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August 26, 2010

Via Email
Original via mail

Ms. Erica M. Hamilton
Commission Secretary
BC Utilities Commission
Sixth Floor, 900 Howe Street, Box 250
Vancouver, BC V6Z 2N3

Dear Ms. Hamilton:

Re: ***FortisBC Inc. ("FortisBC") Application for Approval of the 2011 Capital Expenditure Plan Project No. 3698603 - Responses to Information Requests***

Please find attached FortisBC's responses to Information Requests from the British Columbia Utilities Commission.

Sincerely,

Dennis Swanson
Director, Regulatory Affairs

Q1.0 Reference: Exhibit B-1, Section 1 Introduction p. 3
Summary of 2011 Capital Expenditures

Q1.1 Using a similar format as Table 1.1, please expand table to include the spending for 2006, 2007-2008, and 2009-2010. Please provide updated table in an unprotected excel format.

A1.1 Please see Table BCUC IR1 A1.1 below. An electronic Excel file is provided as Attachment BCUC IR1 A1.1 Capital Expenditures 2006-2012.xlsx.

Table BCUC IR1 A1.1

1	Expenditure Categories	2006	2007	2008	2009	2010	2011	2012	2011	2012	2011	2012
2		($000s)										
3		Actual	Actual	Actual	Actual	Forecast	Requested		Previously Approved		Total	
4	Generation	13,672	20,404	16,195	19,669	19,655	2,513	1,439	16,156	3,842	18,669	5,281
5	Transmission and Stations	45,091	69,068	46,961	49,985	88,747	12,291	-	16,056	-	28,347	-
6	Distribution	28,909	25,411	24,755	23,658	27,505	23,604	-	-	-	23,604	-
7	Telecommunications, SCADA, and Protection and Control	1,161	1,184	2,872	2,549	2,452	5,600	-	1,540	-	7,140	-
8	General Plant	10,786	14,598	9,058	9,720	10,638	12,968	-	595	-	13,563	-
9	**Subtotal - Plant and Equipment**	**99,619**	**130,667**	**99,842**	**105,582**	**148,997**	**56,976**	**1,439**	**34,347**	**3,842**	**91,323**	**5,281**
10	Demand Side Management	1,514	1,623	1,858	2,396	2,772	5,764	-	-	-	5,764	-
11	**Subtotal - Additions**	**101,133**	**132,290**	**101,700**	**107,978**	**151,769**	**62,740**	**1,439**	**34,347**	**3,842**	**97,087**	**5,281**
12	Cost of Removal (net)	1,315	2,999	5,025	4,502	4,941	3,411	36	2,781	6	6,192	42
13	**Total**	**102,448**	**135,289**	**106,725**	**112,480**	**156,710**	**66,151**	**1,475**	**37,128**	**3,848**	**103,279**	**5,323**
14	Annual Operating Savings										**128**	**283**

Q1.2 Please provide an explanation for projects that have incurred a significant variance or are forecasting a significant variance in excess of the level of accuracy of their estimates.

A1.2 Please see Table BCUC IR1 A1.2 below.

Table BCUC IR1 A1.2

Expenditure Categories	2006				2007			
	Actual	Budget	Variance	Remarks	Actual	Budget	Variance	Remarks
Generation	13,672	15,804	(2,132)	Variance is within the level of the accuracy of the estimates	20,404	21,659	(1,255)	Variance is within the level of the accuracy of the estimates
Transmission and Stations	45,091	43,776	1,315	Variance is within the level of the accuracy of the estimates	69,068	64,405	4,663	Variance is within the level of the accuracy of the estimates
Distribution	28,909	19,627	9,282	Variance is due to carry-over from 2005 and PCB program increases.	25,411	19,761	5,650	Variance is due to increased new customer activity and carry-over of work from previous years.
Telecommunications, SCADA, and Protection and Control	1,161	4,541	(3,380)	Budget had included fibre that is part of the Kettle Valley project which had been delayed.	1,184	4,940	(3,756)	Variance as a result of the delay of the start of the Distribution Substation Automation project.
General Plant	10,786	14,972	(4,186)	Variance due to delays in closing of land acquisitions.	14,598	15,650	(1,052)	Variance is within the level of the accuracy of the estimates
Subtotal - Plant and Equipme	**99,619**	**98,720**	**899**		**130,667**	**126,415**	**4,252**	
Demand Side Management	1,514	1,528	(14)	DSM program take-up and expenditures subject to voluntary customer participation, actual expenditures will vary from plan.	1,623	1,657	(34)	DSM program take-up and expenditures subject to voluntary customer participation, actual expenditures will vary from plan.
Subtotal - Additions	**101,133**	**100,248**	**885**		**132,290**	**128,072**	**4,218**	
Cost of Removal (net)	1,315	1,315	-		2,999	2,999	-	
Total	**102,448**	**101,563**	**885**		**135,289**	**131,071**	**4,218**	

