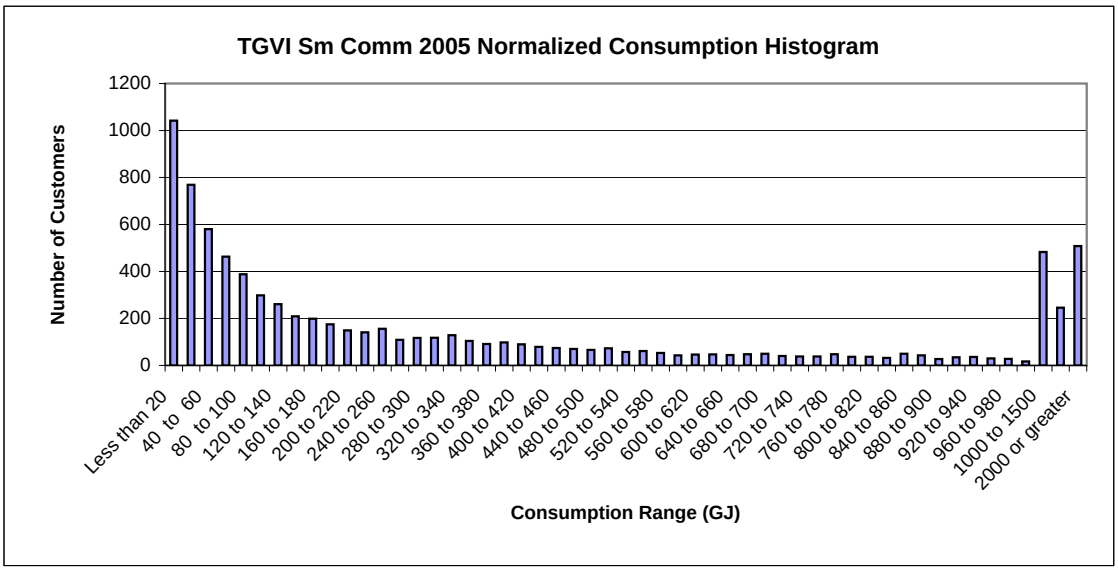
5970 to 5980	0
5980 to 5990	0
5990 to 6000	0
6000 or greater	0


TGVI Sm Comm 2005 Actual Consumption Histogram
Number of Customers
1200
1000
800
600
400
200
0
Less than 20
40 to 60
80 to 100
120 to 140
160 to 180
200 to 220
240 to 260
280 to 300
320 to 340
360 to 380
400 to 420
440 to 460
480 to 500
520 to 540
560 to 580
600 to 620
640 to 660
680 to 700
720 to 740
760 to 780
800 to 820
840 to 860
880 to 900
920 to 940
960 to 980
1000 to 1500
2000 or greater
Consumption Range (GJ)


TGVI Sm Comm 2005 Normalized Consumption Histogram
Number of Customers
1200
1000
800
600
400
200
0
Less than 20
40 to 60
80 to 100
120 to 140
160 to 180
200 to 220
240 to 260
280 to 300
320 to 340
360 to 380
400 to 420
440 to 460
480 to 500
520 to 540
560 to 580
600 to 620
640 to 660
680 to 700
720 to 740
760 to 780
800 to 820
840 to 860
880 to 900
920 to 940
960 to 980
1000 to 1500
2000 or greater
Consumption Range (GJ)

TGVI Small Commercial = AGS, SCS1, SCS2, LCS1 & LCS2 Customers

All customers included in this analysis (even if less than 12 months consumption)

2005 Actuals TGVI Small Commercial	
Range (GJ)	**Customers**
Less than 10	628
10 to 20	425
20 to 30	430
30 to 40	340
40 to 50	317
50 to 60	277
60 to 70	229
70 to 80	230
80 to 90	209
90 to 100	178
100 to 110	159
110 to 120	151
120 to 130	136
130 to 140	115
140 to 150	116
150 to 160	92
160 to 170	100
170 to 180	105
180 to 190	86
190 to 200	82
200 to 210	70
210 to 220	74
220 to 230	72
230 to 240	73
240 to 250	87
250 to 260	64
260 to 270	60
270 to 280	53
280 to 290	64
290 to 300	51
300 to 310	60
310 to 320	73
320 to 330	55
330 to 340	62
340 to 350	57
350 to 360	48
360 to 370	47
370 to 380	53
380 to 390	50
390 to 400	45
400 to 410	49
410 to 420	33
420 to 430	41
430 to 440	42
440 to 450	35
450 to 460	41
460 to 470	32
470 to 480	38
480 to 490	34
490 to 500	32
500 to 510	38

2005 Normalized TGVI Small Commercial	
Range (GJ)	**Customers**
Less than 10	623
10 to 20	419
20 to 30	428
30 to 40	341
40 to 50	312
50 to 60	268
60 to 70	235
70 to 80	228
80 to 90	207
90 to 100	181
100 to 110	157
110 to 120	141
120 to 130	150
130 to 140	111
140 to 150	124
150 to 160	85
160 to 170	97
170 to 180	102
180 to 190	96
190 to 200	79
200 to 210	77
210 to 220	72
220 to 230	75
230 to 240	66
240 to 250	82
250 to 260	74
260 to 270	58
270 to 280	51
280 to 290	63
290 to 300	54
300 to 310	59
310 to 320	59
320 to 330	62
330 to 340	67
340 to 350	44
350 to 360	60
360 to 370	52
370 to 380	39
380 to 390	51
390 to 400	47
400 to 410	52
410 to 420	38
420 to 430	37
430 to 440	42
440 to 450	39
450 to 460	35
460 to 470	36
470 to 480	34
480 to 490	36
490 to 500	30
500 to 510	36

510 to 520	25
520 to 530	31
530 to 540	28
540 to 550	38
550 to 560	27
560 to 570	24
570 to 580	30
580 to 590	16
590 to 600	25
600 to 610	25
610 to 620	20
620 to 630	26
630 to 640	19
640 to 650	27
650 to 660	17
660 to 670	30
670 to 680	29
680 to 690	22
690 to 700	28
700 to 710	13
710 to 720	19
720 to 730	20
730 to 740	19
740 to 750	18
750 to 760	28
760 to 770	23
770 to 780	23
780 to 790	10
790 to 800	22
800 to 810	18
810 to 820	17
820 to 830	12
830 to 840	34
840 to 850	24
850 to 860	22
860 to 870	20
870 to 880	13
880 to 890	16
890 to 900	13
900 to 910	20
910 to 920	14
920 to 930	20
930 to 940	19
940 to 950	8
950 to 960	18
960 to 970	13
970 to 980	9
980 to 990	7
990 to 1000	13
1000 to 1010	15
1010 to 1020	9
1020 to 1030	7
1030 to 1040	16
1040 to 1050	15
1050 to 1060	12
1060 to 1070	9
1070 to 1080	8
1080 to 1090	13

510 to 520	37
520 to 530	23
530 to 540	34
540 to 550	26
550 to 560	35
560 to 570	26
570 to 580	27
580 to 590	24
590 to 600	19
600 to 610	23
610 to 620	23
620 to 630	24
630 to 640	23
640 to 650	19
650 to 660	25
660 to 670	20
670 to 680	28
680 to 690	29
690 to 700	21
700 to 710	27
710 to 720	13
720 to 730	20
730 to 740	18
740 to 750	20
750 to 760	18
760 to 770	27
770 to 780	21
780 to 790	22
790 to 800	15
800 to 810	20
810 to 820	17
820 to 830	18
830 to 840	14
840 to 850	24
850 to 860	26
860 to 870	25
870 to 880	18
880 to 890	13
890 to 900	14
900 to 910	18
910 to 920	17
920 to 930	13
930 to 940	23
940 to 950	14
950 to 960	16
960 to 970	13
970 to 980	15
980 to 990	11
990 to 1000	6
1000 to 1010	12
1010 to 1020	11
1020 to 1030	15
1030 to 1040	7
1040 to 1050	8
1050 to 1060	15
1060 to 1070	16
1070 to 1080	11
1080 to 1090	7

1090 to 1100	14
1100 to 1110	13
1110 to 1120	10
1120 to 1130	10
1130 to 1140	10
1140 to 1150	15
1150 to 1160	13
1160 to 1170	9
1170 to 1180	10
1180 to 1190	11
1190 to 1200	16
1200 to 1210	15
1210 to 1220	8
1220 to 1230	10
1230 to 1240	11
1240 to 1250	12
1250 to 1260	12
1260 to 1270	13
1270 to 1280	8
1280 to 1290	8
1290 to 1300	5
1300 to 1310	9
1310 to 1320	11
1320 to 1330	10
1330 to 1340	6
1340 to 1350	4
1350 to 1360	10
1360 to 1370	13
1370 to 1380	8
1380 to 1390	6
1390 to 1400	4
1400 to 1410	3
1410 to 1420	9
1420 to 1430	8
1430 to 1440	8
1440 to 1450	7
1450 to 1460	4
1460 to 1470	5
1470 to 1480	4
1480 to 1490	4
1490 to 1500	7
1500 to 1510	9
1510 to 1520	8
1520 to 1530	2
1530 to 1540	4
1540 to 1550	5
1550 to 1560	2
1560 to 1570	6
1570 to 1580	5
1580 to 1590	9
1590 to 1600	3
1600 to 1610	7
1610 to 1620	6
1620 to 1630	5
1630 to 1640	9
1640 to 1650	7
1650 to 1660	3
1660 to 1670	8

1090 to 1100	11
1100 to 1110	16
1110 to 1120	13
1120 to 1130	10
1130 to 1140	11
1140 to 1150	10
1150 to 1160	10
1160 to 1170	12
1170 to 1180	16
1180 to 1190	8
1190 to 1200	11
1200 to 1210	8
1210 to 1220	18
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1230 to 1240	9
1240 to 1250	9
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1270 to 1280	10
1280 to 1290	14
1290 to 1300	10
1300 to 1310	5
1310 to 1320	5
1320 to 1330	9
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1340 to 1350	9
1350 to 1360	7
1360 to 1370	4
1370 to 1380	9
1380 to 1390	10
1390 to 1400	11
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1450 to 1460	9
1460 to 1470	7
1470 to 1480	4
1480 to 1490	6
1490 to 1500	4
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1550 to 1560	2
1560 to 1570	5
1570 to 1580	4
1580 to 1590	7
1590 to 1600	2
1600 to 1610	8
1610 to 1620	7
1620 to 1630	5
1630 to 1640	6
1640 to 1650	5
1650 to 1660	7
1660 to 1670	7

1670 to 1680	9
1680 to 1690	6
1690 to 1700	2
1700 to 1710	6
1710 to 1720	6
1720 to 1730	5
1730 to 1740	7
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1750 to 1760	2
1760 to 1770	4
1770 to 1780	6
1780 to 1790	4
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1820 to 1830	6
1830 to 1840	2
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1870 to 1880	7
1880 to 1890	5
1890 to 1900	5
1900 to 1910	4
1910 to 1920	7
1920 to 1930	3
1930 to 1940	5
1940 to 1950	4
1950 to 1960	3
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1980 to 1990	5
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2010 to 2020	7
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2220 to 2230	1
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1750 to 1760	6
1760 to 1770	6
1770 to 1780	1
1780 to 1790	3
1790 to 1800	7
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1870 to 1880	6
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1990 to 2000	7
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2040 to 2050	6
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2060 to 2070	1
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2080 to 2090	2
2090 to 2100	8
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2190 to 2200	2
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2220 to 2230	4
2230 to 2240	3
2240 to 2250	4

2250 to 2260	2
2260 to 2270	3
2270 to 2280	2
2280 to 2290	4
2290 to 2300	2
2300 to 2310	2
2310 to 2320	4
2320 to 2330	0
2330 to 2340	2
2340 to 2350	3
2350 to 2360	4
2360 to 2370	3
2370 to 2380	4
2380 to 2390	2
2390 to 2400	1
2400 to 2410	0
2410 to 2420	5
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2520 to 2530	3
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2640 to 2650	3
2650 to 2660	5
2660 to 2670	2
2670 to 2680	5
2680 to 2690	2
2690 to 2700	0
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2720 to 2730	2
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2750 to 2760	1
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2780 to 2790	2
2790 to 2800	1
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2810 to 2820	2
2820 to 2830	5

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2260 to 2270	4
2270 to 2280	2
2280 to 2290	3
2290 to 2300	4
2300 to 2310	1
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2320 to 2330	3
2330 to 2340	1
2340 to 2350	3
2350 to 2360	3
2360 to 2370	1
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2380 to 2390	4
2390 to 2400	3
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2470 to 2480	3
2480 to 2490	3
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2880 to 2890	3
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3050 to 3060	1
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3080 to 3090	4
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3170 to 3180	2
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3210 to 3220	2
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3260 to 3270	2
3270 to 3280	1
3280 to 3290	1
3290 to 3300	1
3300 to 3310	1
3310 to 3320	1
3320 to 3330	2
3330 to 3340	2
3340 to 3350	0
3350 to 3360	1
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3390 to 3400	0
3400 to 3410	1

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2910 to 2920	3
2920 to 2930	3
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2950 to 2960	1
2960 to 2970	3
2970 to 2980	0
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2990 to 3000	0
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3010 to 3020	3
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3080 to 3090	4
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3210 to 3220	2
3220 to 3230	1
3230 to 3240	1
3240 to 3250	0
3250 to 3260	1
3260 to 3270	2
3270 to 3280	2
3280 to 3290	1
3290 to 3300	1
3300 to 3310	0
3310 to 3320	1
3320 to 3330	3
3330 to 3340	0
3340 to 3350	2
3350 to 3360	0
3360 to 3370	2
3370 to 3380	1
3380 to 3390	1
3390 to 3400	2
3400 to 3410	1

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3430 to 3440	0		3430 to 3440	2
3440 to 3450	0		3440 to 3450	1
3450 to 3460	0		3450 to 3460	0
3460 to 3470	1		3460 to 3470	3
3470 to 3480	1		3470 to 3480	0
3480 to 3490	1		3480 to 3490	0
3490 to 3500	2		3490 to 3500	0
3500 to 3510	1		3500 to 3510	0
3510 to 3520	0		3510 to 3520	0
3520 to 3530	0		3520 to 3530	1
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3550 to 3560	0		3550 to 3560	2
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3580 to 3590	3		3580 to 3590	0
3590 to 3600	0		3590 to 3600	1
3600 to 3610	0		3600 to 3610	4
3610 to 3620	1		3610 to 3620	0
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3640 to 3650	0		3640 to 3650	2
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3680 to 3690	1		3680 to 3690	1
3690 to 3700	2		3690 to 3700	1
3700 to 3710	3		3700 to 3710	0
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3730 to 3740	5		3730 to 3740	0
3740 to 3750	0		3740 to 3750	2
3750 to 3760	0		3750 to 3760	0
3760 to 3770	3		3760 to 3770	4
3770 to 3780	0		3770 to 3780	1
3780 to 3790	0		3780 to 3790	2
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3840 to 3850	0		3840 to 3850	0
3850 to 3860	1		3850 to 3860	2
3860 to 3870	1		3860 to 3870	0
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3880 to 3890	0		3880 to 3890	1
3890 to 3900	2		3890 to 3900	1
3900 to 3910	0		3900 to 3910	0
3910 to 3920	2		3910 to 3920	1
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3960 to 3970	1		3960 to 3970	1
3970 to 3980	1		3970 to 3980	0
3980 to 3990	0		3980 to 3990	2

3990 to 4000	3
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4460 to 4470	0
4470 to 4480	3
4480 to 4490	0
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4510 to 4520	0
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4550 to 4560	1
4560 to 4570	0

3990 to 4000	0
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4010 to 4020	1
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4030 to 4040	0
4040 to 4050	1
4050 to 4060	3
4060 to 4070	0
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4080 to 4090	1
4090 to 4100	2
4100 to 4110	1
4110 to 4120	1
4120 to 4130	0
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4160 to 4170	0
4170 to 4180	1
4180 to 4190	0
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4200 to 4210	0
4210 to 4220	0
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4300 to 4310	1
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4380 to 4390	1
4390 to 4400	0
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5060 to 5070	1
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5130 to 5140	0
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5700 to 5710	1
5710 to 5720	0
5720 to 5730	0

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5320 to 5330	0
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5680 to 5690	1
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5700 to 5710	0
5710 to 5720	0
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5940 to 5950	0
5950 to 5960	0
5960 to 5970	1
5970 to 5980	0
5980 to 5990	0
5990 to 6000	0
6000 or greater	41

5730 to 5740	0
5740 to 5750	0
5750 to 5760	0
5760 to 5770	0
5770 to 5780	0
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5920 to 5930	0
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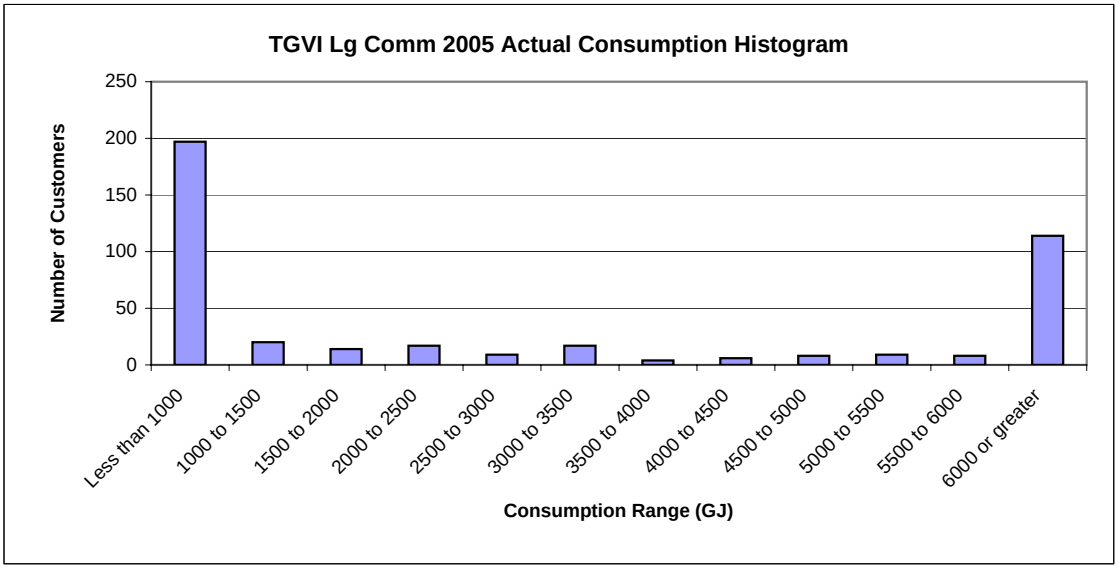
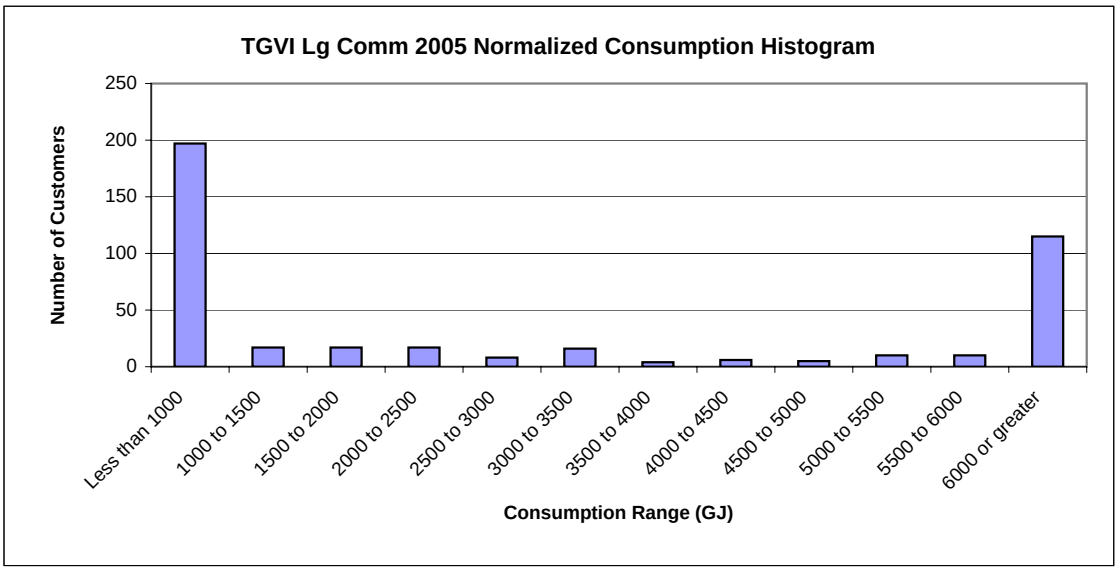
5960 to 5970	0
5970 to 5980	1
5980 to 5990	0
5990 to 6000	0
6000 or greater	43


TGVI Lg Comm 2005 Actual Consumption Histogram
Number of Customers
250
200
150
100
50
0
Less than 1000
1000 to 1500
1500 to 2000
2000 to 2500
2500 to 3000
3000 to 3500
3500 to 4000
4000 to 4500
4500 to 5000
5000 to 5500
5500 to 6000
6000 or greater
Consumption Range (GJ)


TGVI Lg Comm 2005 Normalized Consumption Histogram
Number of Customers
250
200
150
100
50
0
Less than 1000
1000 to 1500
1500 to 2000
2000 to 2500
2500 to 3000
3000 to 3500
3500 to 4000
4000 to 4500
4500 to 5000
5000 to 5500
5500 to 6000
6000 or greater
Consumption Range (GJ)

TGVI Large Commercial = LCS3, HLF & ILF Customers

All customers included in this analysis (even if less than 12 months consumption)

2005 Actuals TGVI Large Commercial	
Range (GJ)	**Customers**
Less than 10	14
10 to 20	6
20 to 30	3
30 to 40	6
40 to 50	10
50 to 60	4
60 to 70	4
70 to 80	6
80 to 90	3
90 to 100	7
100 to 110	4
110 to 120	9
120 to 130	4
130 to 140	7
140 to 150	1
150 to 160	4
160 to 170	7
170 to 180	4
180 to 190	2
190 to 200	2
200 to 210	4
210 to 220	3
220 to 230	4
230 to 240	2
240 to 250	5
250 to 260	4
260 to 270	1
270 to 280	1
280 to 290	3
290 to 300	3
300 to 310	2
310 to 320	2
320 to 330	0
330 to 340	1
340 to 350	0
350 to 360	5
360 to 370	1
370 to 380	1
380 to 390	0
390 to 400	2
400 to 410	3
410 to 420	2
420 to 430	0
430 to 440	3
440 to 450	1
450 to 460	0
460 to 470	0
470 to 480	0
480 to 490	1
490 to 500	0
500 to 510	2

2005 Normalized TGVI Large Commercial	
Range (GJ)	**Customers**
Less than 10	14
10 to 20	6
20 to 30	3
30 to 40	6
40 to 50	9
50 to 60	4
60 to 70	4
70 to 80	7
80 to 90	1
90 to 100	7
100 to 110	5
110 to 120	7
120 to 130	4
130 to 140	8
140 to 150	3
150 to 160	2
160 to 170	8
170 to 180	3
180 to 190	3
190 to 200	2
200 to 210	4
210 to 220	2
220 to 230	4
230 to 240	3
240 to 250	4
250 to 260	4
260 to 270	2
270 to 280	2
280 to 290	2
290 to 300	2
300 to 310	3
310 to 320	1
320 to 330	2
330 to 340	1
340 to 350	0
350 to 360	1
360 to 370	4
370 to 380	1
380 to 390	1
390 to 400	1
400 to 410	2
410 to 420	3
420 to 430	1
430 to 440	1
440 to 450	2
450 to 460	1
460 to 470	0
470 to 480	0
480 to 490	0
490 to 500	1
500 to 510	0

510 to 520	0
520 to 530	2
530 to 540	2
540 to 550	2
550 to 560	0
560 to 570	2
570 to 580	0
580 to 590	1
590 to 600	1
600 to 610	3
610 to 620	1
620 to 630	0
630 to 640	0
640 to 650	1
650 to 660	1
660 to 670	1
670 to 680	1
680 to 690	1
690 to 700	2
700 to 710	3
710 to 720	1
720 to 730	0
730 to 740	0
740 to 750	0
750 to 760	0
760 to 770	0
770 to 780	1
780 to 790	0
790 to 800	0
800 to 810	0
810 to 820	1
820 to 830	0
830 to 840	1
840 to 850	1
850 to 860	0
860 to 870	0
870 to 880	0
880 to 890	0
890 to 900	0
900 to 910	1
910 to 920	1
920 to 930	1
930 to 940	0
940 to 950	0
950 to 960	1
960 to 970	1
970 to 980	0
980 to 990	0
990 to 1000	0
1000 to 1010	0
1010 to 1020	0
1020 to 1030	2
1030 to 1040	1
1040 to 1050	1
1050 to 1060	0
1060 to 1070	1
1070 to 1080	0
1080 to 1090	0