Table BCUC IR1 A1.2 cont'd

Expenditure Categories	2008				2009				2010 Forecast			
	Actual	Budget	Variance	Remarks	Actual	Budget	Variance	Remarks	Forecast	Budget	Variance	Remarks
Generation	16,195	19,079	(2,884)	Variance is within the level of the accuracy of the estimates	19,669	21,535	(1,866)	Variance is within the level of the accuracy of the estimates	19,655	20,068	(413)	Variance is within the level of the accuracy of the estimates
Transmission and Stations	46,961	66,182	(19,221)	Variance due to timing of approval of significant Transmission growth projects.	49,985	59,860	(9,875)	Variance due to project material and labour significantly lower than estimate. Saving are market driven. The balance of the variance is due to timing of expenditures.	88,747	101,629	(12,882)	Variance is due to the combination of lower than estimated material and labour costs forecasted for the OTR, additional equipment required for 30L Voltage conversion to complete the scope of work and poor soil conditions at the Recreation Substation.
Distribution	24,755	20,455	4,300	Variance is due to increased new customer activity.	23,658	22,188	1,470	Variance is within the level of the accuracy of the estimates	27,505	26,070	1,435	Variance is within the level of the accuracy of the estimates
Telecommunications, SCADA, and Protection and Control	2,872	2,544	328	Variance is within the level of the accuracy of the estimates	2,549	2,085	465	Variance due to Distribution Automation components costs higher than estimated.	2,452	2,057	395	Variance due to Distribution Automation and Protection Upgrade components costs higher than estimated.
General Plant	9,058	8,697	361	Variance is within the level of the accuracy of the estimates	9,720	10,022	(301)	Variance is within the level of the accuracy of the estimates	10,638	9,193	1,445	Variance is due to the addition of the Mandatory Reliability Standards (MRS) project.
Subtotal - Plant and Equipme	**99,842**	**116,957**	**(17,115)**		**105,582**	**115,689**	**(10,107)**		**148,997**	**159,016**	**(10,019)**	
Demand Side Management	1,858	1,613	245	DSM program take-up and expenditures subject to voluntary customer participation, actual expenditures will vary from plan.	2,396	2,568	(172)	DSM program take-up and expenditures subject to voluntary customer participation, actual expenditures will vary from plan.	2,772	2,826	(54)	DSM program take-up and expenditures subject to voluntary customer participation, actual expenditures will vary from plan.
Subtotal - Additions	**101,700**	**118,570**	**(16,870)**		**107,978**	**118,257**	**(10,279)**		**151,769**	**161,842**	**(10,073)**	
Cost of Removal (net)	5,025	5,025	-		4,502	4,502	-		4,941	4,941	-	
Total	**106,725**	**123,595**	**(16,870)**		**112,480**	**122,759**	**(10,279)**		**156,710**	**166,783**	**(10,073)**	

Q2.0 Reference: Exhibit B-1, Section 1 Introduction, Table 1.2, p. 10
Expenditures by Plant Category

Q2.1 Please resubmit Table 1.2 which includes comparative columns for Approved and Actual Plant Expenditures for the period 2006 – 2010. Include footnotes which reference the sources of approval.

A2.1 Please see Table BCUC IR1 A2.1 below.