510 to 520	2
520 to 530	0
530 to 540	2
540 to 550	2
550 to 560	2
560 to 570	0
570 to 580	2
580 to 590	0
590 to 600	1
600 to 610	1
610 to 620	3
620 to 630	1
630 to 640	0
640 to 650	0
650 to 660	1
660 to 670	0
670 to 680	1
680 to 690	2
690 to 700	1
700 to 710	0
710 to 720	3
720 to 730	3
730 to 740	0
740 to 750	0
750 to 760	0
760 to 770	0
770 to 780	0
780 to 790	1
790 to 800	0
800 to 810	0
810 to 820	0
820 to 830	0
830 to 840	1
840 to 850	0
850 to 860	1
860 to 870	1
870 to 880	0
880 to 890	0
890 to 900	0
900 to 910	0
910 to 920	1
920 to 930	1
930 to 940	0
940 to 950	1
950 to 960	0
960 to 970	0
970 to 980	1
980 to 990	1
990 to 1000	0
1000 to 1010	0
1010 to 1020	0
1020 to 1030	0
1030 to 1040	0
1040 to 1050	2
1050 to 1060	1
1060 to 1070	1
1070 to 1080	0
1080 to 1090	1

1090 to 1100	0
1100 to 1110	0
1110 to 1120	0
1120 to 1130	0
1130 to 1140	0
1140 to 1150	1
1150 to 1160	0
1160 to 1170	1
1170 to 1180	0
1180 to 1190	0
1190 to 1200	0
1200 to 1210	0
1210 to 1220	1
1220 to 1230	0
1230 to 1240	0
1240 to 1250	0
1250 to 1260	0
1260 to 1270	1
1270 to 1280	0
1280 to 1290	0
1290 to 1300	0
1300 to 1310	0
1310 to 1320	0
1320 to 1330	0
1330 to 1340	2
1340 to 1350	0
1350 to 1360	0
1360 to 1370	0
1370 to 1380	1
1380 to 1390	1
1390 to 1400	1
1400 to 1410	2
1410 to 1420	0
1420 to 1430	0
1430 to 1440	0
1440 to 1450	1
1450 to 1460	0
1460 to 1470	0
1470 to 1480	0
1480 to 1490	3
1490 to 1500	0
1500 to 1510	2
1510 to 1520	0
1520 to 1530	1
1530 to 1540	0
1540 to 1550	0
1550 to 1560	0
1560 to 1570	1
1570 to 1580	1
1580 to 1590	0
1590 to 1600	0
1600 to 1610	1
1610 to 1620	0
1620 to 1630	0
1630 to 1640	0
1640 to 1650	0
1650 to 1660	0
1660 to 1670	1

1090 to 1100	0
1100 to 1110	0
1110 to 1120	0
1120 to 1130	0
1130 to 1140	0
1140 to 1150	0
1150 to 1160	0
1160 to 1170	1
1170 to 1180	0
1180 to 1190	1
1190 to 1200	0
1200 to 1210	0
1210 to 1220	0
1220 to 1230	0
1230 to 1240	1
1240 to 1250	0
1250 to 1260	0
1260 to 1270	0
1270 to 1280	0
1280 to 1290	1
1290 to 1300	0
1300 to 1310	0
1310 to 1320	0
1320 to 1330	0
1330 to 1340	0
1340 to 1350	0
1350 to 1360	0
1360 to 1370	2
1370 to 1380	0
1380 to 1390	0
1390 to 1400	1
1400 to 1410	1
1410 to 1420	0
1420 to 1430	3
1430 to 1440	0
1440 to 1450	0
1450 to 1460	0
1460 to 1470	0
1470 to 1480	1
1480 to 1490	0
1490 to 1500	0
1500 to 1510	1
1510 to 1520	2
1520 to 1530	2
1530 to 1540	0
1540 to 1550	0
1550 to 1560	1
1560 to 1570	0
1570 to 1580	0
1580 to 1590	0
1590 to 1600	1
1600 to 1610	1
1610 to 1620	0
1620 to 1630	1
1630 to 1640	0
1640 to 1650	0
1650 to 1660	0
1660 to 1670	0

1670 to 1680	0
1680 to 1690	0
1690 to 1700	0
1700 to 1710	0
1710 to 1720	1
1720 to 1730	0
1730 to 1740	0
1740 to 1750	0
1750 to 1760	0
1760 to 1770	0
1770 to 1780	0
1780 to 1790	0
1790 to 1800	1
1800 to 1810	0
1810 to 1820	0
1820 to 1830	0
1830 to 1840	0
1840 to 1850	0
1850 to 1860	0
1860 to 1870	0
1870 to 1880	0
1880 to 1890	0
1890 to 1900	1
1900 to 1910	1
1910 to 1920	1
1920 to 1930	1
1930 to 1940	0
1940 to 1950	1
1950 to 1960	0
1960 to 1970	0
1970 to 1980	0
1980 to 1990	0
1990 to 2000	0
2000 to 2010	0
2010 to 2020	1
2020 to 2030	0
2030 to 2040	0
2040 to 2050	1
2050 to 2060	1
2060 to 2070	0
2070 to 2080	1
2080 to 2090	1
2090 to 2100	0
2100 to 2110	0
2110 to 2120	0
2120 to 2130	0
2130 to 2140	1
2140 to 2150	1
2150 to 2160	1
2160 to 2170	0
2170 to 2180	0
2180 to 2190	0
2190 to 2200	0
2200 to 2210	0
2210 to 2220	1
2220 to 2230	0
2230 to 2240	0
2240 to 2250	0

1670 to 1680	0
1680 to 1690	0
1690 to 1700	1
1700 to 1710	0
1710 to 1720	0
1720 to 1730	0
1730 to 1740	0
1740 to 1750	1
1750 to 1760	0
1760 to 1770	0
1770 to 1780	0
1780 to 1790	0
1790 to 1800	0
1800 to 1810	0
1810 to 1820	0
1820 to 1830	1
1830 to 1840	0
1840 to 1850	0
1850 to 1860	0
1860 to 1870	0
1870 to 1880	0
1880 to 1890	0
1890 to 1900	0
1900 to 1910	0
1910 to 1920	0
1920 to 1930	1
1930 to 1940	1
1940 to 1950	1
1950 to 1960	0
1960 to 1970	1
1970 to 1980	1
1980 to 1990	0
1990 to 2000	0
2000 to 2010	0
2010 to 2020	0
2020 to 2030	0
2030 to 2040	0
2040 to 2050	0
2050 to 2060	1
2060 to 2070	0
2070 to 2080	0
2080 to 2090	1
2090 to 2100	1
2100 to 2110	0
2110 to 2120	1
2120 to 2130	1
2130 to 2140	0
2140 to 2150	0
2150 to 2160	0
2160 to 2170	0
2170 to 2180	1
2180 to 2190	1
2190 to 2200	1
2200 to 2210	0
2210 to 2220	0
2220 to 2230	0
2230 to 2240	0
2240 to 2250	0

2250 to 2260	0
2260 to 2270	0
2270 to 2280	1
2280 to 2290	2
2290 to 2300	0
2300 to 2310	0
2310 to 2320	0
2320 to 2330	0
2330 to 2340	0
2340 to 2350	0
2350 to 2360	0
2360 to 2370	0
2370 to 2380	0
2380 to 2390	3
2390 to 2400	0
2400 to 2410	0
2410 to 2420	1
2420 to 2430	0
2430 to 2440	1
2440 to 2450	0
2450 to 2460	0
2460 to 2470	0
2470 to 2480	0
2480 to 2490	0
2490 to 2500	0
2500 to 2510	0
2510 to 2520	0
2520 to 2530	1
2530 to 2540	0
2540 to 2550	1
2550 to 2560	0
2560 to 2570	0
2570 to 2580	0
2580 to 2590	0
2590 to 2600	0
2600 to 2610	0
2610 to 2620	0
2620 to 2630	0
2630 to 2640	0
2640 to 2650	0
2650 to 2660	1
2660 to 2670	0
2670 to 2680	0
2680 to 2690	1
2690 to 2700	0
2700 to 2710	0
2710 to 2720	0
2720 to 2730	0
2730 to 2740	0
2740 to 2750	0
2750 to 2760	1
2760 to 2770	0
2770 to 2780	0
2780 to 2790	0
2790 to 2800	0
2800 to 2810	0
2810 to 2820	0
2820 to 2830	0

2250 to 2260	1
2260 to 2270	0
2270 to 2280	0
2280 to 2290	0
2290 to 2300	0
2300 to 2310	0
2310 to 2320	1
2320 to 2330	2
2330 to 2340	0
2340 to 2350	0
2350 to 2360	0
2360 to 2370	0
2370 to 2380	0
2380 to 2390	0
2390 to 2400	0
2400 to 2410	0
2410 to 2420	0
2420 to 2430	3
2430 to 2440	0
2440 to 2450	0
2450 to 2460	1
2460 to 2470	0
2470 to 2480	1
2480 to 2490	0
2490 to 2500	0
2500 to 2510	0
2510 to 2520	0
2520 to 2530	0
2530 to 2540	0
2540 to 2550	0
2550 to 2560	0
2560 to 2570	1
2570 to 2580	0
2580 to 2590	0
2590 to 2600	1
2600 to 2610	0
2610 to 2620	0
2620 to 2630	0
2630 to 2640	0
2640 to 2650	0
2650 to 2660	0
2660 to 2670	0
2670 to 2680	0
2680 to 2690	0
2690 to 2700	1
2700 to 2710	0
2710 to 2720	0
2720 to 2730	1
2730 to 2740	0
2740 to 2750	0
2750 to 2760	0
2760 to 2770	0
2770 to 2780	0
2780 to 2790	0
2790 to 2800	1
2800 to 2810	0
2810 to 2820	0
2820 to 2830	0

2830 to 2840	0
2840 to 2850	1
2850 to 2860	1
2860 to 2870	1
2870 to 2880	0
2880 to 2890	0
2890 to 2900	0
2900 to 2910	0
2910 to 2920	0
2920 to 2930	0
2930 to 2940	0
2940 to 2950	0
2950 to 2960	0
2960 to 2970	1
2970 to 2980	0
2980 to 2990	0
2990 to 3000	0
3000 to 3010	0
3010 to 3020	0
3020 to 3030	1
3030 to 3040	0
3040 to 3050	0
3050 to 3060	1
3060 to 3070	0
3070 to 3080	0
3080 to 3090	0
3090 to 3100	0
3100 to 3110	0
3110 to 3120	0
3120 to 3130	0
3130 to 3140	1
3140 to 3150	0
3150 to 3160	0
3160 to 3170	0
3170 to 3180	0
3180 to 3190	0
3190 to 3200	0
3200 to 3210	0
3210 to 3220	0
3220 to 3230	0
3230 to 3240	0
3240 to 3250	0
3250 to 3260	1
3260 to 3270	0
3270 to 3280	0
3280 to 3290	0
3290 to 3300	0
3300 to 3310	0
3310 to 3320	0
3320 to 3330	0
3330 to 3340	0
3340 to 3350	0
3350 to 3360	0
3360 to 3370	0
3370 to 3380	0
3380 to 3390	3
3390 to 3400	0
3400 to 3410	0

2830 to 2840	0
2840 to 2850	0
2850 to 2860	0
2860 to 2870	0
2870 to 2880	0
2880 to 2890	0
2890 to 2900	1
2900 to 2910	1
2910 to 2920	1
2920 to 2930	0
2930 to 2940	0
2940 to 2950	0
2950 to 2960	0
2960 to 2970	0
2970 to 2980	0
2980 to 2990	0
2990 to 3000	0
3000 to 3010	0
3010 to 3020	1
3020 to 3030	0
3030 to 3040	0
3040 to 3050	0
3050 to 3060	0
3060 to 3070	0
3070 to 3080	0
3080 to 3090	1
3090 to 3100	0
3100 to 3110	1
3110 to 3120	0
3120 to 3130	0
3130 to 3140	0
3140 to 3150	0
3150 to 3160	0
3160 to 3170	0
3170 to 3180	0
3180 to 3190	1
3190 to 3200	0
3200 to 3210	0
3210 to 3220	0
3220 to 3230	0
3230 to 3240	0
3240 to 3250	0
3250 to 3260	0
3260 to 3270	0
3270 to 3280	0
3280 to 3290	0
3290 to 3300	0
3300 to 3310	1
3310 to 3320	0
3320 to 3330	0
3330 to 3340	0
3340 to 3350	0
3350 to 3360	0
3360 to 3370	0
3370 to 3380	0
3380 to 3390	0
3390 to 3400	0
3400 to 3410	0

3410 to 3420	0
3420 to 3430	0
3430 to 3440	0
3440 to 3450	1
3450 to 3460	0
3460 to 3470	0
3470 to 3480	0
3480 to 3490	0
3490 to 3500	0
3500 to 3510	0
3510 to 3520	0
3520 to 3530	0
3530 to 3540	0
3540 to 3550	0
3550 to 3560	0
3560 to 3570	0
3570 to 3580	0
3580 to 3590	0
3590 to 3600	0
3600 to 3610	0
3610 to 3620	0
3620 to 3630	0
3630 to 3640	0
3640 to 3650	1
3650 to 3660	0
3660 to 3670	0
3670 to 3680	1
3680 to 3690	0
3690 to 3700	0
3700 to 3710	0
3710 to 3720	0
3720 to 3730	0
3730 to 3740	0
3740 to 3750	0
3750 to 3760	0
3760 to 3770	0
3770 to 3780	0
3780 to 3790	0
3790 to 3800	0
3800 to 3810	0
3810 to 3820	1
3820 to 3830	0
3830 to 3840	0
3840 to 3850	0
3850 to 3860	0
3860 to 3870	0
3870 to 3880	0
3880 to 3890	0
3890 to 3900	0
3900 to 3910	0
3910 to 3920	0
3920 to 3930	0
3930 to 3940	0
3940 to 3950	0
3950 to 3960	0
3960 to 3970	0
3970 to 3980	0
3980 to 3990	1

3410 to 3420	0
3420 to 3430	0
3430 to 3440	1
3440 to 3450	2
3450 to 3460	0
3460 to 3470	0
3470 to 3480	0
3480 to 3490	0
3490 to 3500	0
3500 to 3510	1
3510 to 3520	0
3520 to 3530	0
3530 to 3540	0
3540 to 3550	0
3550 to 3560	0
3560 to 3570	0
3570 to 3580	0
3580 to 3590	0
3590 to 3600	0
3600 to 3610	0
3610 to 3620	0
3620 to 3630	0
3630 to 3640	0
3640 to 3650	0
3650 to 3660	0
3660 to 3670	0
3670 to 3680	0
3680 to 3690	0
3690 to 3700	0
3700 to 3710	1
3710 to 3720	0
3720 to 3730	0
3730 to 3740	1
3740 to 3750	0
3750 to 3760	0
3760 to 3770	0
3770 to 3780	0
3780 to 3790	0
3790 to 3800	0
3800 to 3810	0
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3820 to 3830	0
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3850 to 3860	0
3860 to 3870	0
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3890 to 3900	0
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3910 to 3920	0
3920 to 3930	0
3930 to 3940	0
3940 to 3950	0
3950 to 3960	0
3960 to 3970	0
3970 to 3980	0
3980 to 3990	0

3990 to 4000	0
4000 to 4010	0
4010 to 4020	0
4020 to 4030	0
4030 to 4040	0
4040 to 4050	0
4050 to 4060	1
4060 to 4070	0
4070 to 4080	1
4080 to 4090	0
4090 to 4100	0
4100 to 4110	0
4110 to 4120	0
4120 to 4130	0
4130 to 4140	0
4140 to 4150	0
4150 to 4160	0
4160 to 4170	0
4170 to 4180	0
4180 to 4190	1
4190 to 4200	0
4200 to 4210	0
4210 to 4220	0
4220 to 4230	0
4230 to 4240	0
4240 to 4250	0
4250 to 4260	0
4260 to 4270	0
4270 to 4280	0
4280 to 4290	0
4290 to 4300	0
4300 to 4310	0
4310 to 4320	1
4320 to 4330	0
4330 to 4340	0
4340 to 4350	0
4350 to 4360	0
4360 to 4370	0
4370 to 4380	0
4380 to 4390	0
4390 to 4400	0
4400 to 4410	0
4410 to 4420	1
4420 to 4430	0
4430 to 4440	0
4440 to 4450	0
4450 to 4460	0
4460 to 4470	0
4470 to 4480	1
4480 to 4490	0
4490 to 4500	0
4500 to 4510	0
4510 to 4520	0
4520 to 4530	0
4530 to 4540	0
4540 to 4550	0
4550 to 4560	0
4560 to 4570	0

3990 to 4000	0
4000 to 4010	0
4010 to 4020	0
4020 to 4030	0
4030 to 4040	0
4040 to 4050	0
4050 to 4060	1
4060 to 4070	0
4070 to 4080	0
4080 to 4090	0
4090 to 4100	0
4100 to 4110	0
4110 to 4120	0
4120 to 4130	1
4130 to 4140	0
4140 to 4150	0
4150 to 4160	1
4160 to 4170	0
4170 to 4180	0
4180 to 4190	0
4190 to 4200	0
4200 to 4210	0
4210 to 4220	0
4220 to 4230	0
4230 to 4240	0
4240 to 4250	0
4250 to 4260	1
4260 to 4270	0
4270 to 4280	0
4280 to 4290	0
4290 to 4300	0
4300 to 4310	0
4310 to 4320	0
4320 to 4330	0
4330 to 4340	0
4340 to 4350	0
4350 to 4360	0
4360 to 4370	0
4370 to 4380	0
4380 to 4390	0
4390 to 4400	1
4400 to 4410	0
4410 to 4420	0
4420 to 4430	0
4430 to 4440	0
4440 to 4450	0
4450 to 4460	0
4460 to 4470	0
4470 to 4480	0
4480 to 4490	0
4490 to 4500	1
4500 to 4510	0
4510 to 4520	0
4520 to 4530	0
4530 to 4540	0
4540 to 4550	0
4550 to 4560	2
4560 to 4570	0

4570 to 4580	0		4570 to 4580	0
4580 to 4590	0		4580 to 4590	0
4590 to 4600	0		4590 to 4600	0
4600 to 4610	0		4600 to 4610	0
4610 to 4620	0		4610 to 4620	0
4620 to 4630	0		4620 to 4630	0
4630 to 4640	1		4630 to 4640	0
4640 to 4650	0		4640 to 4650	0
4650 to 4660	0		4650 to 4660	0
4660 to 4670	1		4660 to 4670	0
4670 to 4680	0		4670 to 4680	0
4680 to 4690	1		4680 to 4690	0
4690 to 4700	0		4690 to 4700	0
4700 to 4710	0		4700 to 4710	0
4710 to 4720	0		4710 to 4720	0
4720 to 4730	0		4720 to 4730	1
4730 to 4740	0		4730 to 4740	0
4740 to 4750	0		4740 to 4750	1
4750 to 4760	0		4750 to 4760	0
4760 to 4770	0		4760 to 4770	0
4770 to 4780	0		4770 to 4780	1
4780 to 4790	0		4780 to 4790	0
4790 to 4800	0		4790 to 4800	0
4800 to 4810	0		4800 to 4810	0
4810 to 4820	0		4810 to 4820	0
4820 to 4830	0		4820 to 4830	0
4830 to 4840	0		4830 to 4840	0
4840 to 4850	1		4840 to 4850	0
4850 to 4860	0		4850 to 4860	0
4860 to 4870	0		4860 to 4870	0
4870 to 4880	0		4870 to 4880	0
4880 to 4890	0		4880 to 4890	0
4890 to 4900	0		4890 to 4900	0
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4920 to 4930	0		4920 to 4930	0
4930 to 4940	1		4930 to 4940	0
4940 to 4950	0		4940 to 4950	0
4950 to 4960	0		4950 to 4960	0
4960 to 4970	2		4960 to 4970	0
4970 to 4980	0		4970 to 4980	0
4980 to 4990	1		4980 to 4990	0
4990 to 5000	0		4990 to 5000	0
5000 to 5010	0		5000 to 5010	0
5010 to 5020	0		5010 to 5020	1
5020 to 5030	0		5020 to 5030	0
5030 to 5040	0		5030 to 5040	0
5040 to 5050	1		5040 to 5050	1
5050 to 5060	0		5050 to 5060	1
5060 to 5070	0		5060 to 5070	0
5070 to 5080	0		5070 to 5080	1
5080 to 5090	0		5080 to 5090	0
5090 to 5100	1		5090 to 5100	0
5100 to 5110	0		5100 to 5110	0
5110 to 5120	0		5110 to 5120	0
5120 to 5130	0		5120 to 5130	0
5130 to 5140	0		5130 to 5140	1
5140 to 5150	0		5140 to 5150	0

5150 to 5160	1		5150 to 5160	0
5160 to 5170	0		5160 to 5170	0
5170 to 5180	0		5170 to 5180	0
5180 to 5190	0		5180 to 5190	1
5190 to 5200	0		5190 to 5200	0
5200 to 5210	0		5200 to 5210	0
5210 to 5220	1		5210 to 5220	0
5220 to 5230	0		5220 to 5230	0
5230 to 5240	0		5230 to 5240	0
5240 to 5250	0		5240 to 5250	1
5250 to 5260	0		5250 to 5260	0
5260 to 5270	0		5260 to 5270	0
5270 to 5280	0		5270 to 5280	0
5280 to 5290	0		5280 to 5290	0
5290 to 5300	1		5290 to 5300	0
5300 to 5310	0		5300 to 5310	1
5310 to 5320	0		5310 to 5320	0
5320 to 5330	0		5320 to 5330	0
5330 to 5340	0		5330 to 5340	0
5340 to 5350	0		5340 to 5350	0
5350 to 5360	0		5350 to 5360	0
5360 to 5370	1		5360 to 5370	0
5370 to 5380	0		5370 to 5380	0
5380 to 5390	0		5380 to 5390	0
5390 to 5400	0		5390 to 5400	1
5400 to 5410	0		5400 to 5410	0
5410 to 5420	2		5410 to 5420	0
5420 to 5430	0		5420 to 5430	0
5430 to 5440	0		5430 to 5440	0
5440 to 5450	0		5440 to 5450	0
5450 to 5460	0		5450 to 5460	0
5460 to 5470	0		5460 to 5470	1
5470 to 5480	0		5470 to 5480	0
5480 to 5490	1		5480 to 5490	0
5490 to 5500	0		5490 to 5500	0
5500 to 5510	0		5500 to 5510	1
5510 to 5520	0		5510 to 5520	1
5520 to 5530	0		5520 to 5530	0
5530 to 5540	0		5530 to 5540	0
5540 to 5550	1		5540 to 5550	0
5550 to 5560	0		5550 to 5560	0
5560 to 5570	0		5560 to 5570	0
5570 to 5580	0		5570 to 5580	0
5580 to 5590	0		5580 to 5590	1
5590 to 5600	0		5590 to 5600	0
5600 to 5610	0		5600 to 5610	0
5610 to 5620	1		5610 to 5620	0
5620 to 5630	1		5620 to 5630	0
5630 to 5640	0		5630 to 5640	1
5640 to 5650	0		5640 to 5650	0
5650 to 5660	1		5650 to 5660	0
5660 to 5670	0		5660 to 5670	0
5670 to 5680	0		5670 to 5680	0
5680 to 5690	0		5680 to 5690	0
5690 to 5700	0		5690 to 5700	0
5700 to 5710	0		5700 to 5710	0
5710 to 5720	0		5710 to 5720	1
5720 to 5730	0		5720 to 5730	1

5730 to 5740	0
5740 to 5750	0
5750 to 5760	0
5760 to 5770	0
5770 to 5780	0
5780 to 5790	0
5790 to 5800	1
5800 to 5810	1
5810 to 5820	0
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5840 to 5850	0
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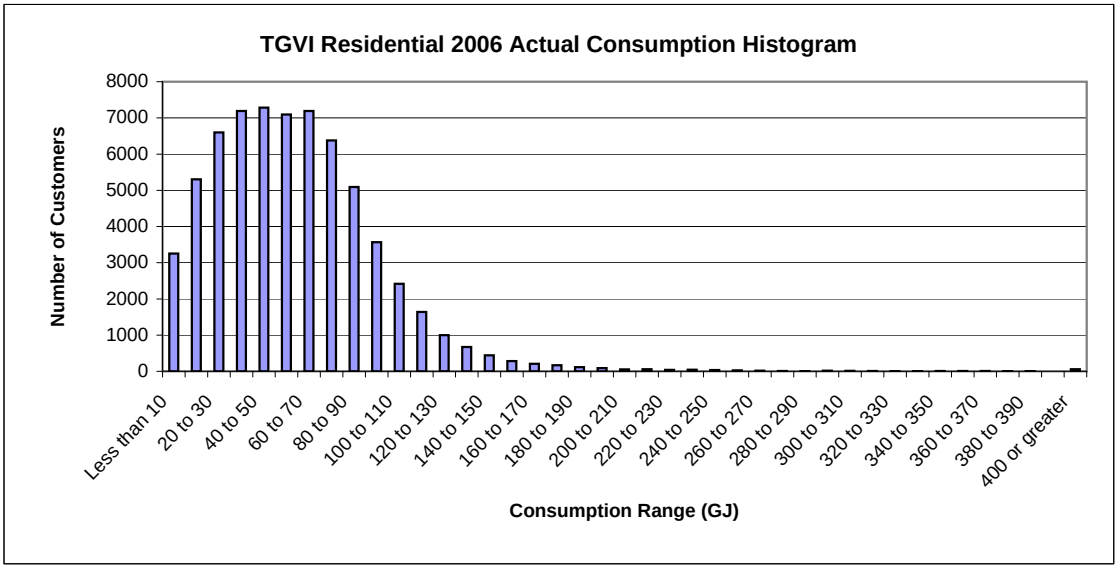
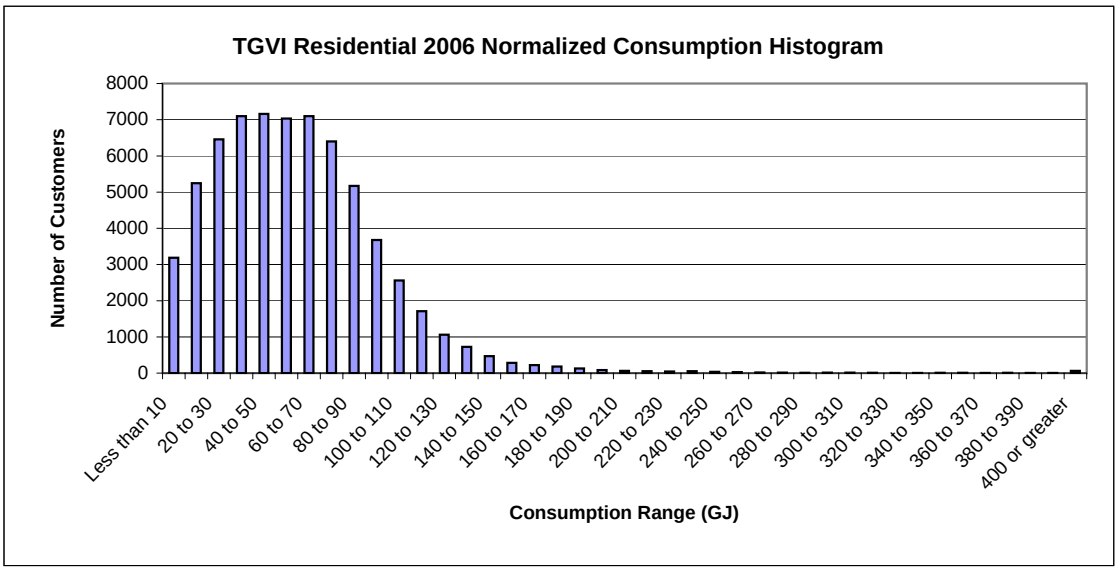
5890 to 5900	0
5900 to 5910	0
5910 to 5920	0
5920 to 5930	0
5930 to 5940	0
5940 to 5950	0
5950 to 5960	1
5960 to 5970	0
5970 to 5980	1
5980 to 5990	0
5990 to 6000	0
6000 or greater	114

5730 to 5740	0
5740 to 5750	0
5750 to 5760	1
5760 to 5770	0
5770 to 5780	0
5780 to 5790	1
5790 to 5800	0
5800 to 5810	0
5810 to 5820	0
5820 to 5830	0
5830 to 5840	0
5840 to 5850	0
5850 to 5860	0
5860 to 5870	0
5870 to 5880	0
5880 to 5890	0
5890 to 5900	1
5900 to 5910	1
5910 to 5920	0
5920 to 5930	0
5930 to 5940	0
5940 to 5950	0
5950 to 5960	0
5960 to 5970	0
5970 to 5980	0
5980 to 5990	0
5990 to 6000	0
6000 or greater	115


TGVI Residential 2006 Actual Consumption Histogram
Number of Customers
8000
7000
6000
5000
4000
3000
2000
1000
0
Less than 10
20 to 30
40 to 50
60 to 70
80 to 90
100 to 110
120 to 130
140 to 150
160 to 170
180 to 190
200 to 210
220 to 230
240 to 250
260 to 270
280 to 290
300 to 310
320 to 330
340 to 350
360 to 370
380 to 390
400 or greater
Consumption Range (GJ)


TGVI Residential 2006 Normalized Consumption Histogram
Number of Customers
8000
7000
6000
5000
4000
3000
2000
1000
0
Less than 10
20 to 30
40 to 50
60 to 70
80 to 90
100 to 110
120 to 130
140 to 150
160 to 170
180 to 190
200 to 210
220 to 230
240 to 250
260 to 270
280 to 290
300 to 310
320 to 330
340 to 350
360 to 370
380 to 390
400 or greater
Consumption Range (GJ)

TGVI Residential = RGS Customers

12 Months consumption is required to be included in this analysis
The 2006 period illustrated is May 2006 - April 2007

2006 Actuals TGVI Residential	
Range (GJ)	**Customers**
Less than 10	3,254
10 to 20	5,305
20 to 30	6,597
30 to 40	7,189
40 to 50	7,283
50 to 60	7,096
60 to 70	7,189
70 to 80	6,378
80 to 90	5,090
90 to 100	3,566
100 to 110	2,418
110 to 120	1,640
120 to 130	999
130 to 140	673
140 to 150	440
150 to 160	283
160 to 170	206
170 to 180	169
180 to 190	115
190 to 200	89
200 to 210	52
210 to 220	56
220 to 230	41
230 to 240	45
240 to 250	34
250 to 260	28
260 to 270	19
270 to 280	10
280 to 290	6
290 to 300	18
300 to 310	13
310 to 320	8
320 to 330	5
330 to 340	6
340 to 350	9
350 to 360	8
360 to 370	8
370 to 380	4
380 to 390	4
390 to 400	2
400 to 410	5
410 to 420	5
420 to 430	5
430 to 440	1
440 to 450	2
450 to 460	1
460 to 470	1
470 to 480	4
480 to 490	3
490 to 500	8

2006 Normalized TGVI Residential	
Range (GJ)	**Customers**
Less than 10	3,188
10 to 20	5,247
20 to 30	6,458
30 to 40	7,100
40 to 50	7,162
50 to 60	7,032
60 to 70	7,097
70 to 80	6,401
80 to 90	5,172
90 to 100	3,678
100 to 110	2,557
110 to 120	1,711
120 to 130	1,059
130 to 140	724
140 to 150	468
150 to 160	285
160 to 170	222
170 to 180	183
180 to 190	127
190 to 200	85
200 to 210	64
210 to 220	51
220 to 230	42
230 to 240	51
240 to 250	36
250 to 260	28
260 to 270	16
270 to 280	15
280 to 290	9
290 to 300	12
300 to 310	15
310 to 320	11
320 to 330	5
330 to 340	6
340 to 350	8
350 to 360	9
360 to 370	5
370 to 380	8
380 to 390	4
390 to 400	3
400 to 410	5
410 to 420	4
420 to 430	5
430 to 440	3
440 to 450	1
450 to 460	2
460 to 470	0
470 to 480	1
480 to 490	7
490 to 500	1

500 to 510	4
510 to 520	3
520 to 530	2
530 to 540	0
540 to 550	0
550 to 560	1
560 to 570	0
570 to 580	1
580 to 590	0
590 to 600	0
600 to 610	1
610 to 620	1
620 to 630	1
630 to 640	0
640 to 650	0
650 to 660	0
660 to 670	0
670 to 680	1
680 to 690	0
690 to 700	0
700 to 710	1
710 to 720	2
720 to 730	1
730 to 740	0
740 to 750	0
750 to 760	1
760 to 770	0
770 to 780	0
780 to 790	0
790 to 800	0
800 to 810	0
810 to 820	1
820 to 830	0
830 to 840	0
840 to 850	0
850 to 860	0
860 to 870	1
870 to 880	0
880 to 890	1
890 to 900	0
900 to 910	0
910 to 920	0
920 to 930	0
930 to 940	0
940 to 950	0
950 to 960	0
960 to 970	0
970 to 980	0
980 to 990	0
990 to 1000	0
1000 to 1010	0
1010 to 1020	0
1020 to 1030	0
1030 to 1040	0
1040 to 1050	0
1050 to 1060	0
1060 to 1070	0
1070 to 1080	0

500 to 510	9
510 to 520	5
520 to 530	0
530 to 540	2
540 to 550	0
550 to 560	1
560 to 570	0
570 to 580	0
580 to 590	1
590 to 600	0
600 to 610	1
610 to 620	0
620 to 630	1
630 to 640	1
640 to 650	0
650 to 660	0
660 to 670	0
670 to 680	1
680 to 690	0
690 to 700	0
700 to 710	0
710 to 720	1
720 to 730	2
730 to 740	1
740 to 750	0
750 to 760	0
760 to 770	1
770 to 780	0
780 to 790	0
790 to 800	0
800 to 810	0
810 to 820	0
820 to 830	1
830 to 840	0
840 to 850	0
850 to 860	0
860 to 870	0
870 to 880	1
880 to 890	0
890 to 900	1
900 to 910	0
910 to 920	0
920 to 930	0
930 to 940	0
940 to 950	0
950 to 960	0
960 to 970	0
970 to 980	0
980 to 990	0
990 to 1000	0
1000 to 1010	0
1010 to 1020	0
1020 to 1030	0
1030 to 1040	0
1040 to 1050	0
1050 to 1060	0
1060 to 1070	0
1070 to 1080	0

1080 to 1090	0
1090 to 1100	0
1100 to 1110	0
1110 to 1120	0
1120 to 1130	0
1130 to 1140	0
1140 to 1150	0
1150 to 1160	0
1160 to 1170	0
1170 to 1180	0
1180 to 1190	0
1190 to 1200	0
1200 to 1210	0
1210 to 1220	0
1220 to 1230	0
1230 to 1240	0
1240 to 1250	1
1250 to 1260	0
1260 to 1270	0
1270 to 1280	0
1280 to 1290	0
1290 to 1300	0
1300 to 1310	0
1310 to 1320	0
1320 to 1330	0
1330 to 1340	0
1340 to 1350	0
1350 to 1360	0
1360 to 1370	0
1370 to 1380	0
1380 to 1390	0
1390 to 1400	0
1400 to 1410	0
1410 to 1420	0
1420 to 1430	0
1430 to 1440	0
1440 to 1450	0
1450 to 1460	0
1460 to 1470	0
1470 to 1480	0
1480 to 1490	0
1490 to 1500	0
1500 to 1510	0
1510 to 1520	0
1520 to 1530	0
1530 to 1540	0
1540 to 1550	0
1550 to 1560	0
1560 to 1570	0
1570 to 1580	0
1580 to 1590	0
1590 to 1600	0
1600 to 1610	0
1610 to 1620	0
1620 to 1630	0
1630 to 1640	0
1640 to 1650	0
1650 to 1660	0

1080 to 1090	0
1090 to 1100	0
1100 to 1110	0
1110 to 1120	0
1120 to 1130	0
1130 to 1140	0
1140 to 1150	0
1150 to 1160	0
1160 to 1170	0
1170 to 1180	0
1180 to 1190	0
1190 to 1200	0
1200 to 1210	0
1210 to 1220	0
1220 to 1230	0
1230 to 1240	0
1240 to 1250	0
1250 to 1260	0
1260 to 1270	1
1270 to 1280	0
1280 to 1290	0
1290 to 1300	0
1300 to 1310	0
1310 to 1320	0
1320 to 1330	0
1330 to 1340	0
1340 to 1350	0
1350 to 1360	0
1360 to 1370	0
1370 to 1380	0
1380 to 1390	0
1390 to 1400	0
1400 to 1410	0
1410 to 1420	0
1420 to 1430	0
1430 to 1440	0
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1470 to 1480	0
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1550 to 1560	0
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1580 to 1590	0
1590 to 1600	0
1600 to 1610	0
1610 to 1620	0
1620 to 1630	0
1630 to 1640	0
1640 to 1650	0
1650 to 1660	0

1660 to 1670	0
1670 to 1680	0
1680 to 1690	0
1690 to 1700	0
1700 to 1710	0
1710 to 1720	0
1720 to 1730	0
1730 to 1740	0
1740 to 1750	0
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1790 to 1800	0
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2010 to 2020	0
2020 to 2030	0
2030 to 2040	0
2040 to 2050	0
2050 to 2060	0
2060 to 2070	0
2070 to 2080	0
2080 to 2090	0
2090 to 2100	0
2100 to 2110	0
2110 to 2120	0
2120 to 2130	0
2130 to 2140	0
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2160 to 2170	0
2170 to 2180	0
2180 to 2190	0
2190 to 2200	0
2200 to 2210	0
2210 to 2220	0
2220 to 2230	0
2230 to 2240	0

1660 to 1670	0
1670 to 1680	0
1680 to 1690	0
1690 to 1700	0
1700 to 1710	0
1710 to 1720	0
1720 to 1730	0
1730 to 1740	0
1740 to 1750	0
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2110 to 2120	0
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2130 to 2140	0
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2160 to 2170	0
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2180 to 2190	0
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2200 to 2210	0
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2220 to 2230	0
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2270 to 2280	0		2270 to 2280	0
2280 to 2290	0		2280 to 2290	0
2290 to 2300	0		2290 to 2300	0
2300 to 2310	0		2300 to 2310	0
2310 to 2320	0		2310 to 2320	0
2320 to 2330	0		2320 to 2330	0
2330 to 2340	0		2330 to 2340	0
2340 to 2350	0		2340 to 2350	0
2350 to 2360	0		2350 to 2360	0
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2380 to 2390	0		2380 to 2390	0
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2500 to 2510	0		2500 to 2510	0
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2590 to 2600	0		2590 to 2600	0
2600 to 2610	0		2600 to 2610	0
2610 to 2620	0		2610 to 2620	0
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2630 to 2640	0		2630 to 2640	0
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2710 to 2720	0		2710 to 2720	0
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2740 to 2750	0		2740 to 2750	0
2750 to 2760	0		2750 to 2760	0
2760 to 2770	0		2760 to 2770	0
2770 to 2780	0		2770 to 2780	0
2780 to 2790	0		2780 to 2790	0
2790 to 2800	0		2790 to 2800	0
2800 to 2810	0		2800 to 2810	0
2810 to 2820	0		2810 to 2820	0

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2850 to 2860	0
2860 to 2870	0
2870 to 2880	0
2880 to 2890	0
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2900 to 2910	0
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2960 to 2970	0
2970 to 2980	0
2980 to 2990	0
2990 to 3000	0
3000 to 3010	0
3010 to 3020	0
3020 to 3030	0
3030 to 3040	0
3040 to 3050	0
3050 to 3060	0
3060 to 3070	0
3070 to 3080	0
3080 to 3090	0
3090 to 3100	0
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3110 to 3120	0
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3190 to 3200	0
3200 to 3210	0
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3230 to 3240	0
3240 to 3250	0
3250 to 3260	0
3260 to 3270	0
3270 to 3280	0
3280 to 3290	0
3290 to 3300	0
3300 to 3310	0
3310 to 3320	0
3320 to 3330	0
3330 to 3340	0
3340 to 3350	0
3350 to 3360	0
3360 to 3370	0
3370 to 3380	0
3380 to 3390	0
3390 to 3400	0

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5950 to 5960	0
5960 to 5970	0
5970 to 5980	0
5980 to 5990	0
5990 to 6000	0
6000 or greater	0

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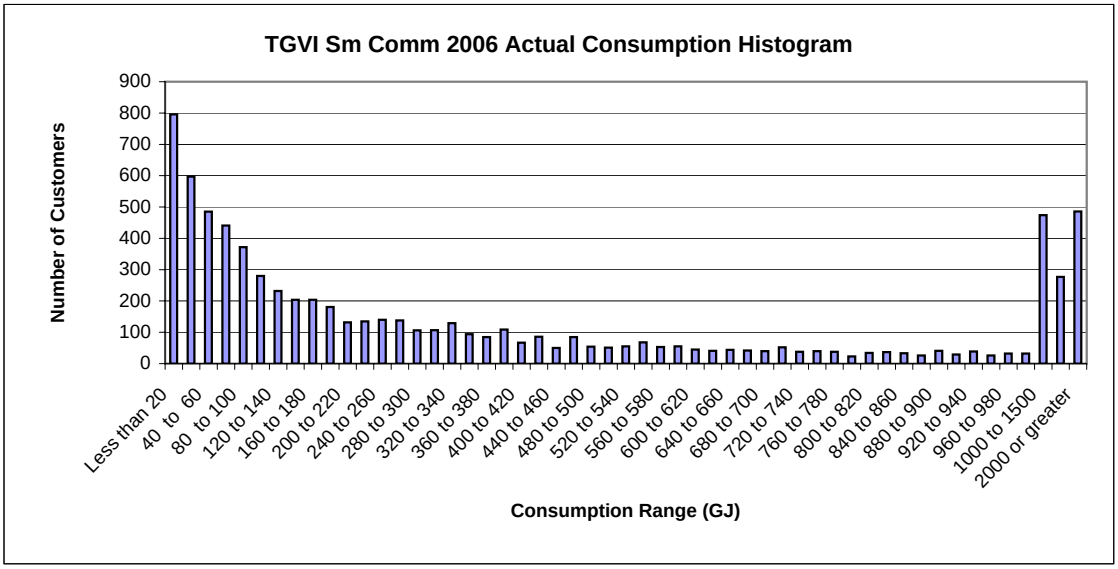
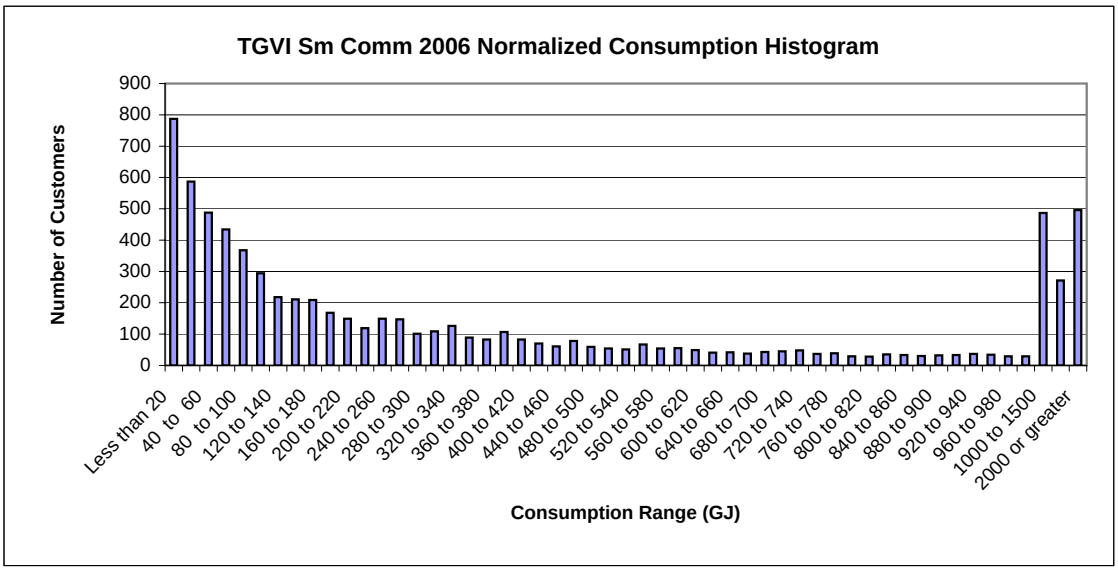
5960 to 5970	0
5970 to 5980	0
5980 to 5990	0
5990 to 6000	0
6000 or greater	0


TGVI Sm Comm 2006 Actual Consumption Histogram
Number of Customers
900
800
700
600
500
400
300
200
100
0
Less than 20
40 to 60
80 to 100
120 to 140
160 to 180
200 to 220
240 to 260
280 to 300
320 to 340
360 to 380
400 to 420
440 to 460
480 to 500
520 to 540
560 to 580
600 to 620
640 to 660
680 to 700
720 to 740
760 to 780
800 to 820
840 to 860
880 to 900
920 to 940
960 to 980
1000 to 1500
2000 or greater
Consumption Range (GJ)


TGVI Sm Comm 2006 Normalized Consumption Histogram
Number of Customers
900
800
700
600
500
400
300
200
100
0
Less than 20
40 to 60
80 to 100
120 to 140
160 to 180
200 to 220
240 to 260
280 to 300
320 to 340
360 to 380
400 to 420
440 to 460
480 to 500
520 to 540
560 to 580
600 to 620
640 to 660
680 to 700
720 to 740
760 to 780
800 to 820
840 to 860
880 to 900
920 to 940
960 to 980
1000 to 1500
2000 or greater
Consumption Range (GJ)

TGVI Small Commercial = AGS, SCS1, SCS2, LCS1 & LCS2 Customers

12 Months consumption is required to be included in this analysis
The 2006 period illustrated is May 2006 - April 2007

2006 Actuals TGVI Small Commercial	
Range (GJ)	**Customers**
Less than 10	441
10 to 20	355
20 to 30	307
30 to 40	290
40 to 50	278
50 to 60	207
60 to 70	210
70 to 80	231
80 to 90	204
90 to 100	168
100 to 110	139
110 to 120	141
120 to 130	119
130 to 140	113
140 to 150	104
150 to 160	100
160 to 170	110
170 to 180	94
180 to 190	87
190 to 200	94
200 to 210	65
210 to 220	67
220 to 230	69
230 to 240	66
240 to 250	70
250 to 260	70
260 to 270	77
270 to 280	61
280 to 290	57
290 to 300	49
300 to 310	50
310 to 320	57
320 to 330	66
330 to 340	63
340 to 350	45
350 to 360	49
360 to 370	45
370 to 380	40
380 to 390	54
390 to 400	55
400 to 410	33
410 to 420	34
420 to 430	40
430 to 440	46
440 to 450	27
450 to 460	23
460 to 470	43
470 to 480	42
480 to 490	27
490 to 500	27

2006 Normalized TGVI Small Commercial	
Range (GJ)	**Customers**
Less than 10	436
10 to 20	351
20 to 30	304
30 to 40	283
40 to 50	283
50 to 60	205
60 to 70	191
70 to 80	243
80 to 90	205
90 to 100	163
100 to 110	143
110 to 120	151
120 to 130	108
130 to 140	110
140 to 150	111
150 to 160	100
160 to 170	114
170 to 180	95
180 to 190	79
190 to 200	89
200 to 210	78
210 to 220	71
220 to 230	62
230 to 240	57
240 to 250	79
250 to 260	70
260 to 270	73
270 to 280	74
280 to 290	52
290 to 300	49
300 to 310	51
310 to 320	58
320 to 330	60
330 to 340	66
340 to 350	44
350 to 360	45
360 to 370	51
370 to 380	32
380 to 390	57
390 to 400	50
400 to 410	40
410 to 420	43
420 to 430	27
430 to 440	43
440 to 450	40
450 to 460	21
460 to 470	40
470 to 480	38
480 to 490	33
490 to 500	26

500 to 510	22
510 to 520	29
520 to 530	28
530 to 540	27
540 to 550	27
550 to 560	41
560 to 570	24
570 to 580	29
580 to 590	22
590 to 600	33
600 to 610	22
610 to 620	23
620 to 630	21
630 to 640	20
640 to 650	25
650 to 660	19
660 to 670	18
670 to 680	24
680 to 690	18
690 to 700	22
700 to 710	24
710 to 720	28
720 to 730	23
730 to 740	15
740 to 750	15
750 to 760	25
760 to 770	20
770 to 780	18
780 to 790	11
790 to 800	12
800 to 810	17
810 to 820	17
820 to 830	17
830 to 840	20
840 to 850	17
850 to 860	16
860 to 870	11
870 to 880	15
880 to 890	18
890 to 900	23
900 to 910	14
910 to 920	15
920 to 930	19
930 to 940	20
940 to 950	15
950 to 960	11
960 to 970	20
970 to 980	12
980 to 990	17
990 to 1000	15
1000 to 1010	17
1010 to 1020	13
1020 to 1030	12
1030 to 1040	14
1040 to 1050	17
1050 to 1060	10
1060 to 1070	8
1070 to 1080	10