Table BCUC IR1 A2.1

	2006		2007		2008		2009		2010		2011	2012	2011	2012	2011	2012
	Approved	Actual	Approved	Actual	Approved	Actual	Approved	Actual	Approved	Forecast	Requested		Previously Approved		Total	
Approval	G-58-06		G-162-06		G-147-07		G-193-08, G-11-09		G-162-09							
Generation																
Growth	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sustaining	15,804	13,672	21,659	20,404	16,521	16,195	21,660	19,669	19,263	19,655	2,513	1,439	16,156	3,842	18,669	5,281
Subtotal	**15,804**	**13,672**	**21,659**	**20,404**	**16,521**	**16,195**	**21,660**	**19,669**	**19,263**	**19,655**	**2,513**	**1,439**	**16,156**	**3,842**	**18,669**	**5,281**
Transmission and Stations																
Growth	30,005	27,108	56,926	59,616	61,659	38,328	69,030	44,386	81,536	79,093	5,341	-	16,056	-	21,397	-
Sustaining	13,071	17,983	7479	9,452	10,297	8,633	9,071	5,599	10,175	9,654	6,950	-	-	-	6,950	-
Subtotal	**43,076**	**45,091**	**64,405**	**69,068**	**71,956**	**46,961**	**78,101**	**49,985**	**91,711**	**88,747**	**12,291**	**-**	**16,056**	**-**	**28,347**	**-**
Distribution																
Growth	10,531	16,581	11,745	14,994	19,242	16,281	12,626	11,141	14,944	13,284	11,529	-	-	-	11,529	-
Sustaining	9,096	12,328	8,016	10,417	3,274	8,474	10,502	12,517	14,525	14,221	12,075	-	-	-	12,075	-
Subtotal	**19,627**	**28,909**	**19,761**	**25,411**	**22,516**	**24,755**	**23,128**	**23,658**	**29,469**	**27,505**	**23,604**	**-**	**-**	**-**	**23,604**	**-**
Telecommunications, SCADA, and Protection and Control																
Growth	3,565	36	3,458	162	1,902	1,108	1,779	1,784	1,664	1,884	4,049	-	1,540	-	5,589	-
Sustaining	976	1,125	1,482	1,022	1,491	1,764	747	765	619	568	1,551	-	-	-	1,551	-
Subtotal	**4,541**	**1,161**	**4,940**	**1,184**	**3,393**	**2,872**	**2,526**	**2,549**	**2,283**	**2,452**	**5,600**	**-**	**1,540**	**-**	**7,140**	**-**
General Plant																
Mandatory Reliability	-	-	-	-	-	-	-	-	2,399	1,688	-	-	595	-	595	-
Vehicles	5,502	3,275	3,400	4,431	2,461	1,628	2,000	2,342	2,000	2,000	2,000	-	-	-	2,000	-
Metering	(32)	80	64	542	136	278	526	431	559	559	213	-	-	-	213	-
Information Systems	4,929	5,000	5,640	6,655	4,517	4,543	5,167	4,768	4,494	4,351	5,550	-	-	-	5,550	-
Telecommunications	197	183	175	221	175	258	105	90	106	101	358	-	-	-	358	-
Buildings	3,281	1,227	5,410	1,565	1,312	1,527	1,305	1,270	1,062	1,062	1,244	-	-	-	1,244	-
Kootenay Operations Centre	-	-	-	-	-	-	-	-	-	-	485	-	-	-	485	-
Kelowna Long Term Solution	-	-	-	-	-	-	-	-	-	-	489	-	-	-	489	-
Benvoulin Property Expansion	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Furniture	258	278	212	248	187	237	347	294	393	354	176	-	-	-	176	-
Tools and Equipment	837	743	749	936	650	587	572	525	575	523	601	-	-	-	601	-
PCB Environmental Compliance	-	-	-	-	-	-	-	-	-	-	1,852	-	-	-	1,852	-
Subtotal	**14,972**	**10,786**	**15,650**	**14,598**	**9,438**	**9,058**	**10,022**	**9,721**	**11,588**	**10,638**	**12,968**	**-**	**595**	**-**	**13,563**	**-**
Subtotal - Plant and Equipment	**98,020**	**99,619**	**126,415**	**130,667**	**123,824**	**99,842**	**135,437**	**105,582**	**154,314**	**148,997**	**56,976**	**1,439**	**34,347**	**3,842**	**91,323**	**5,281**
Demand Side Management	1,528	1,514	1,657	1,623	1,613	1,858	2,568	2,396	2,826	2,772	**5,764**				**5,764**	
Subtotal - Additions	**99,548**	**101,133**	**128,072**	**132,290**	**125,437**	**101,700**	**138,005**	**107,978**	**157,140**	**151,769**	**62,740**	**1,439**	**34,347**	**3,842**	**97,087**	**5,281**
Cost of Removal (net)	1,315	1,315	2,999	2,999	5,025	5,025	4,502	4,502	4,941	4,941	3,411	**36**	2,781	**6**	6,192	42
Total	**100,863**	**102,448**	**131,071**	**135,289**	**130,462**	**106,725**	**142,507**	**112,480**	**162,081**	**156,710**	**66,151**	**1,475**	**37,128**	**3,848**	**103,279**	**5,323**