500 to 510	26
510 to 520	28
520 to 530	26
530 to 540	25
540 to 550	32
550 to 560	35
560 to 570	29
570 to 580	25
580 to 590	23
590 to 600	32
600 to 610	22
610 to 620	27
620 to 630	21
630 to 640	20
640 to 650	18
650 to 660	24
660 to 670	18
670 to 680	20
680 to 690	24
690 to 700	19
700 to 710	25
710 to 720	20
720 to 730	24
730 to 740	24
740 to 750	17
750 to 760	20
760 to 770	21
770 to 780	18
780 to 790	13
790 to 800	16
800 to 810	12
810 to 820	16
820 to 830	18
830 to 840	17
840 to 850	16
850 to 860	17
860 to 870	16
870 to 880	14
880 to 890	14
890 to 900	18
900 to 910	22
910 to 920	11
920 to 930	17
930 to 940	20
940 to 950	21
950 to 960	13
960 to 970	12
970 to 980	17
980 to 990	15
990 to 1000	14
1000 to 1010	17
1010 to 1020	17
1020 to 1030	14
1030 to 1040	10
1040 to 1050	13
1050 to 1060	17
1060 to 1070	11
1070 to 1080	7

1080 to 1090	6
1090 to 1100	15
1100 to 1110	9
1110 to 1120	11
1120 to 1130	8
1130 to 1140	14
1140 to 1150	12
1150 to 1160	9
1160 to 1170	5
1170 to 1180	12
1180 to 1190	17
1190 to 1200	4
1200 to 1210	7
1210 to 1220	9
1220 to 1230	14
1230 to 1240	10
1240 to 1250	12
1250 to 1260	15
1260 to 1270	4
1270 to 1280	8
1280 to 1290	7
1290 to 1300	17
1300 to 1310	6
1310 to 1320	5
1320 to 1330	6
1330 to 1340	12
1340 to 1350	8
1350 to 1360	13
1360 to 1370	12
1370 to 1380	12
1380 to 1390	11
1390 to 1400	4
1400 to 1410	7
1410 to 1420	11
1420 to 1430	6
1430 to 1440	10
1440 to 1450	5
1450 to 1460	4
1460 to 1470	3
1470 to 1480	8
1480 to 1490	3
1490 to 1500	2
1500 to 1510	7
1510 to 1520	4
1520 to 1530	5
1530 to 1540	2
1540 to 1550	3
1550 to 1560	11
1560 to 1570	8
1570 to 1580	4
1580 to 1590	10
1590 to 1600	6
1600 to 1610	10
1610 to 1620	8
1620 to 1630	4
1630 to 1640	5
1640 to 1650	4
1650 to 1660	5

1080 to 1090	10
1090 to 1100	8
1100 to 1110	14
1110 to 1120	9
1120 to 1130	11
1130 to 1140	7
1140 to 1150	14
1150 to 1160	10
1160 to 1170	9
1170 to 1180	9
1180 to 1190	9
1190 to 1200	15
1200 to 1210	7
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5990 to 6000	0
6000 or greater	41

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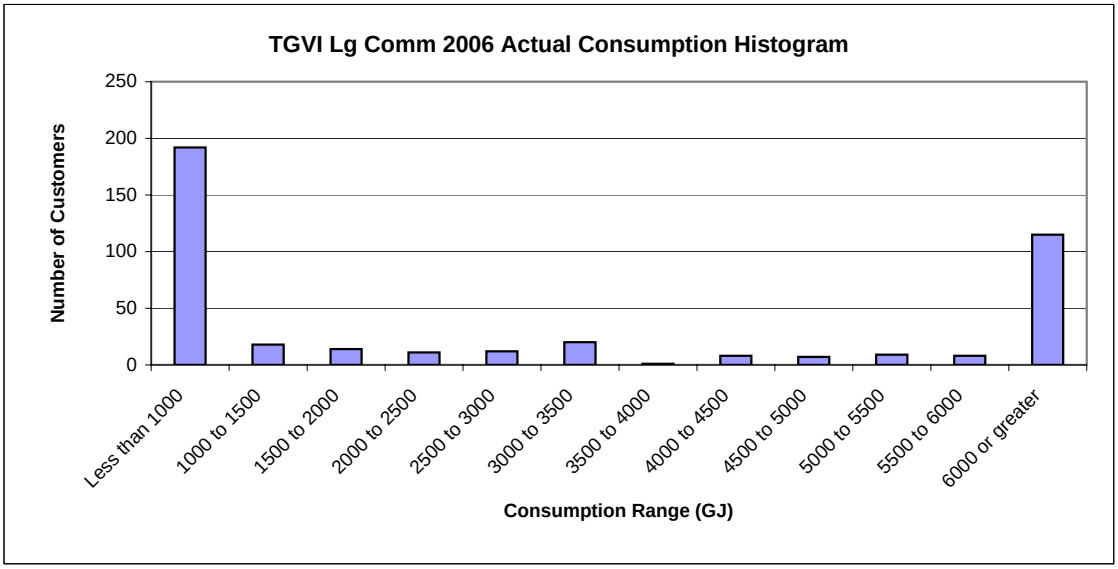
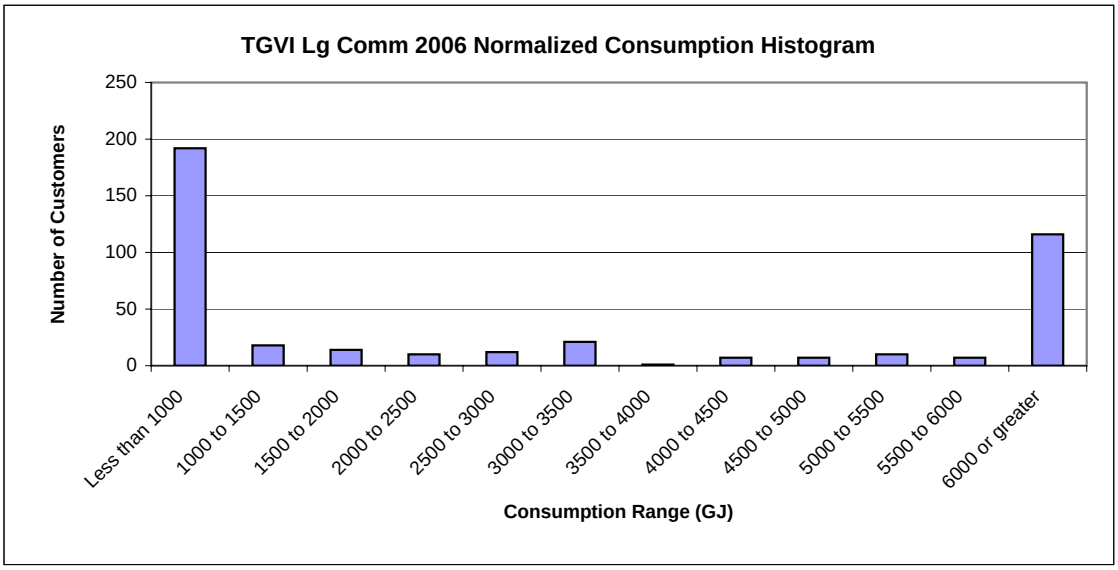
5990 to 6000	0
6000 or greater	42


TGVI Lg Comm 2006 Actual Consumption Histogram
Number of Customers
250
200
150
100
50
0
Less than 1000
1000 to 1500
1500 to 2000
2000 to 2500
2500 to 3000
3000 to 3500
3500 to 4000
4000 to 4500
4500 to 5000
5000 to 5500
5500 to 6000
6000 or greater
Consumption Range (GJ)


TGVI Lg Comm 2006 Normalized Consumption Histogram
Number of Customers
250
200
150
100
50
0
Less than 1000
1000 to 1500
1500 to 2000
2000 to 2500
2500 to 3000
3000 to 3500
3500 to 4000
4000 to 4500
4500 to 5000
5000 to 5500
5500 to 6000
6000 or greater
Consumption Range (GJ)

TGVI Large Commercial = LCS3, HLF & ILF Customers

12 Months consumption is required to be included in this analysis
The 2006 period illustrated is May 2006 - April 2007

2006 Actuals TGVI Large Commercial	
Range (GJ)	**Customers**
Less than 10	15
10 to 20	7
20 to 30	5
30 to 40	6
40 to 50	3
50 to 60	4
60 to 70	3
70 to 80	7
80 to 90	7
90 to 100	3
100 to 110	10
110 to 120	7
120 to 130	4
130 to 140	5
140 to 150	2
150 to 160	3
160 to 170	7
170 to 180	3
180 to 190	3
190 to 200	1
200 to 210	2
210 to 220	1
220 to 230	3
230 to 240	5
240 to 250	0
250 to 260	6
260 to 270	4
270 to 280	4
280 to 290	3
290 to 300	3
300 to 310	2
310 to 320	2
320 to 330	2
330 to 340	2
340 to 350	4
350 to 360	0
360 to 370	0
370 to 380	0
380 to 390	0
390 to 400	1
400 to 410	1
410 to 420	2
420 to 430	1
430 to 440	0
440 to 450	0
450 to 460	2
460 to 470	0
470 to 480	0
480 to 490	1
490 to 500	0

2006 Normalized TGVI Large Commercial	
Range (GJ)	**Customers**
Less than 10	15
10 to 20	7
20 to 30	5
30 to 40	6
40 to 50	3
50 to 60	3
60 to 70	4
70 to 80	7
80 to 90	5
90 to 100	5
100 to 110	8
110 to 120	8
120 to 130	5
130 to 140	4
140 to 150	2
150 to 160	4
160 to 170	7
170 to 180	2
180 to 190	3
190 to 200	2
200 to 210	2
210 to 220	1
220 to 230	3
230 to 240	3
240 to 250	2
250 to 260	4
260 to 270	5
270 to 280	4
280 to 290	4
290 to 300	2
300 to 310	2
310 to 320	1
320 to 330	3
330 to 340	2
340 to 350	4
350 to 360	1
360 to 370	0
370 to 380	0
380 to 390	0
390 to 400	0
400 to 410	1
410 to 420	2
420 to 430	1
430 to 440	1
440 to 450	0
450 to 460	0
460 to 470	2
470 to 480	0
480 to 490	0
490 to 500	1

500 to 510	0
510 to 520	0
520 to 530	5
530 to 540	0
540 to 550	4
550 to 560	1
560 to 570	2
570 to 580	0
580 to 590	3
590 to 600	2
600 to 610	0
610 to 620	1
620 to 630	0
630 to 640	0
640 to 650	0
650 to 660	0
660 to 670	0
670 to 680	2
680 to 690	0
690 to 700	1
700 to 710	3
710 to 720	0
720 to 730	0
730 to 740	2
740 to 750	0
750 to 760	2
760 to 770	1
770 to 780	0
780 to 790	0
790 to 800	2
800 to 810	1
810 to 820	0
820 to 830	0
830 to 840	0
840 to 850	1
850 to 860	0
860 to 870	0
870 to 880	0
880 to 890	0
890 to 900	0
900 to 910	0
910 to 920	0
920 to 930	0
930 to 940	0
940 to 950	0
950 to 960	1
960 to 970	1
970 to 980	0
980 to 990	1
990 to 1000	0
1000 to 1010	2
1010 to 1020	1
1020 to 1030	0
1030 to 1040	1
1040 to 1050	0
1050 to 1060	0
1060 to 1070	0
1070 to 1080	0

500 to 510	0
510 to 520	0
520 to 530	1
530 to 540	4
540 to 550	2
550 to 560	2
560 to 570	1
570 to 580	2
580 to 590	1
590 to 600	3
600 to 610	1
610 to 620	0
620 to 630	1
630 to 640	0
640 to 650	0
650 to 660	0
660 to 670	0
670 to 680	0
680 to 690	2
690 to 700	0
700 to 710	1
710 to 720	3
720 to 730	0
730 to 740	0
740 to 750	2
750 to 760	0
760 to 770	2
770 to 780	1
780 to 790	0
790 to 800	0
800 to 810	2
810 to 820	1
820 to 830	0
830 to 840	0
840 to 850	0
850 to 860	1
860 to 870	0
870 to 880	0
880 to 890	0
890 to 900	0
900 to 910	0
910 to 920	0
920 to 930	0
930 to 940	0
940 to 950	0
950 to 960	0
960 to 970	0
970 to 980	2
980 to 990	0
990 to 1000	1
1000 to 1010	0
1010 to 1020	2
1020 to 1030	1
1030 to 1040	0
1040 to 1050	1
1050 to 1060	0
1060 to 1070	0
1070 to 1080	0

1080 to 1090	0
1090 to 1100	0
1100 to 1110	0
1110 to 1120	0
1120 to 1130	1
1130 to 1140	0
1140 to 1150	1
1150 to 1160	0
1160 to 1170	2
1170 to 1180	1
1180 to 1190	1
1190 to 1200	1
1200 to 1210	0
1210 to 1220	0
1220 to 1230	1
1230 to 1240	0
1240 to 1250	0
1250 to 1260	1
1260 to 1270	0
1270 to 1280	0
1280 to 1290	0
1290 to 1300	1
1300 to 1310	0
1310 to 1320	1
1320 to 1330	0
1330 to 1340	0
1340 to 1350	1
1350 to 1360	0
1360 to 1370	1
1370 to 1380	1
1380 to 1390	0
1390 to 1400	0
1400 to 1410	0
1410 to 1420	0
1420 to 1430	0
1430 to 1440	0
1440 to 1450	0
1450 to 1460	0
1460 to 1470	0
1470 to 1480	0
1480 to 1490	0
1490 to 1500	0
1500 to 1510	0
1510 to 1520	0
1520 to 1530	0
1530 to 1540	0
1540 to 1550	0
1550 to 1560	1
1560 to 1570	2
1570 to 1580	0
1580 to 1590	0
1590 to 1600	0
1600 to 1610	1
1610 to 1620	1
1620 to 1630	0
1630 to 1640	1
1640 to 1650	0
1650 to 1660	0

1080 to 1090	0
1090 to 1100	0
1100 to 1110	0
1110 to 1120	0
1120 to 1130	0
1130 to 1140	1
1140 to 1150	0
1150 to 1160	0
1160 to 1170	1
1170 to 1180	2
1180 to 1190	0
1190 to 1200	1
1200 to 1210	2
1210 to 1220	0
1220 to 1230	0
1230 to 1240	1
1240 to 1250	0
1250 to 1260	0
1260 to 1270	0
1270 to 1280	1
1280 to 1290	0
1290 to 1300	0
1300 to 1310	0
1310 to 1320	1
1320 to 1330	0
1330 to 1340	1
1340 to 1350	0
1350 to 1360	0
1360 to 1370	1
1370 to 1380	0
1380 to 1390	1
1390 to 1400	1
1400 to 1410	0
1410 to 1420	0
1420 to 1430	0
1430 to 1440	0
1440 to 1450	0
1450 to 1460	0
1460 to 1470	0
1470 to 1480	0
1480 to 1490	0
1490 to 1500	0
1500 to 1510	0
1510 to 1520	0
1520 to 1530	0
1530 to 1540	0
1540 to 1550	0
1550 to 1560	0
1560 to 1570	0
1570 to 1580	1
1580 to 1590	2
1590 to 1600	0
1600 to 1610	0
1610 to 1620	0
1620 to 1630	1
1630 to 1640	1
1640 to 1650	0
1650 to 1660	1

1660 to 1670	0
1670 to 1680	1
1680 to 1690	0
1690 to 1700	1
1700 to 1710	0
1710 to 1720	0
1720 to 1730	0
1730 to 1740	0
1740 to 1750	1
1750 to 1760	0
1760 to 1770	1
1770 to 1780	0
1780 to 1790	0
1790 to 1800	0
1800 to 1810	0
1810 to 1820	0
1820 to 1830	0
1830 to 1840	0
1840 to 1850	0
1850 to 1860	0
1860 to 1870	1
1870 to 1880	0
1880 to 1890	1
1890 to 1900	0
1900 to 1910	0
1910 to 1920	0
1920 to 1930	0
1930 to 1940	1
1940 to 1950	0
1950 to 1960	1
1960 to 1970	0
1970 to 1980	0
1980 to 1990	0
1990 to 2000	0
2000 to 2010	2
2010 to 2020	1
2020 to 2030	0
2030 to 2040	0
2040 to 2050	0
2050 to 2060	0
2060 to 2070	2
2070 to 2080	0
2080 to 2090	0
2090 to 2100	1
2100 to 2110	1
2110 to 2120	1
2120 to 2130	0
2130 to 2140	0
2140 to 2150	0
2150 to 2160	0
2160 to 2170	0
2170 to 2180	0
2180 to 2190	0
2190 to 2200	0
2200 to 2210	0
2210 to 2220	0
2220 to 2230	1
2230 to 2240	0

1660 to 1670	0
1670 to 1680	0
1680 to 1690	0
1690 to 1700	1
1700 to 1710	0
1710 to 1720	1
1720 to 1730	0
1730 to 1740	0
1740 to 1750	0
1750 to 1760	0
1760 to 1770	0
1770 to 1780	1
1780 to 1790	1
1790 to 1800	0
1800 to 1810	0
1810 to 1820	0
1820 to 1830	0
1830 to 1840	0
1840 to 1850	0
1850 to 1860	0
1860 to 1870	0
1870 to 1880	0
1880 to 1890	1
1890 to 1900	0
1900 to 1910	1
1910 to 1920	0
1920 to 1930	0
1930 to 1940	0
1940 to 1950	0
1950 to 1960	1
1960 to 1970	0
1970 to 1980	0
1980 to 1990	1
1990 to 2000	0
2000 to 2010	0
2010 to 2020	0
2020 to 2030	0
2030 to 2040	3
2040 to 2050	0
2050 to 2060	0
2060 to 2070	0
2070 to 2080	0
2080 to 2090	0
2090 to 2100	2
2100 to 2110	0
2110 to 2120	0
2120 to 2130	1
2130 to 2140	2
2140 to 2150	0
2150 to 2160	0
2160 to 2170	0
2170 to 2180	0
2180 to 2190	0
2190 to 2200	0
2200 to 2210	0
2210 to 2220	0
2220 to 2230	0
2230 to 2240	0

2240 to 2250	0
2250 to 2260	0
2260 to 2270	0
2270 to 2280	1
2280 to 2290	0
2290 to 2300	0
2300 to 2310	0
2310 to 2320	0
2320 to 2330	0
2330 to 2340	0
2340 to 2350	0
2350 to 2360	0
2360 to 2370	0
2370 to 2380	0
2380 to 2390	0
2390 to 2400	0
2400 to 2410	0
2410 to 2420	0
2420 to 2430	0
2430 to 2440	0
2440 to 2450	0
2450 to 2460	0
2460 to 2470	0
2470 to 2480	1
2480 to 2490	0
2490 to 2500	0
2500 to 2510	0
2510 to 2520	0
2520 to 2530	0
2530 to 2540	1
2540 to 2550	0
2550 to 2560	0
2560 to 2570	0
2570 to 2580	0
2580 to 2590	1
2590 to 2600	0
2600 to 2610	0
2610 to 2620	0
2620 to 2630	0
2630 to 2640	0
2640 to 2650	0
2650 to 2660	0
2660 to 2670	0
2670 to 2680	0
2680 to 2690	0
2690 to 2700	0
2700 to 2710	0
2710 to 2720	1
2720 to 2730	1
2730 to 2740	1
2740 to 2750	1
2750 to 2760	0
2760 to 2770	0
2770 to 2780	0
2780 to 2790	0
2790 to 2800	0
2800 to 2810	1
2810 to 2820	0

2240 to 2250	0
2250 to 2260	1
2260 to 2270	0
2270 to 2280	0
2280 to 2290	0
2290 to 2300	0
2300 to 2310	1
2310 to 2320	0
2320 to 2330	0
2330 to 2340	0
2340 to 2350	0
2350 to 2360	0
2360 to 2370	0
2370 to 2380	0
2380 to 2390	0
2390 to 2400	0
2400 to 2410	0
2410 to 2420	0
2420 to 2430	0
2430 to 2440	0
2440 to 2450	0
2450 to 2460	0
2460 to 2470	0
2470 to 2480	0
2480 to 2490	0
2490 to 2500	0
2500 to 2510	1
2510 to 2520	0
2520 to 2530	0
2530 to 2540	0
2540 to 2550	0
2550 to 2560	0
2560 to 2570	0
2570 to 2580	1
2580 to 2590	0
2590 to 2600	0
2600 to 2610	0
2610 to 2620	1
2620 to 2630	0
2630 to 2640	0
2640 to 2650	0
2650 to 2660	0
2660 to 2670	0
2670 to 2680	0
2680 to 2690	0
2690 to 2700	0
2700 to 2710	0
2710 to 2720	0
2720 to 2730	0
2730 to 2740	0
2740 to 2750	1
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2760 to 2770	1
2770 to 2780	0
2780 to 2790	1
2790 to 2800	0
2800 to 2810	0
2810 to 2820	0

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2880 to 2890	0
2890 to 2900	1
2900 to 2910	0
2910 to 2920	0
2920 to 2930	1
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2940 to 2950	0
2950 to 2960	0
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2970 to 2980	0
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2990 to 3000	1
3000 to 3010	0
3010 to 3020	0
3020 to 3030	0
3030 to 3040	0
3040 to 3050	0
3050 to 3060	1
3060 to 3070	0
3070 to 3080	0
3080 to 3090	0
3090 to 3100	0
3100 to 3110	0
3110 to 3120	0
3120 to 3130	1
3130 to 3140	0
3140 to 3150	0
3150 to 3160	0
3160 to 3170	0
3170 to 3180	1
3180 to 3190	0
3190 to 3200	0
3200 to 3210	0
3210 to 3220	0
3220 to 3230	0
3230 to 3240	0
3240 to 3250	0
3250 to 3260	0
3260 to 3270	0
3270 to 3280	0
3280 to 3290	0
3290 to 3300	0
3300 to 3310	1
3310 to 3320	0
3320 to 3330	0
3330 to 3340	1
3340 to 3350	0
3350 to 3360	0
3360 to 3370	1
3370 to 3380	1
3380 to 3390	1
3390 to 3400	0

2820 to 2830	0
2830 to 2840	0
2840 to 2850	1
2850 to 2860	0
2860 to 2870	0
2870 to 2880	0
2880 to 2890	1
2890 to 2900	1
2900 to 2910	0
2910 to 2920	0
2920 to 2930	0
2930 to 2940	1
2940 to 2950	0
2950 to 2960	1
2960 to 2970	0
2970 to 2980	0
2980 to 2990	0
2990 to 3000	0
3000 to 3010	0
3010 to 3020	0
3020 to 3030	0
3030 to 3040	1
3040 to 3050	0
3050 to 3060	0
3060 to 3070	0
3070 to 3080	0
3080 to 3090	0
3090 to 3100	1
3100 to 3110	0
3110 to 3120	0
3120 to 3130	0
3130 to 3140	0
3140 to 3150	0
3150 to 3160	0
3160 to 3170	1
3170 to 3180	0
3180 to 3190	0
3190 to 3200	0
3200 to 3210	0
3210 to 3220	1
3220 to 3230	0
3230 to 3240	0
3240 to 3250	0
3250 to 3260	0
3260 to 3270	0
3270 to 3280	0
3280 to 3290	0
3290 to 3300	0
3300 to 3310	0
3310 to 3320	0
3320 to 3330	0
3330 to 3340	0
3340 to 3350	1
3350 to 3360	1
3360 to 3370	0
3370 to 3380	0
3380 to 3390	0
3390 to 3400	0

3400 to 3410	0
3410 to 3420	0
3420 to 3430	0
3430 to 3440	0
3440 to 3450	0
3450 to 3460	0
3460 to 3470	0
3470 to 3480	0
3480 to 3490	0
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3660 to 3670	0
3670 to 3680	0
3680 to 3690	0
3690 to 3700	0
3700 to 3710	0
3710 to 3720	0
3720 to 3730	0
3730 to 3740	0
3740 to 3750	0
3750 to 3760	0
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3770 to 3780	0
3780 to 3790	0
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3900 to 3910	0
3910 to 3920	0
3920 to 3930	0
3930 to 3940	0
3940 to 3950	0
3950 to 3960	0
3960 to 3970	0
3970 to 3980	0

3400 to 3410	0
3410 to 3420	1
3420 to 3430	1
3430 to 3440	1
3440 to 3450	0
3450 to 3460	0
3460 to 3470	0
3470 to 3480	0
3480 to 3490	0
3490 to 3500	0
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3550 to 3560	0
3560 to 3570	0
3570 to 3580	0
3580 to 3590	0
3590 to 3600	0
3600 to 3610	1
3610 to 3620	0
3620 to 3630	0
3630 to 3640	0
3640 to 3650	0
3650 to 3660	0
3660 to 3670	0
3670 to 3680	0
3680 to 3690	0
3690 to 3700	0
3700 to 3710	0
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3720 to 3730	0
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3900 to 3910	0
3910 to 3920	0
3920 to 3930	0
3930 to 3940	0
3940 to 3950	0
3950 to 3960	0
3960 to 3970	0
3970 to 3980	0

3980 to 3990	0
3990 to 4000	0
4000 to 4010	0
4010 to 4020	0
4020 to 4030	0
4030 to 4040	0
4040 to 4050	0
4050 to 4060	0
4060 to 4070	1
4070 to 4080	0
4080 to 4090	1
4090 to 4100	0
4100 to 4110	0
4110 to 4120	0
4120 to 4130	0
4130 to 4140	0
4140 to 4150	0
4150 to 4160	0
4160 to 4170	0
4170 to 4180	0
4180 to 4190	0
4190 to 4200	0
4200 to 4210	0
4210 to 4220	0
4220 to 4230	0
4230 to 4240	1
4240 to 4250	0
4250 to 4260	0
4260 to 4270	0
4270 to 4280	0
4280 to 4290	0
4290 to 4300	0
4300 to 4310	0
4310 to 4320	0
4320 to 4330	0
4330 to 4340	0
4340 to 4350	1
4350 to 4360	0
4360 to 4370	0
4370 to 4380	1
4380 to 4390	1
4390 to 4400	0
4400 to 4410	0
4410 to 4420	1
4420 to 4430	0
4430 to 4440	0
4440 to 4450	0
4450 to 4460	0
4460 to 4470	1
4470 to 4480	0
4480 to 4490	0
4490 to 4500	0
4500 to 4510	0
4510 to 4520	0
4520 to 4530	0
4530 to 4540	0
4540 to 4550	0
4550 to 4560	0

3980 to 3990	0
3990 to 4000	0
4000 to 4010	0
4010 to 4020	0
4020 to 4030	0
4030 to 4040	0
4040 to 4050	0
4050 to 4060	0
4060 to 4070	0
4070 to 4080	0
4080 to 4090	0
4090 to 4100	0
4100 to 4110	0
4110 to 4120	1
4120 to 4130	0
4130 to 4140	0
4140 to 4150	1
4150 to 4160	0
4160 to 4170	0
4170 to 4180	0
4180 to 4190	0
4190 to 4200	0
4200 to 4210	0
4210 to 4220	0
4220 to 4230	0
4230 to 4240	0
4240 to 4250	0
4250 to 4260	0
4260 to 4270	0
4270 to 4280	0
4280 to 4290	0
4290 to 4300	1
4300 to 4310	0
4310 to 4320	0
4320 to 4330	0
4330 to 4340	0
4340 to 4350	0
4350 to 4360	0
4360 to 4370	0
4370 to 4380	0
4380 to 4390	0
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4410 to 4420	0
4420 to 4430	0
4430 to 4440	1
4440 to 4450	1
4450 to 4460	0
4460 to 4470	0
4470 to 4480	1
4480 to 4490	0
4490 to 4500	0
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4510 to 4520	0
4520 to 4530	1
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4540 to 4550	0
4550 to 4560	0

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4570 to 4580	0		4570 to 4580	0
4580 to 4590	0		4580 to 4590	0
4590 to 4600	0		4590 to 4600	0
4600 to 4610	0		4600 to 4610	1
4610 to 4620	0		4610 to 4620	0
4620 to 4630	0		4620 to 4630	0
4630 to 4640	0		4630 to 4640	0
4640 to 4650	0		4640 to 4650	0
4650 to 4660	0		4650 to 4660	0
4660 to 4670	0		4660 to 4670	0
4670 to 4680	0		4670 to 4680	0
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4690 to 4700	1		4690 to 4700	0
4700 to 4710	0		4700 to 4710	0
4710 to 4720	0		4710 to 4720	0
4720 to 4730	0		4720 to 4730	0
4730 to 4740	0		4730 to 4740	0
4740 to 4750	0		4740 to 4750	0
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4760 to 4770	0		4760 to 4770	0
4770 to 4780	1		4770 to 4780	0
4780 to 4790	0		4780 to 4790	0
4790 to 4800	0		4790 to 4800	0
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4900 to 4910	0		4900 to 4910	1
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4920 to 4930	0		4920 to 4930	0
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5710 to 5720	0

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5710 to 5720	0

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5740 to 5750	0
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5760 to 5770	0
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5780 to 5790	0
5790 to 5800	0
5800 to 5810	0
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5820 to 5830	0
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5880 to 5890	1
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5920 to 5930	0
5930 to 5940	0
5940 to 5950	0
5950 to 5960	0
5960 to 5970	1
5970 to 5980	0
5980 to 5990	0
5990 to 6000	0
6000 or greater	115

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5760 to 5770	0
5770 to 5780	0
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5790 to 5800	0
5800 to 5810	0
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5870 to 5880	0
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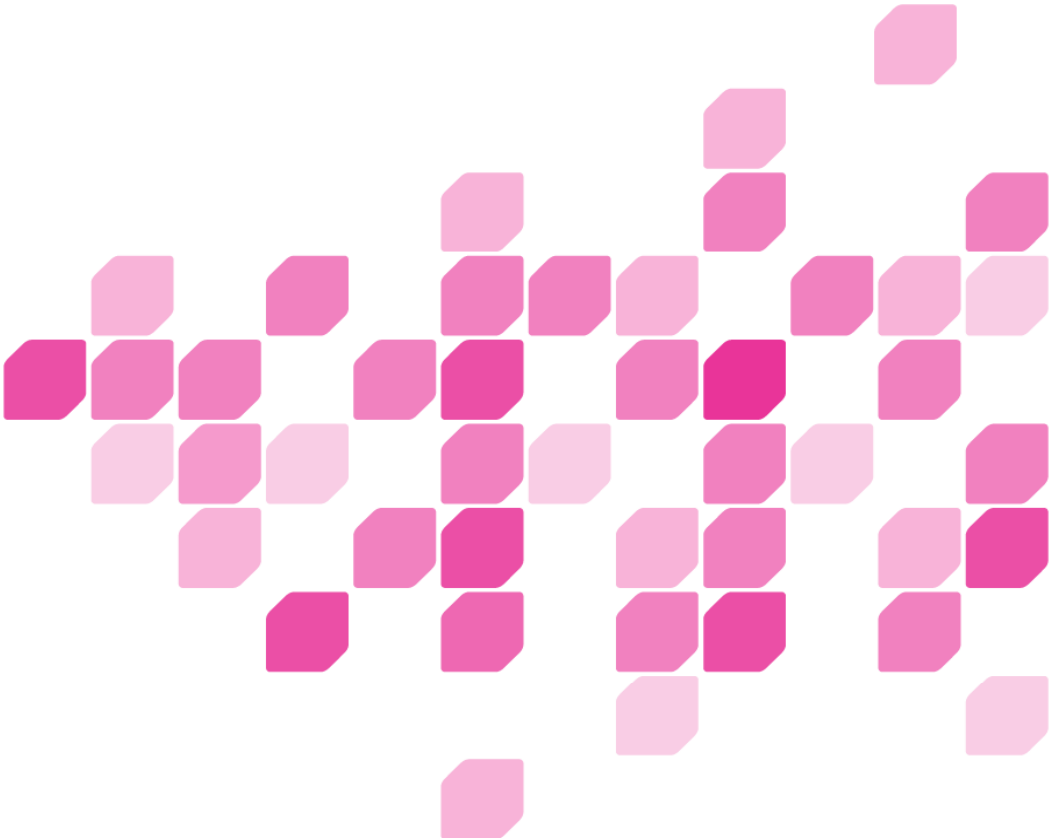
5900 to 5910	0
5910 to 5920	2
5920 to 5930	0
5930 to 5940	0
5940 to 5950	0
5950 to 5960	1
5960 to 5970	0
5970 to 5980	0
5980 to 5990	0
5990 to 6000	0
6000 or greater	116

Attachment 17.1

Terasen Gas
2007 Customer Choice Ad Tracking
August Results

Kelvin Chan
Marina Gilson

(R1187)



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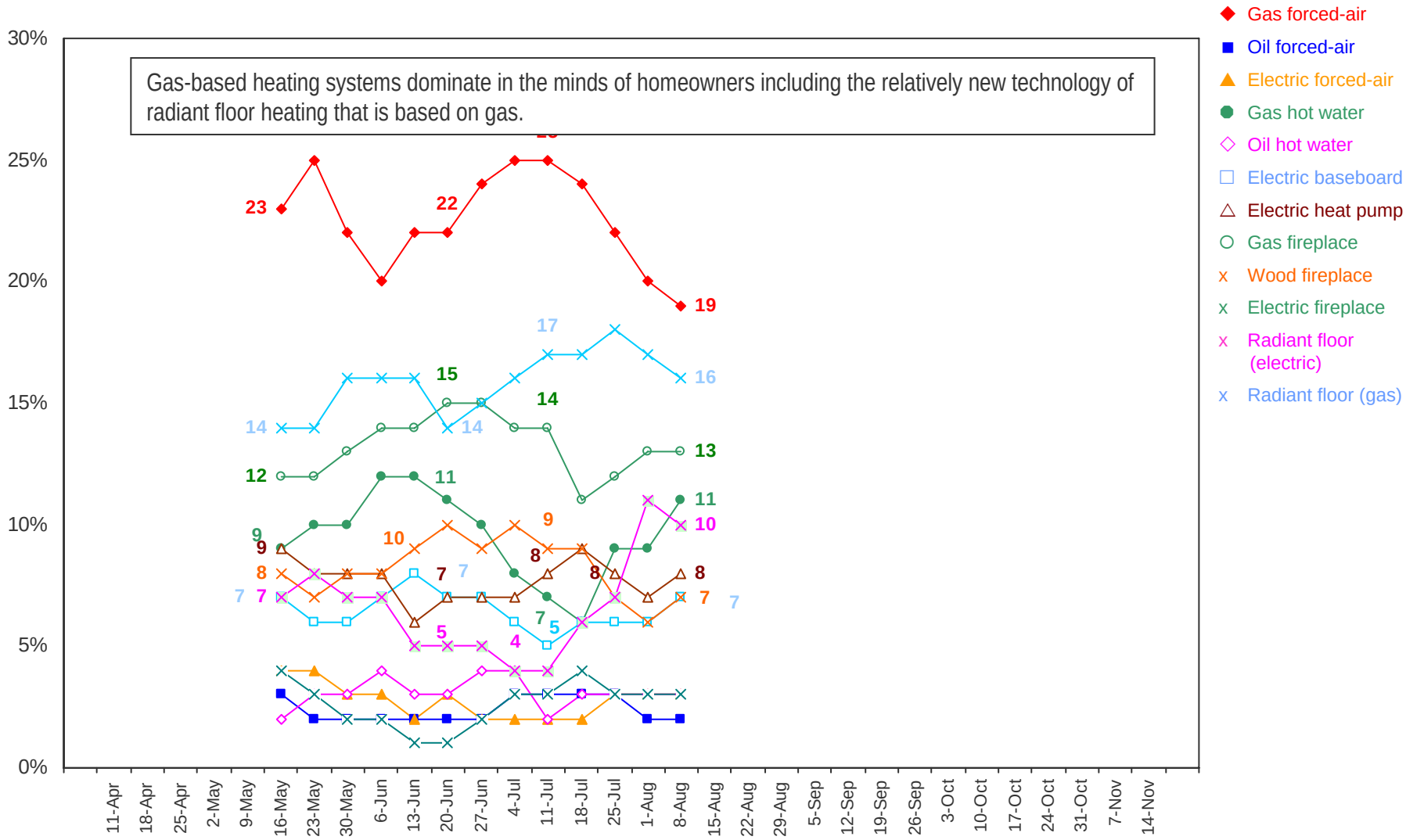
Equity Score and Perceptions of Energy Sources

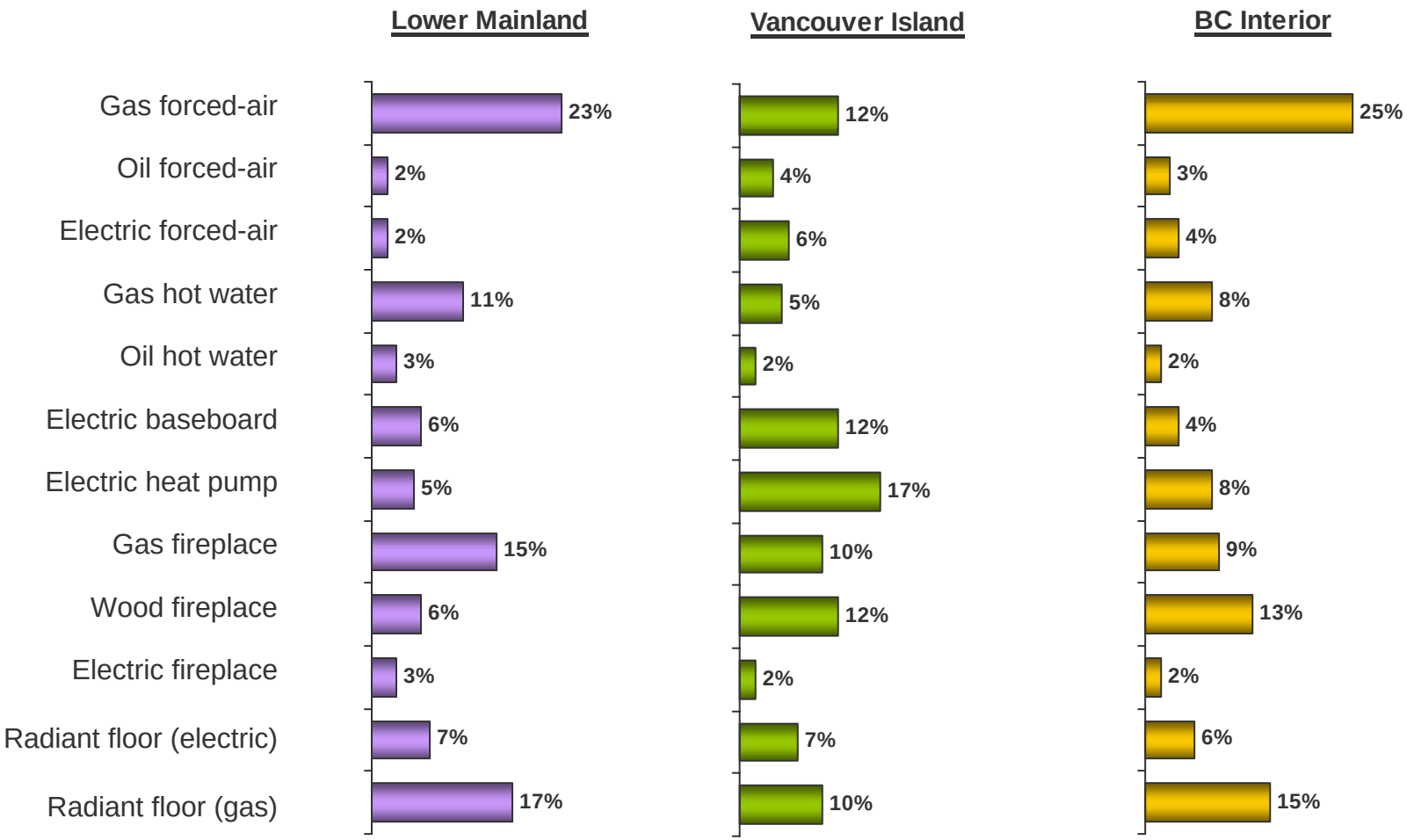
Equity Score (Power in the Mind) of Heating Systems



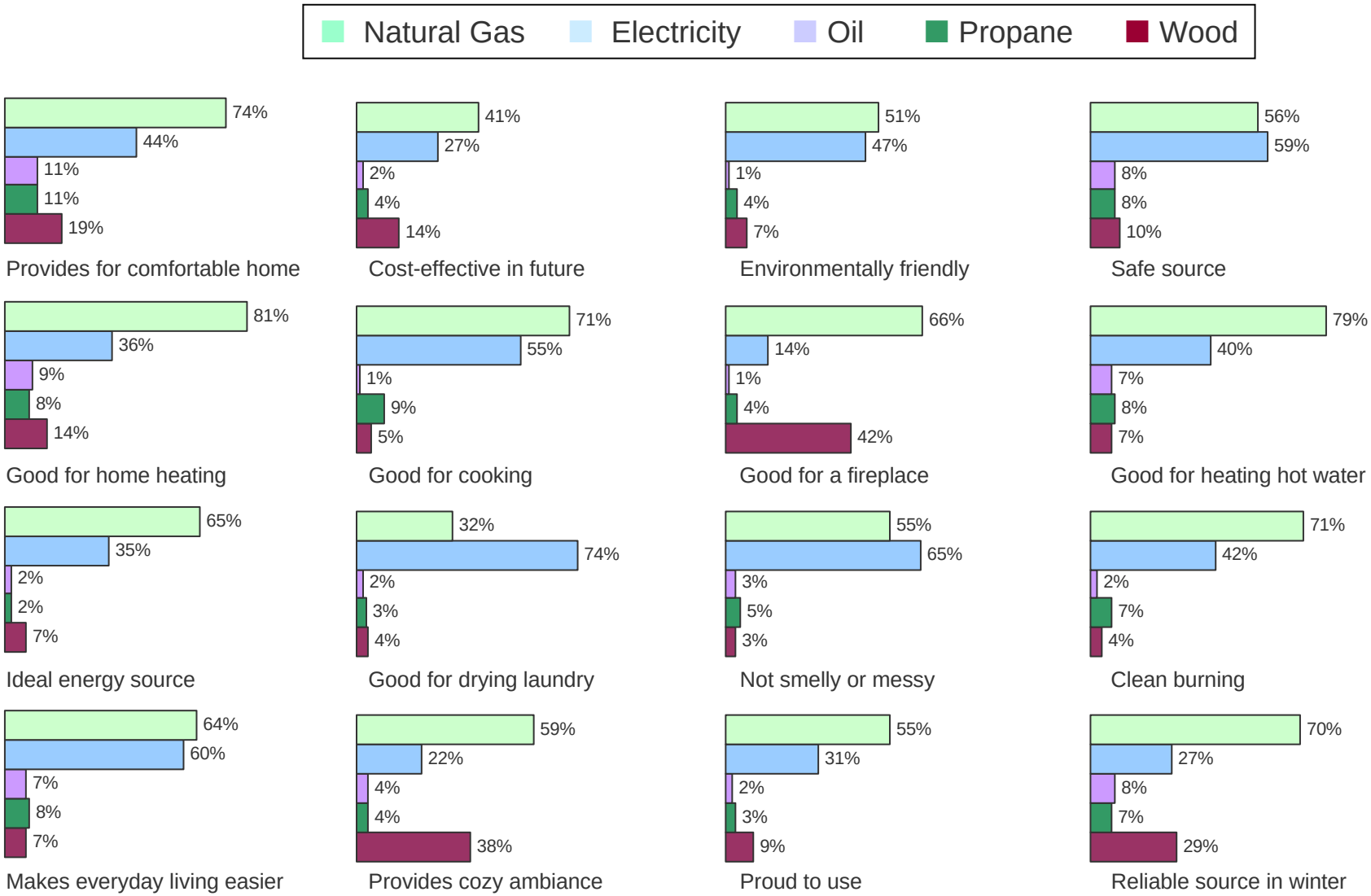
Percent of Homeowners Who Know Their Heating System (4 Weeks Rolling Average)

Equity Score (Power in the Mind) of Heating Systems

Electric heat pumps have the most power in the minds of Vancouver Island homeowners, while gas forced-air heating and radiant floor heating using gas are stronger in the Lower Mainland and BC Interior.

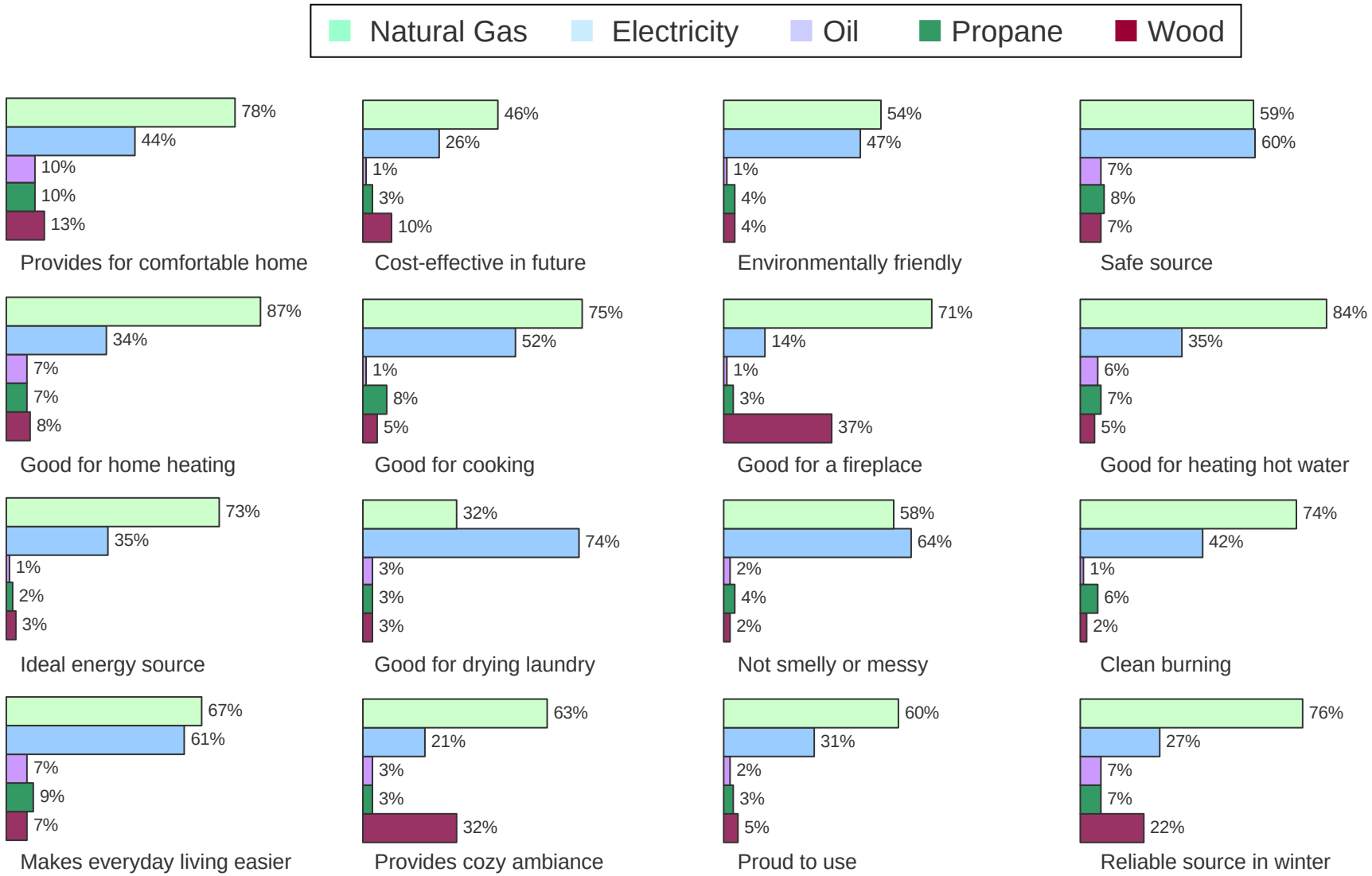


Perceptions of Energy Sources - Total (P1A-P)