Table BCUC IR1 A2.1 cont'd

	2006		2007		2008		2009		2010		2011	2012	2011	2012	2011	2012
	Approved	Actual	Approved	Actual	Approved	Actual	Approved	Actual	Approved	Forecast	Requested		Previously Approved		Total	
Approval	G-58-06		G-162-06		G-147-07		G-193-08, G-11-09		G-162-09							
Growth	44,101	43,725	72,129	74,773	82,803	55,717	83,435	57,311	98,144	94,261	20,919	-	17,596	-	38,515	-
Sustaining	38,947	45,108	38,636	41,296	31,583	35,066	41,980	38,550	44,582	44,098	23,089	1,439	16,156	3,842	39,245	5,281
General Plant	14,972	10,786	15,650	14,598	9,438	9,058	10,022	9,721	11,588	10,638	12,968	-	595	-	13,563	-
Demand Side Management	1,528	1,514	1,657	1,623	1,613	1,858	2,568	2,396	2,826	2,772	5,764	-	-	-	5,764	-
Cost of Removal (net)	1,315	1,315	2,999	2,999	5,025	5,025	4,502	4,502	4,941	4,941	3,411	36	2,781	6	6,192	42
Total	**100,863**	**102,448**	**131,071**	**135,289**	**130,462**	**106,725**	**142,507**	**112,480**	**162,081**	**156,710**	**66,151**	**1,475**	**37,128**	**3,848**	**103,279**	**5,323**

Q2.2 Please provide a table similar to the one requested in the previous question for Capital Additions in the same period.

A2.2 Please see Table BCUC IR1 A2.2 below.

Table BCUC IR1 A2.2
Forecast vs. Actual Capital Additions 2006-2010

Capital Additions	2006			2007		2008		2009		2010
	Forecast Additions [1]	Actual Additions [2]	PLP Additions December 31	Forecast Additions [1]	Actual Additions [2]	Forecast Additions [1]	Actual Additions [2]	Forecast Additions [1]	Actual Additions [2]	Forecast Additions [1]
	($000s)									
Hydraulic Production	18,750	16,093	-	20,318	14,799	6,346	4,952	20,722	17,292	23,678
Transmission Plant	41,264	18,678	-	63,046	33,051	58,632	50,876	54,504	11,870	79,789
Distribution Plant	44,132	63,060	13,308	33,938	56,320	36,559	36,363	29,987	70,484	35,410
General Plant	14,728	14,325	2,300	21,428	18,054	18,504	16,065	13,482	16,127	11,902
Additions to Plant in Service	**118,874**	**112,156**	**15,608**	**138,730**	**122,224**	**120,041**	**108,256**	**118,695**	**115,773**	**150,779**

[1] Annual Revenue Requirements applications

[2] Annual Reports to BCUC

Q2.3 Please provide a continuity schedule which shows the opening balances, additions, retirements, ending balances for each of the asset categories shown in Table 1.2.

A2.3 FortisBC understands this to be a request to classify total Plant in Service by the categories in Table 1.2. Such a classification is not possible, as expenditures on any particular asset would at different times over its life be classified as growth and sustaining. The table below provides the requested information by asset grouping.