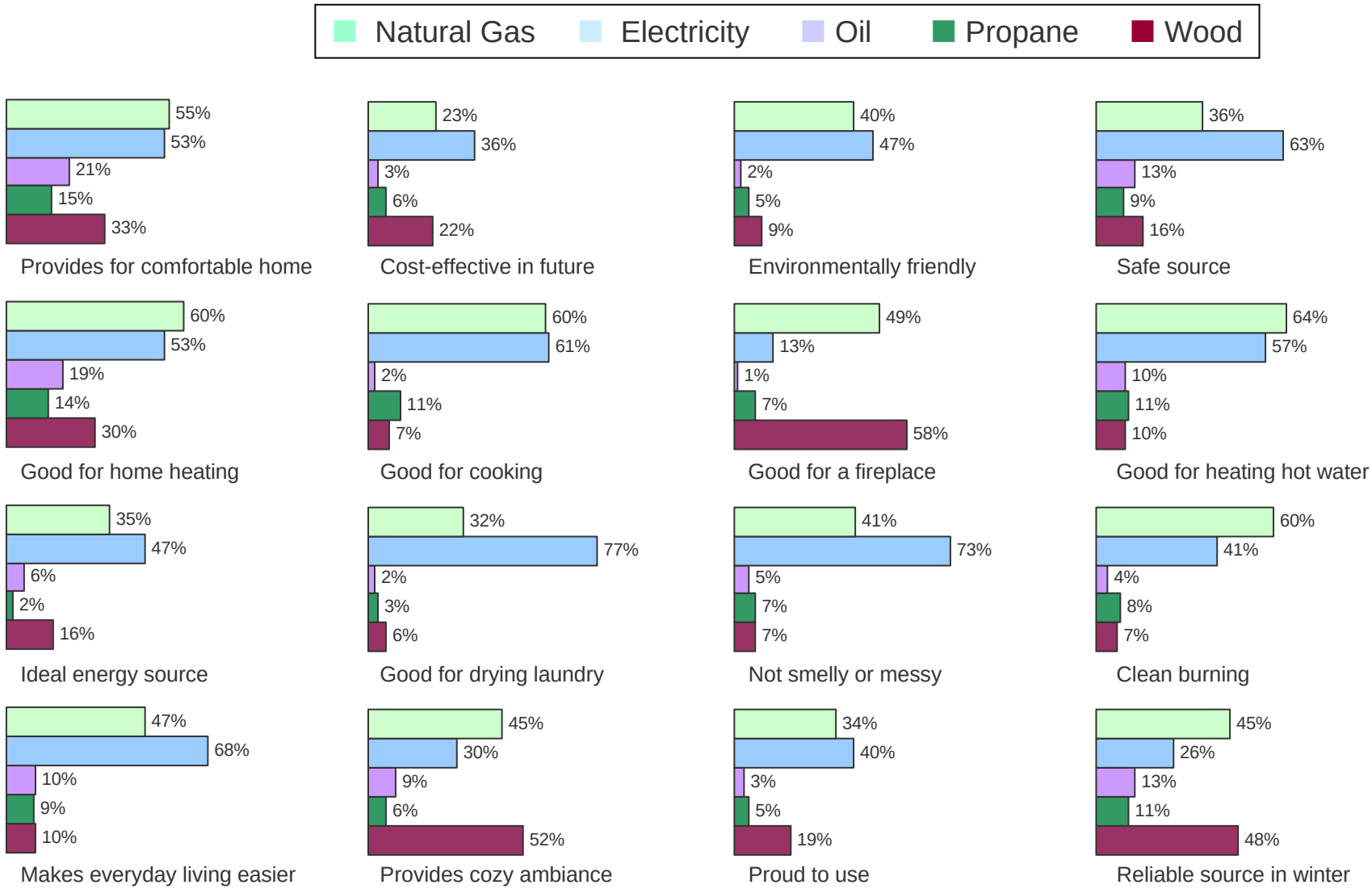
(n=964)

Perceptions of Energy Sources – Lower Mainland
(P1A-P)



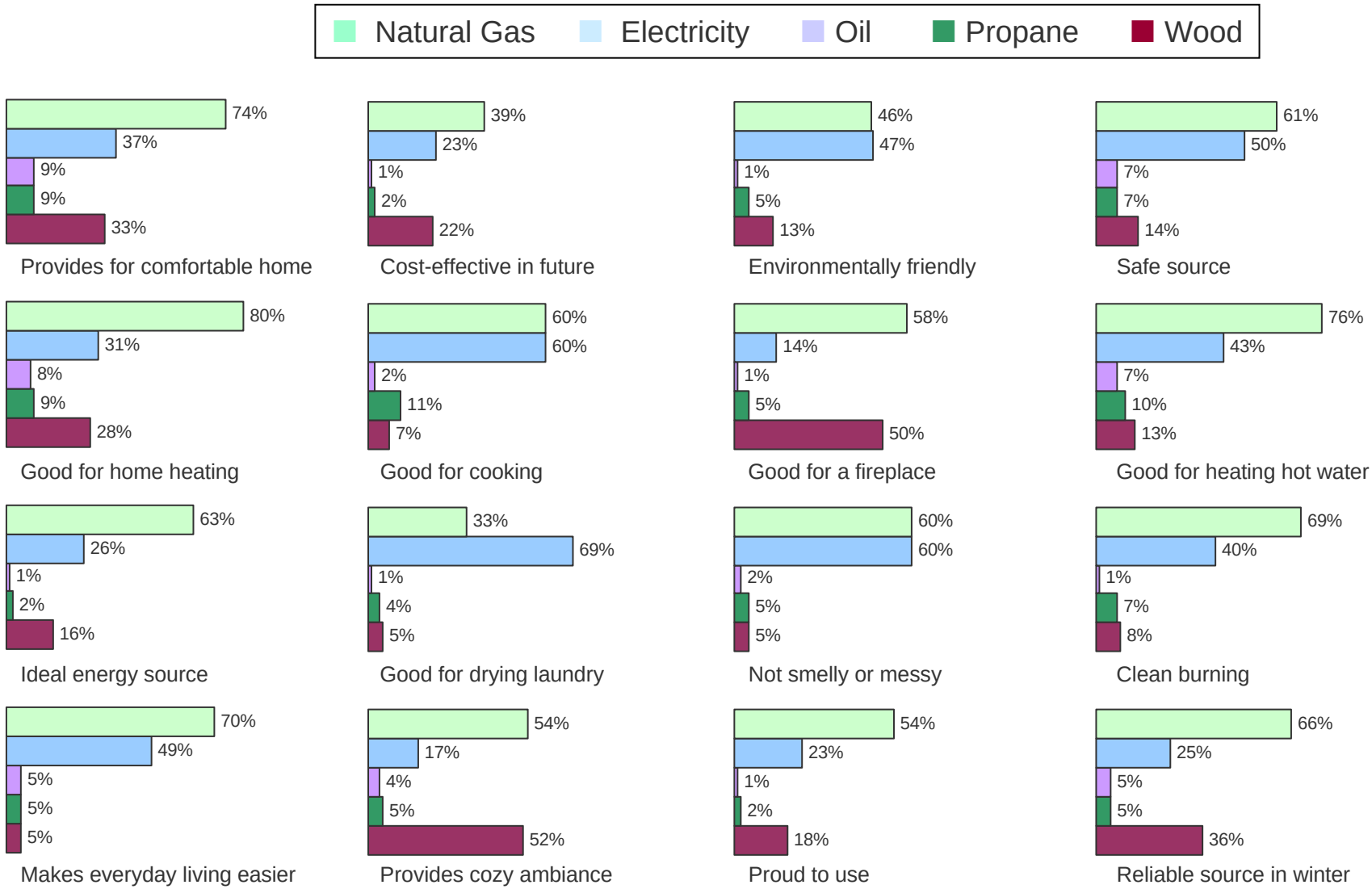
(n=321)

Perceptions of Energy Sources – Vancouver Island
(P1A-P)



(n=321)

Perceptions of Energy Sources – BC Interior (P1A-P)



(n=322)

Summary

Heating System Equity Scores and Perceptions of Energy Sources

- Among the 12 different home heating systems, gas-based heating systems continue to have the greatest equity in the minds of consumers. These levels are not expected to change as a result of the Customer Choice TV ads as the program does not specifically target modification of these attitudes.
- In the Lower Mainland and BC Interior, gas forced-air heating followed by gas-powered radiant floor heating have the most equity in the minds of consumers. After these heating systems, gas fireplaces and gas-powered hot water heating have a significant share of mind in the Lower Mainland, while wood fireplaces are the next most important to those in the Interior. In contrast, Vancouver Island consumers show the greatest commitment and attraction to electric heat pumps.

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Attachment 17.2

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Consumer Preferences

Prepared for Terasen Gas

Prepared by Lorraine Macdonald

Job number 04-0578

Date December 3, 2004

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Research reinvented

TABLE OF CONTENTS

RESEARCH OBJECTIVES & METHODOLOGY

- Terasen Gas wishes to increase penetration of natural gas usage in homes. Therefore, it requires consumer information about fuel preferences for heating and operating appliances. If the results of the study are positive, they will be used to demonstrate to home builders and developers that there is consumer preference for natural gas. If the results do not indicate a preference for natural gas, then they will be used to create increased awareness and preference for natural gas equipment, fireplaces and appliances among consumers.

- Synovate was commissioned to conduct a research study among British Columbians to determine their fuel preferences. The specific objectives of the study are:

  - To determine if there is consumer preference for natural gas equipment, fireplaces and appliances
  - To understand why there is or is not a preference for natural gas
  - To determine the priority consumers place on the fuel used to heat the home and run appliances in the home purchase decision process
  - To determine how to create awareness and/or preference for natural gas equipment

- A total of 8,300 invitations were sent out to Synovate's e-panel; 1167 responded and qualified for inclusion in the study. The fieldwork was conducted from September 16th to 22nd, 2004. The following responses were attained (Note: Respondents can fall into more than one category):

Visited the survey site	3,039
Purchased Home In Past 2 Years	420 (13.8%)
Intend To Purchase In Next 2 Years	567 (18.7%)
Changed Home Heating In Past 2 Years	335 (11.0%)
Changed Cooking Fuel In Past 2 Years	82 (2.7%)
Did not or do not plan to purchase a home, no fuel change	1,872 (61.6%)

- Throughout the report, we have limited our comments only to those differences that have statistical significance at the 95% level of confidence. The key findings of the study are presented in this report. Detailed computer tables that break out each question by key variables has been presented under separate cover.

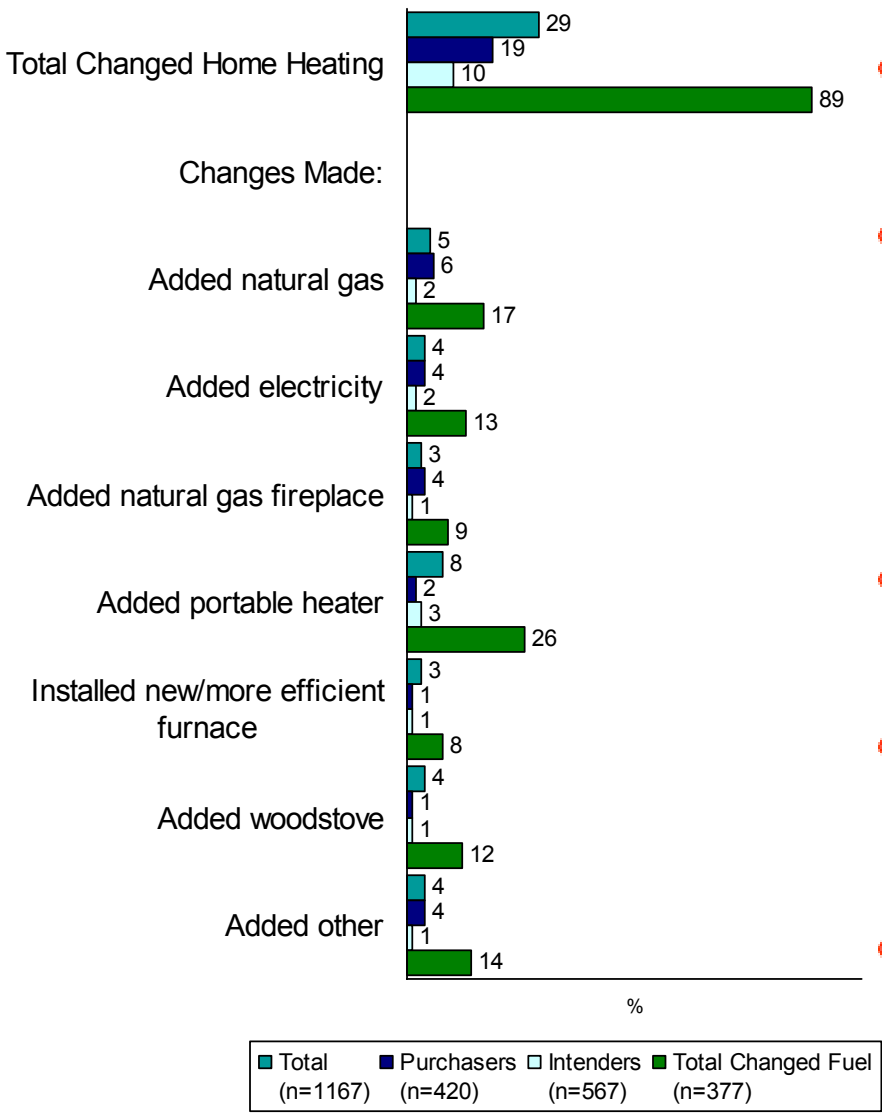
EXECUTIVE SUMMARY

- **There definitely appears to be consumer preference for natural gas equipment, fireplaces and other appliances.** Given the choice, the majority of recent home purchasers and Intenders would opt for natural gas over electricity to heat their home and hot water by a minimum 2.5:1 ratio. For cooking appliances and fireplaces however, the preference for natural gas is not quite as strong as electricity is clearly a viable option for cooking and wood is an option for fireplaces. Clothes dryers was the only use for which natural gas clearly did not have a strong pull.
- **The preference for natural gas is even stronger among those who already have natural gas in their home.**
- **Consumers' perception of the high and/or rising cost of natural gas is the primary deterrent** to using natural gas at all or for all possible uses. **Other main barriers include unfamiliarity with the fuel (or its uses) and a concern over its safety.** On the other hand, consumers who choose natural gas do so because they perceive it to be more cost efficient. It is also preferred because it is a clean burning fuel and therefore, environmentally friendly.
- In addition to there being a preference for natural gas to heat the home, for more than one-half of those intending to purchase a home in the next two years, **the fuel used to heat the home is a very, if not extremely, important criteria in the home purchase decision**. The high importance placed on this criteria is driven by the high cost of fuels and consumers looking for energy efficiency.
- However, compared to home heating, the fuel available for operating appliances is not as important, but still, important to 4 in 10 Intenders. Again, it is the cost of fuel and a desire for energy efficiency that drives this importance rating. For those who only place moderate importance on this criteria, they reason that this can always be changed.
- Younger consumers, and perhaps first time buyers, tend to place less importance on the fuel used for heating and operating appliances in their home purchase decision because to them, the house itself and other factors play a greater role. On the flip side, older consumers place greater importance on fuel (both for heating and operating appliances) as they have definite opinions regarding cost and their own personal preferences.
- To summarize, there is consumer preference for natural gas, especially for home and water heating. Furthermore, this is an important criteria in the home purchase decision. The cooking fuel available is less important in the home purchase decision, as this is likely perceived as being "easier" to change than home heating.
- At least 4 in 10 of those who currently do not heat their home or water with natural gas would choose natural gas for these purposes if given the option. Likewise, 4 in 10 who do not currently cook with natural gas would like to. Since preference for natural gas strengthens once one uses it, the key is to encourage conversions. As such, **in addition to encouraging builders to build with natural gas, the greater opportunity is in expanding consumers' current use of natural gas.**

Terasen Gas' next steps should focus on:

1. Increasing awareness of the various uses of natural gas (especially clothes dryers)
2. Communicating to consumers that natural gas is safe to use, particularly for cooking
3. Communicating the benefits of natural gas (instant heat in cooking, clean compared to wood and cost efficient)
4. Making "conversion" offers that will expand natural gas usage among those who already use natural gas to heat their home and/or water. These should focus on smaller appliances such as fireplaces and cooking appliances as they will likely be more attainable than converting an entire home heating system.

Detailed Findings: Recent Home Heating Changes

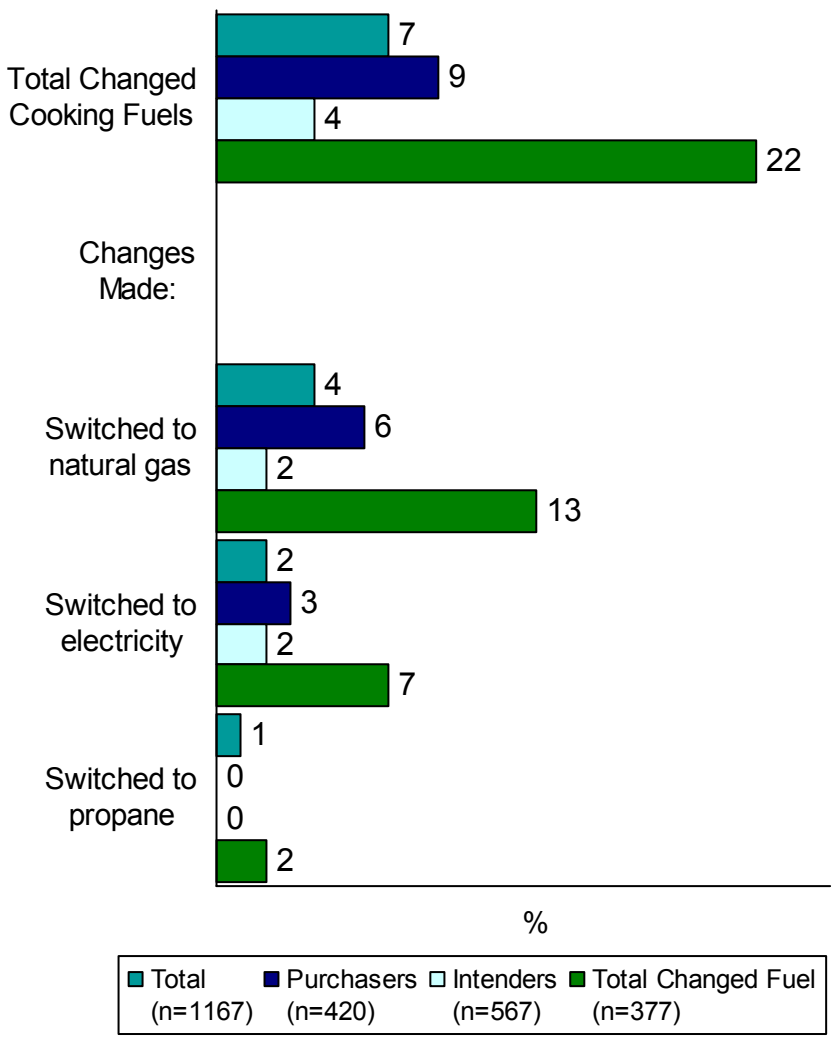


1c. Have you changed your home heating in the past two years?

11% of British Columbians have changed their home heating in the past 2 years.

- Among those who have purchased a home in the last two years, 19% have also changed their home heating within the same timeframe, while half as many of those intending to purchase a home have done the same.
- Among the Purchasers who have changed their home heating within the past two years, adding natural gas was the most common addition. Specifically, 6% of those who have purchased a home in the past two years either took the effort to convert their home heating to natural gas or switched as a result of changing homes. Another 4% added a natural gas fireplace to their new home. Comparatively fewer Purchasers have switched to electricity (4%). Other changes made by a few Purchasers include the addition of a portable heater, the installation of a new furnace, wood stove, wood boiler or heat pump.
- Given that Intenders are planning to move shortly, it follows suit that the most common change in home heating for Intenders is the addition of a portable heater (3%). Very few Intenders have made the investment to switch to natural gas, electricity or even add a natural gas fireplace.
- Of those who have changed home heating or cooking fuel (referred to as Fuel Changers throughout this report) in the past two years, about one-quarter have added a portable heater, while two in ten added natural gas and 9% added a natural gas fireplace. Just over one in ten added each of electricity and/or a woodstove.
- Between the regions, those living on the Island or in the Interior are more likely to have changed their home heating within the past two years (32% each) than those on the Lower Mainland (25%). Moreover, two in ten of those living in single-detached homes on the Island have recently changed their home heating compared with one in ten single detached home dwellers in the other two regions. Half of those on the Island in single-detached homes switched to natural gas.

Detailed Findings: Recent Cooking Fuel Changes

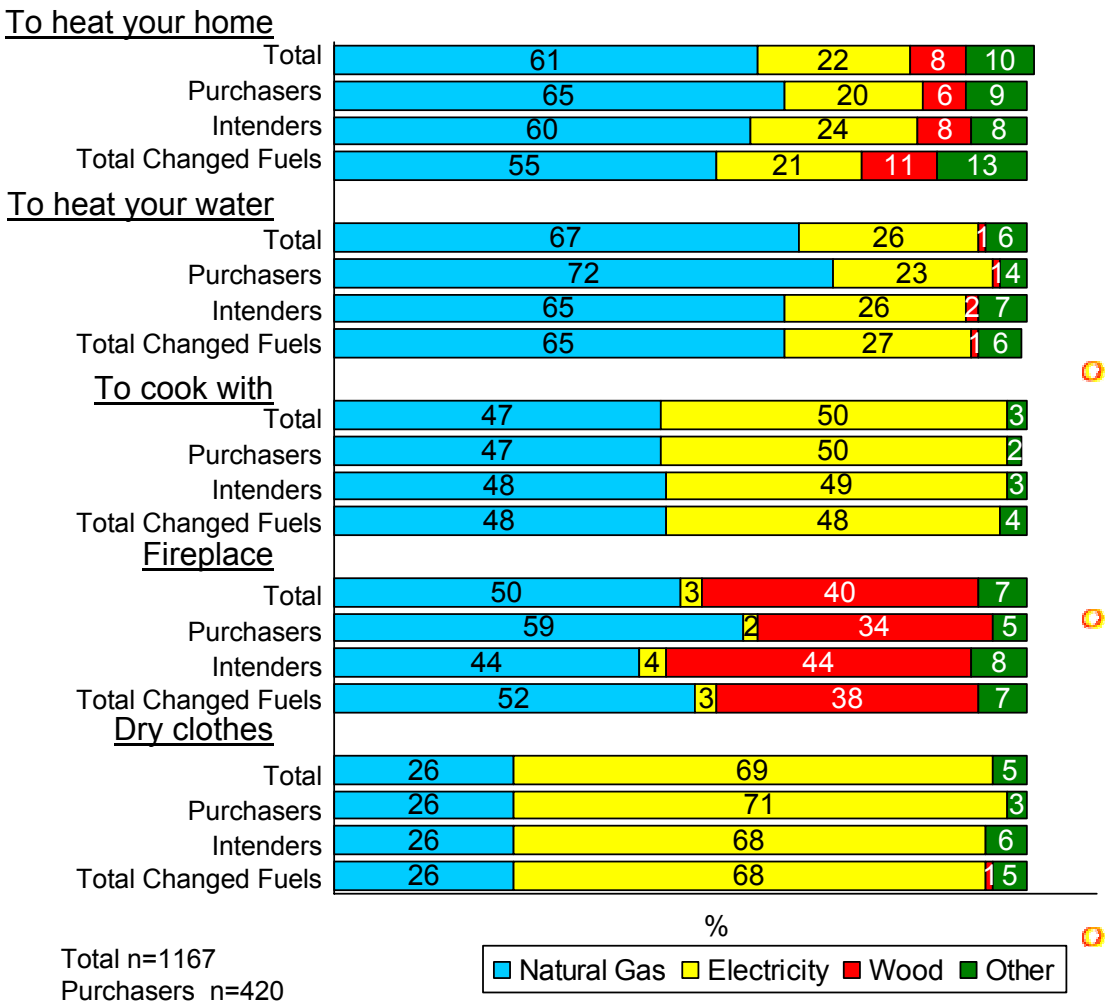


1d. Have you changed your cooking fuel in the past two years?

3% of British Columbians have changed their cooking fuel in the past 2 years.

- Among recent home purchasers, 9% have also changed their cooking fuel in the last two years while half as many Intenders (4%) have done the same. About two in ten Total Fuel Changers have changed cooking fuels.
- Of the few Purchasers who have switched their cooking fuel source, two-thirds have switched to natural gas, while one-third have switched to electricity. However, it is unclear whether these recent changes are due to a preference for these cooking fuels – and therefore, a subsequent change to the new home was made to accommodate such appliances or whether these changes were a result of the new home being equipped with a different cooking fuel.
- Among the few Intenders who have changed their cooking fuel in the past two years, one-half have switched to natural gas while the other half have switched to electricity.
- Just over half of the Fuel Changers who changed cooking fuels changed to natural gas while one-third switched to electricity and the balance are now using propane.
- Regionally, there are not many differences, except that slightly more households on the Lower Mainland switched to electricity compared to the Island and the Interior. Overall however, the majority changed to natural gas.

Detailed Findings: Ideal Fuel Source For Various Uses



Total n=1167
Purchasers n=420
Intenders n=567
Total Changed Fuel n=377

2. Assuming you were building a new home and all fuels were available, what type of fuel would you prefer for each of the following uses?

- If all fuels were available for a new home that was to be built especially for them, over six in ten Recent Purchasers and Intenders would choose natural gas for home heating. Around two in ten would choose electricity and less than one in ten would choose wood. Hardly anyone would choose oil or propane as a fuel to heat their home. Just over half (55%) of those who have changed their home heating and cooking fuel in the past two years would prefer natural gas to heat their homes while only two in ten would choose electricity. Just one in ten would like to use wood.

- Among those who already heat their home with natural gas, 80% would choose to continue using natural gas, although 8% would switch to electricity and 6% actually prefer wood. However, in return, 43% of those who currently heat with electricity would prefer natural gas, as would 34% of those who currently heat with another fuel source.

- Those in the Lower Mainland and Interior are far more likely than those on Vancouver Island to choose natural gas (over six in ten in the Lower Mainland and the Interior vs. 47% on the Island). Moreover, three-quarters (73%) of single-detached dwellers in the Lower Mainland have a stronger preference for natural gas for home heating over other fuels than people in the same type of housing in the other regions (48% on the Island and 63% in the Interior).

- Almost one-third (28%) of those who live on the Island would opt for electricity and a similar proportion of those on the Lower Mainland (mostly condo dwellers) would also choose electricity, which is significantly higher than in the Interior (13%). About one in ten residents in the Interior and on the Island would prefer to use wood to heat their homes compared to only 2% of those in the Lower Mainland.

Continued…

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Detailed Findings: Ideal Fuel Source For Various Uses (continued)

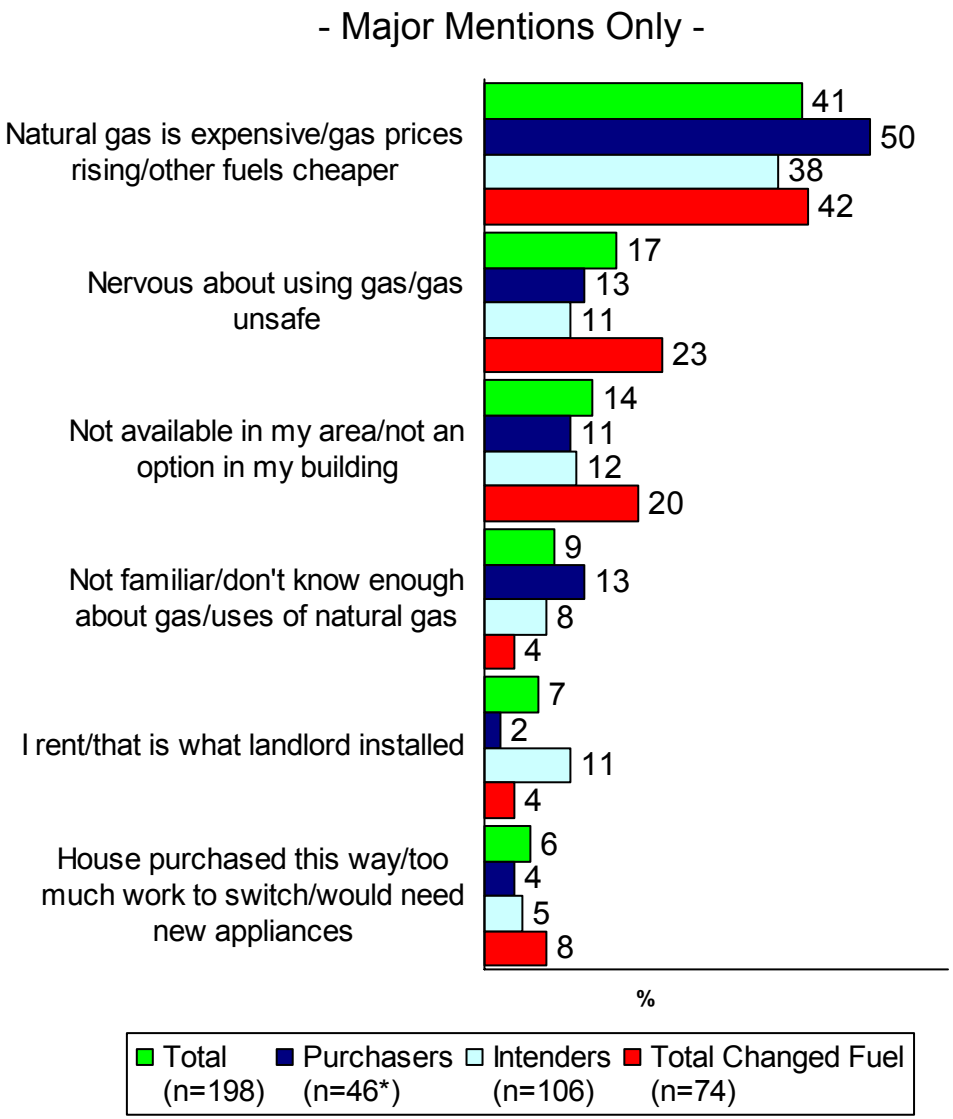
- There is also a clear preference to using natural gas to heat water. Around seven in ten Purchasers would choose natural gas while only two in ten would choose electricity. Compared to Purchasers, slightly fewer Intenders would chose natural gas and a few more would chose electricity to heat their water. "Total Fuel Changers" are very similar to Intenders – about two-thirds prefer natural gas and one-third prefer electricity. Again, those in the Lower Mainland (73%) and Interior (64%) are far more likely than those on Vancouver Island (55%) to choose natural gas to heat water. Likewise, those who currently use natural gas to heat their water would stay with this fuel (85%), while 50% of those who use other fuel sources to heat their water would switch to natural gas if they could. Most noteworthy, 44% of those who currently use electricity to heat water would rather use natural gas.

- When it comes to preferred fuel sources for cooking, there is an even split between electricity and natural gas. This applies to Purchasers, Intenders and Fuel Changers. Very few Purchasers, Intenders or Fuel Changers would use any other fuel source given the choice. When viewing these findings by region, those in the Lower Mainland are more likely to choose Natural Gas than those in the Interior (54% vs. 35% respectively), while those living in the Interior are slightly more likely than those in the Lower Mainland to prefer electricity for cooking (60% vs. 44% respectively). Those living on the Island are equally likely to choose natural gas as they are to choose electricity. The large majority (82%) of those who already use natural gas for cooking would continue to use natural gas. Only 14% of those who currently have a natural gas cooking appliance would want to switch to electricity if they could. In contrast, 41% of those who do not have a natural gas cooking appliance would prefer to cook with one. Condo dwellers have a higher preference to cook with natural gas than all others (55% vs. 47% in single-detached homes and 42% in other dwelling types).

- For fireplaces, natural gas is the preferred fuel source for those who have recently purchased a home (59%), followed by wood (34%). No other fuel source is in the running as an option to fuel fireplaces. For Intenders, the same two fuel sources are preferred except they are preferred equally. Fuel Changers slightly prefer natural gas (52%) over wood (38%). Natural gas is clearly the preferred fuel source for fireplaces among those living in the Lower Mainland (59%), while wood is more preferred among those living on Vancouver Island or in the Interior (46%).

- By far, electricity beats out natural gas as the preferred fuel source for clothes dryers. Around seven in ten Purchasers, Intenders and Fuel Changers would prefer electric clothes dryers while only one-quarter of Purchasers and Intenders would like to have a natural gas clothes dryer. While electricity is the fuel of choice regionally, households on the Island appear to be more receptive to the idea of using gas clothes dryers than those in the other two regions (32% compared with 25% in the Lower Mainland and 22% in the Interior).

Detailed Findings: Reasons For Not Choosing Any Natural Gas



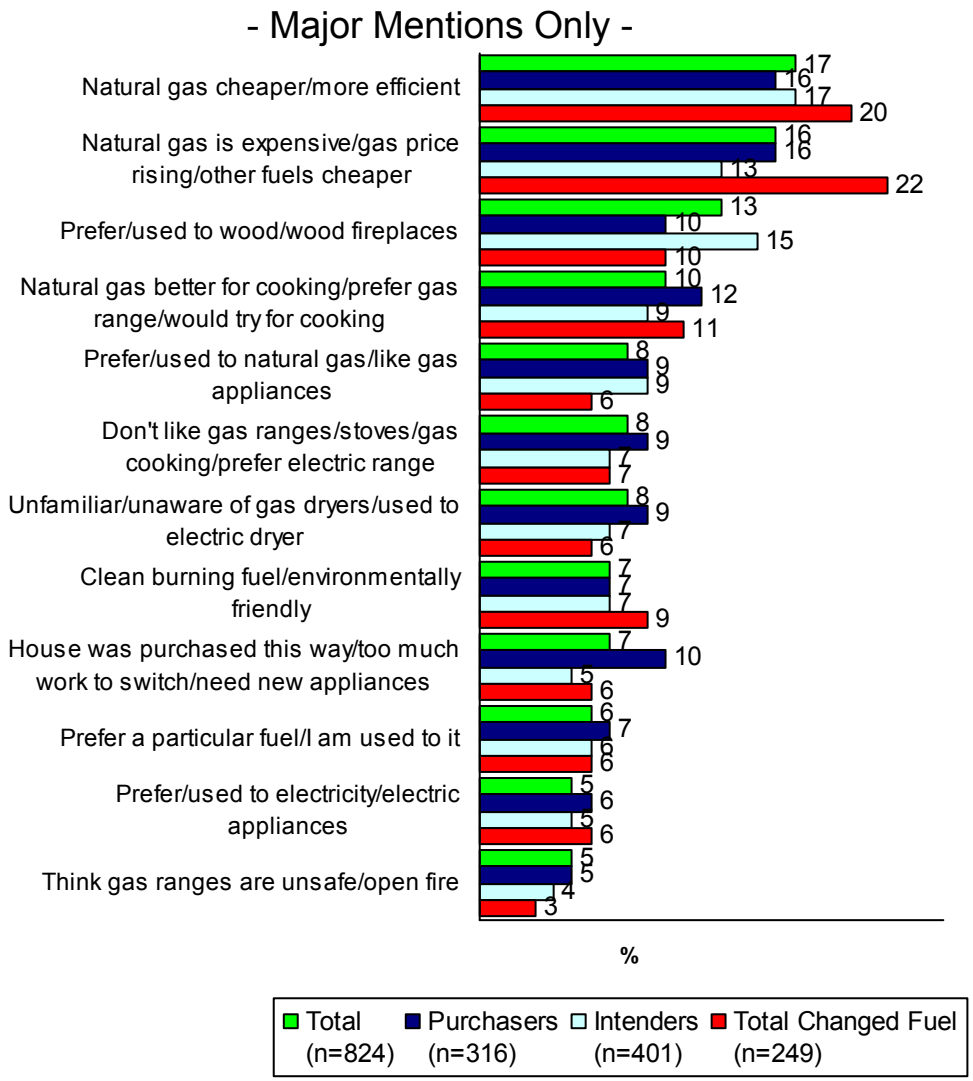
Note: only mentions above 5% are shown.

*Caution: small base size.

3a. Please briefly tell us why you have not chosen natural gas for any use.

- For the few who have not chosen natural gas for any use, the main reason is due to the perception that natural gas is expensive relative to other fuel sources. The next most common reasons for not choosing natural gas relate to a lack of awareness or unfamiliarity with the product. Specifically, one in ten Purchasers and Intenders are uneasy about natural gas or they believe that it is not safe, while twice as many Fuel Changers express this concern. Around one in ten Purchasers and Intenders and half as many Fuel Changers admit to not being knowledgeable about the fuel source in general.
- Availability of natural gas is also a barrier (either it is not available in the building, area, or residents must stick with what their landlord has installed). Meanwhile, others believe that it would be too much of an effort to switch.
- The price of natural gas is a concern for over half (54%) of residents in the Interior. Safety appears to be an issue for Island dwellers with 26% citing this as a reason for not choosing natural gas as a fuel source in the home. About one in ten living in the Lower Mainland and on the Island say they are not familiar or don't know enough about natural gas (11% and 14% respectively).

Detailed Findings: Reasons For Not Choosing Natural Gas For All Uses



Note: only mentions above 5% are shown.

3b. Please briefly tell us why you have chosen natural gas for some uses, but not all uses.

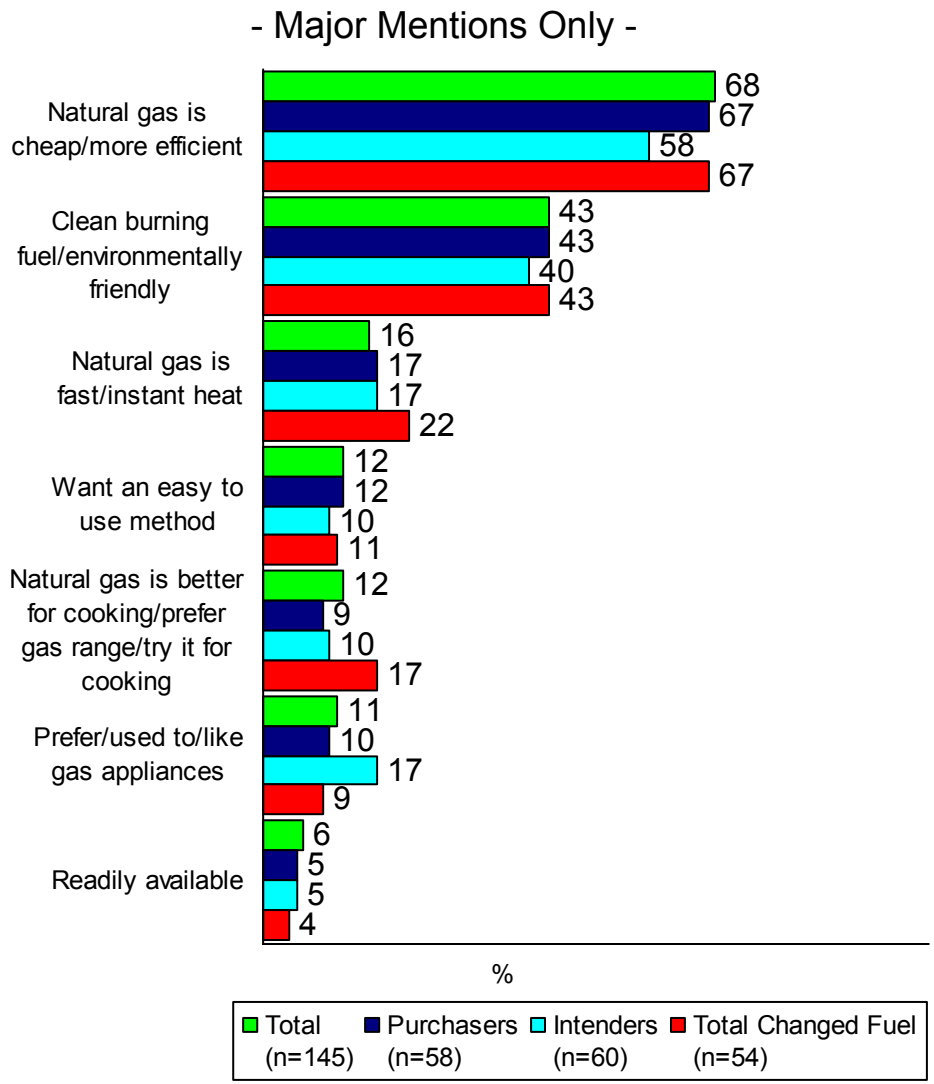
- Reasons for choosing natural gas for some uses, but not for others, appears to be directly tied to an individual's preference. There is little agreement as to why some people choose natural gas and why some choose other fuel sources. Some say that they choose natural gas because it is less expensive, while others say they don't choose natural gas because it is more expensive. Others simply prefer natural gas for cooking while others don't like gas ranges at all or they prefer electricity.

- Overall, however, there is the underlying theme that consumers are choosing what is familiar to them or what they are used to and are shying away from natural gas because of the unknown. That is, they are not choosing natural gas either because they are unaware of its uses, or they are nervous due to the perception that natural gas or natural gas appliances may be unsafe.

- In most cases, the same proportion of Fuel Changers as Purchasers and Intenders give the same reasons for not choosing natural gas for all uses, except with regard to gas price. In this case Fuel Changers are more likely to believe that natural gas is expensive, whereas, Intenders are the least likely to believe this is so.

- Compared with those in the Lower Mainland, cost is more of a deterrent for those in the Interior (22%), as is their preference for wood (17%). Consumers aged 35-44 years are also more concerned about cost than both their younger and older counterparts (22% vs. 13%).

Detailed Findings: Reasons For Choosing All Natural Gas

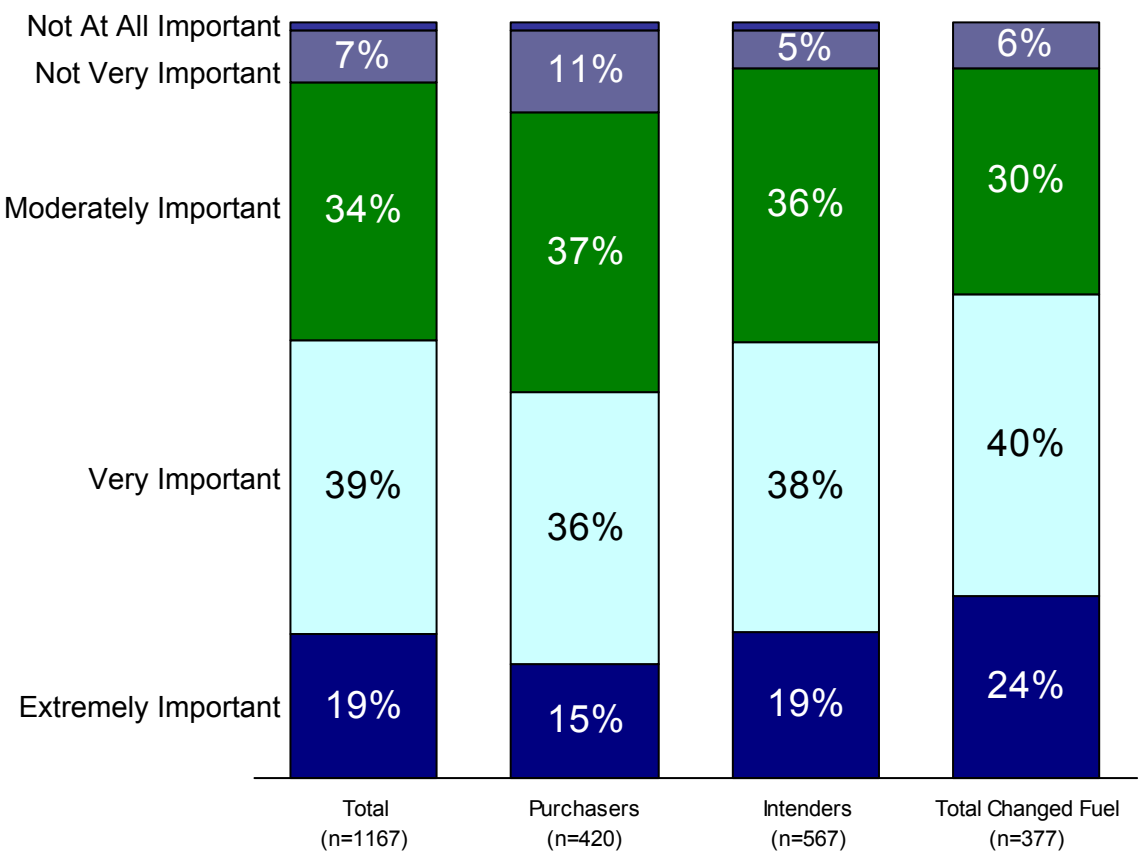


Note: only mentions above 5% are shown.

3c. Please briefly tell us why you have chosen natural gas for all the uses.

- Strong advocates of natural gas (those who would choose natural gas for all uses) give preferentiality to natural gas mainly for one of two reasons; 1) natural gas is less expensive or more efficient than other fuel sources; and 2) natural gas is a cleaner, more environmentally friendly fuel.
- Additional explanations for choosing natural gas over any other fuel source are because natural gas provides quick, nearly instant heat and because natural gas is easy to use. Others express that they simply prefer natural gas appliances in general or, more specifically, because they find natural gas to be better for cooking. Others simply choose natural gas because of its availability.
- Within the sub-groups, significantly more men than women (25% vs. 8%) chose natural gas for everything because they want an easy to use method. Men also want something that is readily available (16% vs. 3%).

Detailed Findings: Importance Of Heating Fuel In Home Purchase Decision



4a. There are many criteria considered when purchasing a home and each has a different level of importance. For example, for many people, the price of the home is extremely important while the colour of the walls might not be very important. Thinking about the fuel used to heat a home, how important is this criteria in your home purchase decision?

- One-half of Purchasers deem the type of fuel used for home heating as highly important (i.e. extremely or very important) when deciding which home to purchase. Slightly more Intenders (57%) consider the home heating fuel source to be a highly important factor in buying a home. Significantly more Fuel Changers feel home heating is a highly important factor when purchasing a home (64%).
- At the other end of the spectrum, slightly more Purchasers (12%) than Intenders and Fuel Changers (both 6%) believe that the home heating fuel source is not an important criteria in the home purchase decision.
- Just over one-third of both Purchasers and Intenders find the fuel source to heat a home to be moderately important, but is not necessarily a deal breaker. A few less Fuel Changers (30%) feel this way.
- When viewing these findings by sub-groups, we see that older consumers place higher importance on the home heating fuel in their home purchase decision (70% high importance among those aged 45+ vs. 51% among those younger than 45). Likewise, those in the Interior (with notably longer, colder winters) place more importance on this criteria than those in the Lower Mainland or on the Island (70% vs. 55% & 49%, respectively).
- The type of heating fuel in the home purchase decision is also extremely important to those who have purchased or intend to purchase a brand new home as opposed to existing stock (23% vs. 16%).

Detailed Findings: Reasons For Importance Rating Of Home Heating Fuel On Home Purchase Decision

- Major Mentions Only -

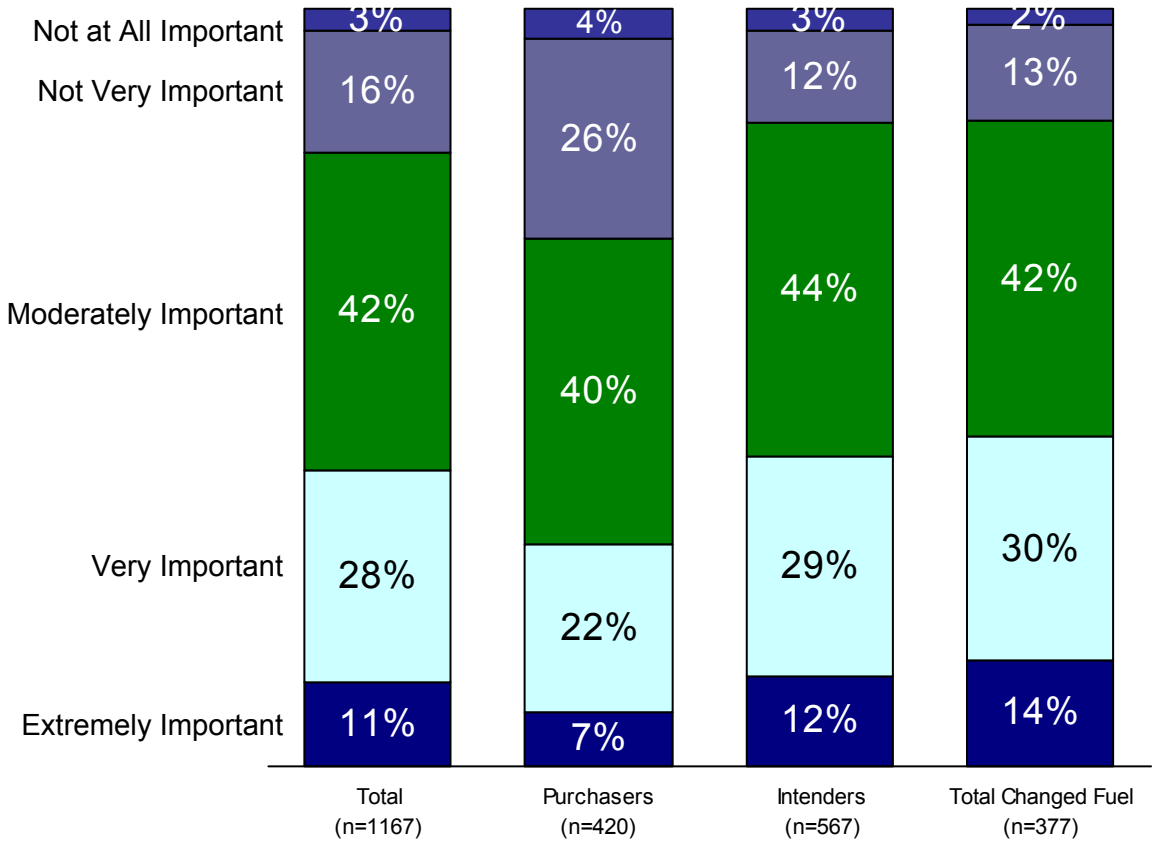
	Total	Purchasers	Intenders	Total Changed Fuel
	%	%	%	%
Extremely or Very Important	(n=681)	(n=213)	(n=327)	(n=240)
The cost of fuels/energy efficiency	74	73	74	72
Moderately Important	(n=396)	(n=157)	(n=206)	(n=113)
The house is more important/ other factors to consider	44	43	47	38
The cost of fuels/energy efficiency	20	22	19	19
The heating method can be changed	19	22	16	26
Not Very or Not At All Important	(n=90)	(n=50)	(n=34*)	(n=24*)
The house is more important/ other factors to consider	53	58	50	42
The heating method can be changed	26	26	21	25

*Caution: small base size.