Table BCUC IR1 A2.3

Asset Categories	2006					2007				2008			
	Opening Balance	Additions	Retirements	Ending Balance	PLP Dec 31, 2006	Opening Balance	Additions	Retirements	Ending Balance	Opening Balance	Additions	Retirements	Ending Balance
Generation	117,202	16,093	(46)	133,249	-	133,249	14,799	(617)	147,431	147,431	4,952	(358)	152,025
Transmission and Stations	224,407	18,678	(546)	242,539	-	242,539	33,051	(78)	275,512	275,512	50,876	(15)	326,373
Distribution	388,805	63,060	(2,947)	448,918	13,308	462,226	56,320	(2,281)	516,265	516,265	36,363	(2,821)	549,807
General Plant													
Buildings	21,540	2,570	(12)	24,098	802	24,900	4,203	-	29,103	29,103	1,567	-	30,670
Furniture	4,689	243	-	4,932	54	4,986	247	-	5,233	5,233	363	(1)	5,595
Vehicles	8,797	3,337	(404)	11,730	935	12,665	4,431	(649)	16,447	16,447	1,628	(1,512)	16,563
Tools	7,785	860	-	8,645	303	8,948	936	-	9,884	9,884	682	-	10,566
Other (IT/Communications)	47,213	7,315	(326)	54,202	206	54,408	8,236	(449)	62,195	62,195	11,825	(163)	73,857
Total	**820,438**	**112,156**	**(4,281)**	**928,313**	**15,608**	**943,921**	**122,224**	**(4,074)**	**1,062,070**	**1,062,070**	**108,256**	**(4,870)**	**1,165,456**

Asset Categories	2009				2010 FORECAST			
	Opening Balance	Additions	Retirements	Ending Balance	Opening Balance	Additions	Retirements	Ending Balance
Generation	152,025	17,292	(840)	168,477	168,477	23,678	(840)	191,315
Transmission and Stations	326,373	11,870	(42,809)	295,434	295,434	79,789	(42,809)	332,414
Distribution	549,807	70,484	38,077	658,368	658,368	35,410	42,475	736,253
General Plant								
Buildings	30,670	6,203	846	37,719	37,719	967	846	39,532
Furniture	5,595	5	(127)	5,473	5,473	785	(127)	6,131
Vehicles	16,563	2,342	(1,353)	17,552	17,552	2,000	(1,353)	18,199
Tools	10,566	658	(355)	10,869	10,869	545	(355)	11,059
Other (IT/Communications)	73,857	6,920	(1,193)	79,584	79,584	7,605	(1,193)	85,996
Total	**1,165,456**	**115,773**	**(7,754)**	**1,273,476**	**1,273,476**	**150,779**	**(3,356)**	**1,420,899**

Q2.4 What is the rate impact in 2011 and 2012 if all capital expenditures shown in Table 1.2 were approved? What is rate impact for every $1m of capital additions to rate base?

A2.4 As shown in Table 1.1, FortisBC is requesting approval of capital expenditures in the amount of $60.4 million in 2011 and $1.5 million in 2012 (excluding Demand Side Management expenditures). The cumulative rate impact associated with the requested amounts are approximately 2.1 per cent which is equivalent to 0.03 per cent rate increase per $1 million of capital expenditure (or approximately 1 per cent rate impact per $30 million of capital expenditure). Please also see the response to BCUC IR1 Q56.2 below.

Q2.5 What is FortisBC's current / forecast number of customers in 2010, 2011, and 2012? What is the level of customer growth in the last 3 years?

A2.5 The forecast number of customers in 2010, 2011 and 2012 is 112,456, 114,254, and 116,192.

The customer growth rate for 2007, 2008 and 2009 was 1.7 per cent, 1.9 per cent and 1.0 per cent.

Q3.0 Reference: Exhibit B-1, Section 2 Generation, p. 15

Major Projects - Upper Bonnington Spill Gate Rebuild

Q3.1 As the Upper Bonnington is under review and will be addressed at a later date, why should the Upper Bonnington Spill Gate Rebuild for $1.63 million proceed at this time?

A3.1 The Upper Bonnington Old Plant Repowering Project addresses the reliability of the power supply for a portion of the plant. If one or several units were to fail there would be a loss of power supply only. In contrast, the Upper Bonnington Spill Gate Rebuild project addresses dam safety issues. A number of issues including public safety, environmental, as well as FortisBC's licenses to operate its dams on the Kootenay River must be considered in the event that a gate failed, or failed to open during flood conditions.

In addition, the components of the spill gates are approaching 70 years of service with minimal maintenance. The Company has no means of inspecting the components while the gate is in place, and therefore has no means of determining whether the gate is in suitable condition. The timing of this project has been selected to coincide with the completion of 22 head gate rehabilitation projects.

Q3.2 In the last 80 years, how many times has the spill gate failed to open and can another work around method be devised?

A3.2 The Company has no record of the spill gate at UBO failing to open when required. The spill gates have not been operated since the late 1980s. If the gates are required to operate, it would be during flood conditions which could result in overtopping of the dam structure if the gates fail to operate at that time.

The project is required to address the proper operation of a dam component necessary to ensure dam safety. To date, the Company has not been able to identify any suitable workaround methods to mitigate against the risk of the spill gates failing to operate or structural failure of the gates themselves.

Q3.3 What is the risk of delaying the project one year or bringing it forward later as part of the overall Upper Bonnington ULE project in 2012?

A3.3 FortisBC's analysis for the Upper Bonnington Repowering Project supports a deferral of the project. The timing will be dependent on the actual condition of the equipment in the plant and the replacement prices of electricity. Given the age of the equipment in the plant, it is expected that the Company may incur higher maintenance costs and potentially increased forced outages at this facility. However, when the cost of the reconstruction is considered, it remains economic to continue to operate the facility as is until the equipment in the facility can no longer provide the existing benefit to customers. The Company will continue to monitor the project economics and will submit the project for Commission approval when required.

Given that the exact timing of the Repowering project is unknown, FortisBC has determined that the spill gate project should proceed at this time. The risk of delaying this particular project one year is primarily impacted by the continuing non-compliance with Canadian Dam Safety Guidelines. A larger concern in delaying this project is the fact that FortisBC currently operates 18 spill gates in its four regulated plants, all in excess of 70 years of age. These components will require future investment, and there is a concern that continued delay of this type of work will create a requirement for large capital expenditures in future years.

Q4.0 Reference: Exhibit B-1, Section 2 Generation, pp. 15-16
Small Sustaining Projects - South Slocan Plant Automation

"The South Slocan Plant Automation project involves installing "smart" motor overloads and additional process monitoring sensors at the South Slocan Plant. The information collected will be used as the basis for a condition based maintenance system which will capitalize on the technology invested in the units during the ULE projects."

Q4.1 Can the number of parameters be reduced to minimize the cost of this project?

A4.1 The project has been scoped to consider the minimal amount of monitoring required to deliver adequate information to make condition based maintenance decisions. A reduction in the number of parameters will not result in a corresponding decrease in project costs, and will result in the Company being unable to effectively deliver on condition based maintenance, which ultimately removes the benefits of the project.

Q4.2 What is the risk of delaying this project for one to five years?

A4.2 A delay in implementation will result in a longer time frame to transition from a strict time based maintenance approach to a condition based approach. It is expected that a switch to condition based maintenance will permit the Company to better allocate maintenance dollars to equipment which requires this investment the most. There is also the possibility that the ability to schedule maintenance by condition may allow the Company to extend the time period between major maintenance outages, thereby potentially reducing some long term maintenance costs.

Q5.0 Reference: Exhibit B-1, Section 2, Generation, p. 16

Small Sustaining Projects - South Slocan Fire Panel

Q5.1 As the fire panel will not include controls nor will it be linked to a suppression system and will annunciate to a central monitoring location, what is the existing system used and is it still functioning?

A5.1 There is currently no fire alarm system installed at the plant. The plant does contain a generator deluge system in the event of a generator fire, and this system is functional. The generator deluge system is a localized fire suppression system, and is not adequate to properly alert occupants of the generating plant in the event of a fire.

Q6.0 Reference: Exhibit B-1, Section 2 Generation, p. 16
Small Sustaining Projects - Lower Bonnington and Upper Bonnington Plant Totalizer Upgrade (Revenue Meter Replacement)

Q6.1 What is the risk of delaying the project one year or bringing it forward later as part of the overall Upper Bonnington ULE project?

A6.1 The Plant Totalizer project is not planned for the units which would be affected by the Upper Bonnington Repowering project (Units 1 through 4), but rather is required for Units 5 and 6. In addition, the timing of the Upper Bonnington Repowering project is unknown at this time (please refer to the response to BCUC IR1 Q3.3 above).