4b. Why do you say that?

- The number one reason why the home heating fuel source is a highly important criteria in purchasing a home is the cost consideration. Three-quarters of Fuel Changers, Intenders and those who have recently purchased a home cite cost and energy efficiency as the number one reason for ranking home heating fuel as highly important when purchasing a home. No other reason was mentioned by more than 10%.
- The main reasons for saying that the home heating fuel source is only moderately important is because the house itself is more important or there are other factors to consider other than home heating. Others cite cost/efficiency as a consideration, while others say that the heating method can always be changed.
- Similarly, those who say the home heating fuel source is not important say so because the house is more important and there are other factors to consider. In addition, they say that the home heating fuel source can be changed.
- Older (45+) consumers place more importance on heating fuel because they are more concerned about the cost of the fuel, ensuring they have their preferred fuel, a clean fuel, etc. while for younger consumers (under 45 yrs), their priorities lie with the house itself/other factors.

Detailed Findings: Importance Of Appliance Fuel On Home Purchase Decision



4c. And thinking about the fuel used to operate specific appliances in the home, how important is this criteria in your home purchase decision relative to the other criteria mentioned previously (e.g. price of the home, colour of the walls)?

- Compared to home heating, how the home is equipped for fueling appliances is not as important a consideration when buying a home.
- When it comes to the fuel used to operate specific appliances, Intenders (41%) and Fuel Changers (44%) believe this to be a highly important criteria more so than Purchasers (29%). Those who recently made a home purchase are in fact, more likely to state that this is not an important consideration when buying a home (30%) than Intenders and Fuel Changers (both 15%).
- Like home heating, the type of fuel used to operate specific appliances in the home is more important to those in the Interior (43%) than on the Island or Lower Mainland, where only a third said it was an extremely or very important (37% and 36% respectively) criteria in the home purchase decision.

Detailed Findings: Reasons For Importance Rating Of Appliance Fuel On Home Purchase Decision

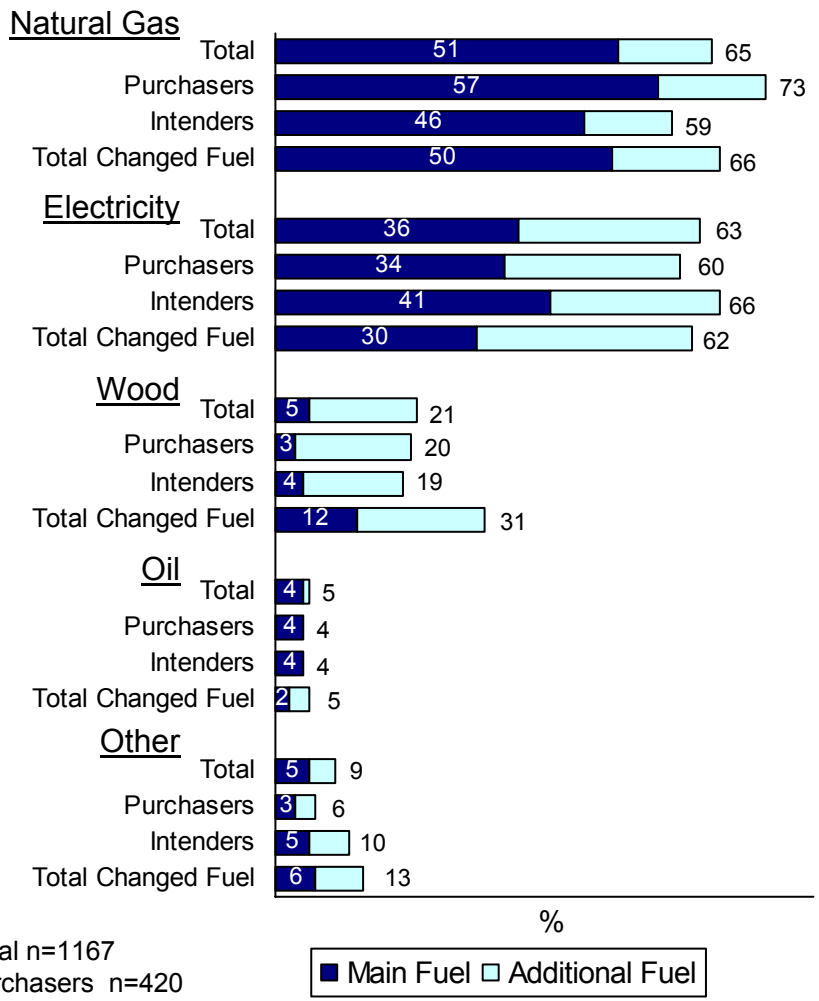
- Major Mentions Only -

	Total % (n=451)	Purchasers % (n=123)	Intenders % (n=231)	Total Changed Fuel % (n=164)
Extremely or Very Important				
The cost of fuels/energy efficiency	48	51	47	49
Prefer natural gas/cooking with gas/ heats faster	12	16	12	12
Prefer electricity/cooking with electricity/ dislike gas	9	11	7	7
Want a safe fuel	6	6	6	7
Too expensive to change fuels/ appliances	6	7	7	3
Moderately Important	(n=489)	(n=170)	(n=250)	(n=158)
The fuel can be changed/ can buy new appliances	22	24	21	25
The house is more important/ other factors to consider	25	29	27	20
The cost of fuels/energy efficiency	17	17	17	15
Prefer natural gas/cooking with gas/ heats faster	8	9	7	11
Don't care/any fuel is okay	10	7	11	10
Not Very or Not At All Important	(n=227)	(n=127)	(n=86)	(n=55)
The house is more important/ other factors to consider	25	29	22	27
Don't care/any fuel is okay	32	29	42	24
The fuel can be changed/ can buy new appliances	30	32	24	36

4d. Why do you say that?

- Those who feel that the type of fuel used to operate appliances is highly important in their home purchase decision say so because of the operating cost of the fuel. For others, their preference for cooking with natural gas or electric appliances plays a highly important role in their home purchase decision. Safety and cost of changing fuels or appliances are also important factors.
- Those who feel that the fuel source for appliances is moderately important in their decision say so because the fuel can be changed or because they can buy new appliances. Again, it is said that the house is more important than the fuel source for appliances and that there are other factors to consider. That being said, consumers are still bearing in mind the cost and the efficiency of the fuels needed to run the appliances. Also, some are still factoring in their preferences for natural gas cooking appliances when making a home purchase. A few simply don't care and think that any type of fuel is ok.
- Those who do not place much importance on the fuel needed to run appliances primarily feel that the house and other factors are more important. They are also not as committed to any particular type of fuel, as any fuel is fine by them. Others who may prefer a particular fuel say that the fuel can be changed, or they can always buy new appliances.
- Again, by we see different priorities by age. Younger consumers are more concerned about the house itself and other factors while older consumers place more attention on fuel type.

Detailed Findings: Existing Home Heating Fuel Source



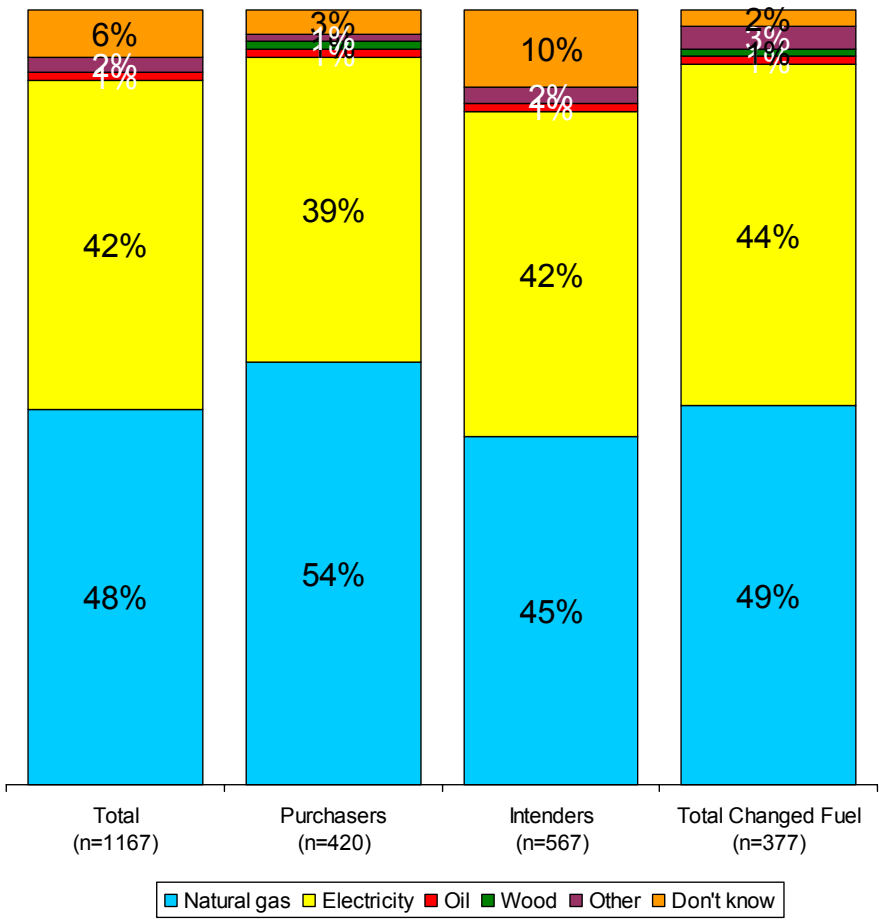
Total n=1167
Purchasers n=420
Intenders n=567
Total Changed Fuel n=377

D1. Please indicate the fuels used to heat your current home. If you use more than one fuel, indicate the fuel used to heat most of your home as the main way and any additional fuel as other ways.

- Currently, over one-half of Purchasers (57%) use natural gas as the main fuel source for home heating, while 34% use electricity. Nearly one-half (46%) of Intenders use natural gas as their main source of heat, while a comparable proportion (41%) use electricity. Among Fuel Changers, half currently use natural gas and only three in ten use electricity. Wood as a heating fuel source is more popular with Fuel Changers than Purchasers and Intenders.
- Natural gas and electricity are used to heat the vast majority of homes in the province. Wood is more of a secondary fuel rather than a primary fuel source and is used in about two in ten homes. Few homes are still heated with oil or other fuel sources.
- When viewing these findings by sub-groups, we see that natural gas use is more prominent in the Interior (66%) and Lower Mainland (54%) as a main heating fuel source. Conversely, those living on the Island are the least likely to use natural gas (only 22%) as their main home heating fuel source and are most likely to use electricity (53%). Further, those living on the Island are the most likely to use wood (32% total use) and are close to being the only people in the province who use oil at all (15% total use).
- By dwelling type, it is those living in single-detached homes who are more likely to use natural gas (56%) as their main fuel compared to those living in any other dwelling type (42%) who are more likely to use electricity.
- Likewise, it is home owners (57%) more so than renters (40%) who use natural gas as their main home heating fuel source.

Detailed Findings: Existing Fuel Source For Water

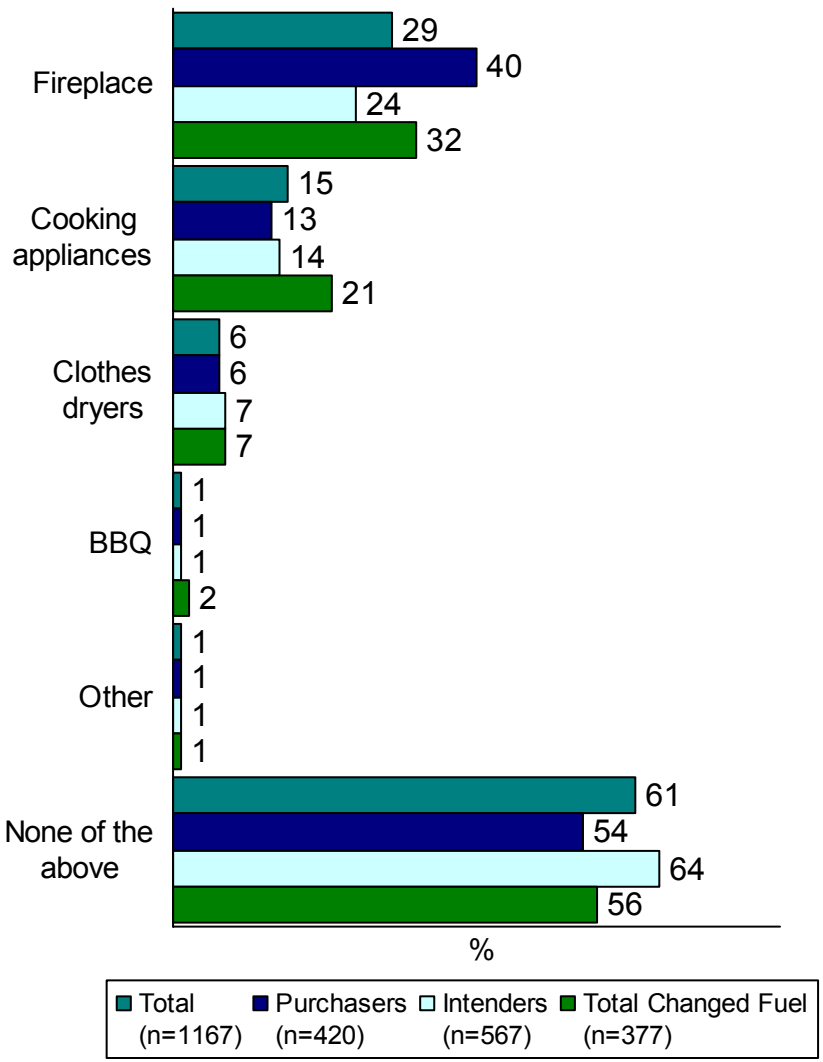
- Main Hot Water Heating Fuel -



D2. Please indicate the main fuel used to heat the water in your home (e.g. water tank).

- When it comes to water heating, 54% of recent Purchasers currently use natural gas, while 39% use electricity and 4% use another fuel source.
- Nearly half (45%) of Intenders currently use natural gas, while a nearly equal proportion (42%) use electricity. Only 4% use another fuel source to heat water while 10% don't know, these primarily being renters who are unsure (12%).
- About half of Fuel Changers use natural gas to heat their water and slightly less of them use electricity (44%). Only 2% don't know what is currently being used and the rest use another source.
- When viewing these findings by sub-group, we see similar patterns to home heating in that natural gas use for water heating is more common in the Lower Mainland (56%) and Interior (54%) than it is on Vancouver Island (23%) where using electricity is more common (68%).
- Further, those who use natural gas for home heating are far more likely to also use natural gas for water heating than those who heat their home with any other fuel (79% vs. 17% respectively). Those who heat their home with other fuel sources are more likely to use electricity instead.
- Home owners (53%) are more likely than renters (39%) to use natural gas to heat their water.
- Just over six in ten (63%) single-detached dwellers in the Lower Mainland and in the Interior (58%) are far more likely than single-detached dwellers on the Island (25%) to use natural gas to heat their water. On the Island, electricity is the fuel of choice of single-detached dwellers with over six in ten using this fuel source.

Detailed Findings: Ownership Of Natural Gas Appliances



- Overall, 46% of Purchasers and 36% of Intenders own a natural gas appliance, the most common being a fireplace, followed by cooking appliances.
- Specifically, four in ten Purchasers have a natural gas fireplace in their home, while slightly fewer Intenders (24%) and 32% of Fuel Changers have one. Natural gas fireplaces are more commonly found in the Lower Mainland (40%) rather than on Vancouver Island (20%) or in the Interior (19%).
- Just over one in ten Purchasers and Intenders have a natural gas cooking appliance in their home. About two in ten Fuel Changers have a natural gas cooking appliance. Natural gas cooking appliances are more common in the Lower Mainland (19%) than they are on the Island and the Interior (both 11%).
- Few Purchasers (6%), Intenders (7%) and Fuel Changers (also 7%) have a natural gas clothes dryer and even fewer have a natural gas barbeque or any other natural gas appliance in their home.
- Among those who currently heat their home with natural gas, only 37% have a natural gas fireplace and even fewer, 20%, cook with natural gas. Half of consumers who heat with natural gas do not have another gas operated appliance in their home.

D3. Which, if any, of the following natural gas appliances do you have in your home?

Detailed Findings: Demographics

	Total	Purchasers	Intenders	Total Changed Fuels
Base	945	420	567	155
	%	%	%	%
Dwelling Type:				
Single detached	67	62	70	74
Duplex	3	4	3	3
Town/row house	12	14	11	13
Apartment/condominium	13	14	12	7
Mobile home	4	6	3	3
Other	1	-	1	1
Age of Dwelling:				
Newly constructed	19	16	20	23
Existing home	81	84	80	77
Home Ownership:				
Own	65	82	50	77
Rent	35	18	50	23
Base	1167	430	567	377
	%	%	%	%
Region:				
Lower Mainland/Fraser Valley	49	46	54	45
Vancouver Island/Sunshine Coast	22	23	20	24
Okanagan	12	14	12	10
Kootenays	5	3	5	6
Kamloops/North	12	14	9	14

Demographics

	Total	Purchasers	Intenders	Total Changed Fuels
Base	1167	420	567	377
	%	%	%	%
Marital Status:				
Single	14	9	19	11
Married	55	62	47	65
Common-law	17	13	21	13
Divorced/separated	12	15	11	10
Widowed	1	1	2	1
Number of People in Household:				
1	12	11	14	10
2	35	35	34	37
3	21	22	21	18
4	20	21	20	21
5+	11	11	11	14
Employment Status:				
Not employed	25	29	21	29
Employed part-time	13	10	14	12
Employed full-time	44	46	45	38
Self-employed	14	12	13	17
Temporarily unemployed	5	3	6	5
Employment Category:				
Professional	16	18	16	15
Managerial/Executive	9	10	8	10
Sales/Customer Service	14	10	17	12
Office/information worker	13	14	13	9
Skilled labour	7	5	9	7
Unskilled labour	3	4	2	3
Student	3	2	4	3
Homemaker	20	23	18	21
Retired	6	7	5	9
Not stated	9	8	9	9

Demographics

	Total	Purchasers	Intenders	Total Changed Fuels
Base	1167	420	567	377
	%	%	%	%
Education:				
Some high school	5	3	6	5
Completed high school	22	22	18	25
Community college/technical/CEGEP	37	38	40	32
Some university	16	16	14	18
Graduated college/university	16	16	17	15
Post graduate degree or higher	5	6	4	6
Age:				
<25	4	1	6	3
25 - 34	29	30	33	19
35 - 44	29	30	28	31
45 - 54	23	22	21	27
55 - 64	15	16	11	20
65+	1	1	1	-
Gender:				
Male	21	17	22	21
Female	79	83	78	79
Household Income:				
<$25,000	15	10	17	14
$25,000 - $<50,000	33	31	36	29
$50,000 - $<75,000	30	29	27	31
$75,000+	24	30	20	27

Questionnaire

Consumer Preferences Study
04-0578
September 13, 2004

(English Only)

Thank you for agreeing to participate in this survey. Your opinions are very important to us and all those involved in this study. As always, your responses will remain completely confidential.

Please enter your M.I.Q # to begin: _____

(Demos from Panel include: Dwelling Type, Home Ownership, HH Size, Marital Status, Education, Age, HH Income, Gender, Employment Status, Employment Type, Age & Gender of HH Members)

1a. To begin, which of the following have you purchased in the past 2 years? ***(Please choose all that apply)***

1. Vehicle
2. Home
3. Major home appliance
4. None of the above

1b. And which of the following do you think you might be purchasing sometime in the next 2 years? ***(Please choose all that apply)***

1. Vehicle
2. Home
3. Major home appliance
4. None of the above

1c. Have you changed your home heating in the past two years? ***(Please choose all that apply)***

1. Yes, added electricity
2. Yes, added natural gas
3. Yes, added portable heater
4. Yes, added natural gas fireplace
5. Yes, other (please specify) _____
6. No

1d. Have you changed your cooking fuel in the past two years? ***(Please choose all that apply)***

1. Yes, switched to natural gas
2. Yes, switched to electricity
3. Yes, other (please specify) _____
4. No

Terminate Directive:
If code 2 is NOT mentioned in either Q1a or Q1b and NO Q1c and 1d, send to terminate message.
Count Quotas for:
Q1a=2 (Recent Purchasers) and Q1b=2 (Intenders)
Renovators (Q1c = codes 1-5 or Q.1d = codes 1-3).

Message for Terminating Panel Members:
Thank you for your interest in participating in this survey. However, we have reached our quota and we cannot ask you to continue with the remainder of the survey. Your name will still be entered into our draw for $500. We will be sure to contact you again should we have another survey suited for you.
Do not allow re-access to MIQ#

2. Assuming you were building a new home and all fuels were available, what type of fuel would you prefer for each of the following uses? ***(Please choose only one)***

		Electricity	Natural Gas	Oil	Propane	Wood	Other
a.	To heat your home (e.g. furnace, baseboards)	1	2	3	4	5	6
b.	To heat your water (e.g. water tank)	1	2	3	4	5	6
c.	To cook with (e.g. stovetop, oven, range)	1	2	3	4	5	6
d.	For your fireplaces	1	2	3	4	5	6
e.	To dry your clothes	1	2	3	4	5	6

If code 2 (natural gas) not chosen at all in Q2a-e, ask:

3a. Please briefly tell us why you have not chosen natural gas for any use. ***Please type in your answer below.***

If code 2 (natural gas) chosen between 1-4 times in Q2a-e, ask:

3b. Please briefly tell us why you have chosen natural gas for some uses, but not all uses. ***Please type in your answer below.***

If code 2 (natural gas) chosen for all in Q2a-e, ask:

3c. Please briefly tell us why you have chosen natural gas for all the uses. ***Please type in your answer below.***

4a. There are many criteria considered when purchasing a home and each has a different level of importance. For example, for many people, the price of the home is extremely important while the colour of the walls might not be very important. Thinking about the fuel used to heat a home, how important is this criteria in your home purchase decision?

1. Extremely important
2. Very important
3. Moderately important
4. Not very important
5. Not at all important

4b. Why do you say that? ***Please type in your answer below.***

4c. And thinking about the fuel used to operate specific appliances in the home, how important is this criteria in your home purchase decision relative to the other criteria mentioned previously (e.g. price of the home, colour of the walls)?

1. Extremely important
2. Very important
3. Moderately important
4. Not very important
5. Not at all important

4d. Why do you say that? ***Please type in your answer below.***

D1. Please indicate the fuels used to heat your current home. If you use more than one fuel, indicate the fuel used to heat **most** of your home as the main way and any additional fuel as **other ways**.

	Main Way **(Choose one only)**	Other Ways **(Choose all that apply)**
Electricity	1	1
Natural Gas	2	2
Oil	3	3
Propane	4	4
Wood	5	5
Other	6	6
No other way		7

D2. Please indicate the main fuel used to heat the water in your home (e.g. water tank)? **Choose one only**

1. Electricity
2. Natural Gas
3. Oil
4. Propane
5. Wood
6. Other

D3. Which, if any, of the following natural gas appliances do you have in your home? **Choose all that apply**

1. Cooking appliances (i.e. Stove, cook top, oven)
2. Fireplace
3. Clothes dryer
4. Other (please specify) _____
5. None of the above

D4. **Purchasers:** Thinking about the home you recently purchased, is it …
Intenders: Thinking about the home you may purchase in the next 2 years, what type of home are you most likely to purchase?
(Please choose only one)
1. A single detached house
2. A duplex (2 units attached)
3. A row/townhouse (3 or more units attached, each with separate entrance)
4. An apartment/condominium
5. Mobile home
6. Other

D5. **Purchasers:** And was this home a newly constructed home or an existing home?
Intenders: And are you likely to purchase a newly constructed home or an existing home?

1. Newly constructed home
2. Existing home

D6. And lastly, in which of the following regions of the province do you currently live?
(Please choose only one)

1. Lower Mainland/Fraser Valley
2. Vancouver Island/Sunshine Coast
3. Okanagan
4. Kootenays
5. Kamloops/North

Thank you for completing the survey!

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