This project was initially proposed in FortisBC's 2009/10 Capital Expenditure Plan, however the project was not approved at that time. As accurate metering is a requirement under the Canal Plant Agreement, this project has been included in the 2011 Capital Expenditure Plan. Due to the inaccuracy of the existing metering, the Company is of the opinion that this project must not be further delayed.

Q7.0 Reference: Exhibit B-1, Section 2, Generation, p. 17

Small Sustaining Projects - Lower Bonnington Powerhouse Windows

Q7.1 What is the risk of delaying the project until 2012 to minimize the costs?

A7.1 The primary driver for this project is employee safety. Given the age and condition of the windows and the recommendations of the engineering consultant, FortisBC feels it is an unacceptable risk to delay this project beyond 2011.

Q8.0 Reference: Exhibit B-1, Section 2 Generation, p. 17

Small Sustaining Projects - All Plants Minor Sustaining Capital

"The projects will be executed as scheduled in the budget year unless a new, previously unidentified project deemed of higher priority is approved by Management to replace it. This list of projects may then change throughout the year. The list will be managed as if it were a single project. The Minor Sustaining Capital project is composed of two projects greater than $0.150 million in value and a group of projects individually valued under $0.150 million."

Q8.1 As the Commission may wish to deal only with identified Capital projects, why would FortisBC not manage the undefined projects under $150,000 through a deferral account?

A8.1 As noted on page 17 of the Application (Exhibit B-1), "This project involves expenditures for repairs that are identified at the generating plants as a result of safety inspections, storm damage, aging equipment, reports by on-call personnel and other inspections." Therefore, although the majority of projects have been identified at the time of the Capital Expenditure Plan submission, other projects will arise and have to be dealt with through the course of the year. These projects are capital in nature and are best managed in this fashion. The introduction of deferral accounts would only create an administrative burden for relatively low value work.

Q9.0 Reference: Exhibit B-1, Section 2 Generation, p. 18

Small Sustaining Projects - All Plants Power House Crane Brakes

"The All Plants Power House Crane Brakes project is required as the existing brakes have recently been slipping under heavy loads, imposing a risk to employee safety. The project consists of repairing the brakes on the main and auxiliary hooks at all four powerhouse cranes at the FBC plants."

Q9.1 Please explain why this is sustaining capital and not maintenance?

A9.1 Please note that the statement "repairing the brakes" should read "replacing the entire brake assembly". There is a long term benefit from these rehabilitations and therefore similar costs have been treated as capital and have previously been approved by the Commission as such.

Please refer to Errata No. 2.

Q10.0 Reference: Exhibit B-1, Section 2 Generation, p. 18
Small Sustaining Projects - Upper Bonnington Extension Power House Crane Upgrade

Q10.1 Has the Worksafe BC inspected or ordered the installation of new equipment?

A10.1 Worksafe BC has not inspected or ordered the installation of new equipment.

"Following an assessment of the crane, it is expected that the project will include components similar to those performed on the previously upgraded cranes,…"

Q10.2 Has the crane assessment be completed, if so, please provide the assessment?

A10.2 No, an assessment has not been completed on this crane. Following an assessment of the crane, it is expected that the project will include components similar to those performed on the previously upgraded cranes, such as adding bridge and trolley mechanical end stops and adding upper and lower travel limit switches on both hooks and may involve replacing the load display system, programmable logic controller and drive modifications, auxiliary hooks, non-destructive testing inspections, runway alignment and block sheave guards.

Q10.3 Can the crane upgrade be delayed and included with the Upper Bonnington ULE project?

A10.3 No, this crane is used to maintain generating units 5 and 6 which are located in the extension plant. The UBO Old Plant Repowering Project is a different location in the plant and is serviced from a different crane.

Q11.0 Reference: Exhibit B-1, Section 3 Transmission and Stations, p. 27
Sustaining Projects – Transmission Line Condition Assessment

On May 27, 2009, FortisBC submitted its Compliance filing for its 2009-2010 Capital Expenditure Plan which contained a copy of its Capitalization Policy, attached as Exhibit A-3 to this Application. FortisBC clearly states "Ordinary Repairs" which "do not extend the useful life of the capital asset…but are necessary to keep the asset in normal operating condition" are generally treated as Operating Expenses rather than Capital Expenditures.

Q11.1 What is the average life of a Transmission wood pole? Is it different for Distribution wood pole?

A11.1 Transmission and distribution pole average life expectancies are 50 years and 40 years respectively. Life expectancy varies largely on the environment the pole is exposed to as well as the type of treatment the pole receives.

Q11.2 Please clearly explain how FortisBC determines which Transmission Line Condition Assessment expenses are related to "extending the life of the pole" and which expenses are simply required to "ensure the integrity of the lines?"

A11.2 The Transmission Line Condition Assessment program both ensures the integrity of the lines and extends the life of the pole.

Q11.3 When FortisBC conducts the "test and treat" component of the program wherein pole treatment is inserted into the pole, how long does this treatment add to the life of the transmission pole?

A11.3 Typical utility experience has indicated that it adds approximately 8-16 years of life to the pole.

"The project is required to address public and employee safety issues, environmental concerns and to maintain reliable service to FortisBC customers"

Q11.4 Please explain why the "above ground visual inspection" component of this program should be treated as a capital expenditure as oppose to an operating expense?

A11.4 Condition assessment is the preliminary investigative phase for scoping the capital replacements required in subsequent years. As this program is concerned with plant replacement and life extension these are capital costs.

This program has previously been approved as capital by the Commission, at minimum, since the Company entered into the current term of the Performance Based Regulation mechanism (Order G-58-06), and therefore the treatment of this capital component cannot be changed without impacting the Operating and Maintenance component of revenue requirements.

Q12.0 Reference: Exhibit B-1, Section 3 Transmission and Stations, p. 28
Sustaining Projects – Transmission Line Rehabilitation

FortisBC explains that the Transmission Line Rehabilitation projects, which are required for the structural stabilization of defective transmission system, are required to "maintain reliable service to FortisBC customers."

Q12.1 Please explain whether this sustaining project involves the installation of a new part that is betterment to the old part of the transmission system?

A12.1 This project may include the installation of a new part that is betterment to the old part of the system (e.g. stubbing of poles along a section of line), or may involve the replacement of an existing part where the old part is retired and the new part is added.

Q12.2 Please explain whether this sustaining project extends the useful life of the existing transmission system or simply a replacement of defective parts?

A12.2 This project does extend the useful life of the existing transmission system and may also include the replacement of defective parts where the defective part is retired and the new part is added.

Q12.3 Please confirm that this sustaining project is necessary to keep the transmission system in normal operating condition.

A12.3 This project will maintain normal operating conditions of the system and extend the life of the asset.

Q12.4 Please clearly explain why this sustaining project should be considered a capital expenditure rather than a regular operating expense?

A12.4 There is a long term benefit from this program, which has previously been approved as capital by the Commission, at minimum, since the Company entered into the current term of the Performance Based Regulation mechanism (Order G-58-06), and therefore the treatment of this capital component cannot be changed without impacting the Operating and Maintenance component of revenue requirements.

Q13.0 Reference: Exhibit B-1, Section 3 Transmission and Stations, p.29 Sustaining Projects – Transmission Right-of-Way Reclamation

"The reclamation project is required to allow FortisBC to remove trees and, where necessary and feasible, expand the tree-free zone around transmission lines."

Q13.1 Please explain FortisBC's treatment of cyclical brushing / trimming of Transmission and Distribution right-of-ways? Are these costs treated as capital or operating expenditures? How does this differ (the same as) the tree removal expenditures, and why?

A13.1 Cyclical brushing is treated as an operating expenditure.

Right-of-way reclamation includes the complete removal of trees in order to re-establish the existing right-of-way, and removes the need to perform cyclical brushing for that portion of the right-of-way. There is a long term benefit from this program, which has previously been approved as capital by the Commission, at minimum, since the Company entered into the current term of the Performance Based Regulation mechanism (Order G-58-06), and therefore the treatment of this capital component cannot be changed without impacting the Operating and Maintenance component of revenue requirements.

Q13.2 Please explain whether this sustaining project involves the installation of a new part that is betterment to the old part of the transmission system?

A13.2 The program does not involve the installation of a new part but is betterment to the transmission system as discussed in the response to BCUC IR1 Q13.3 below.

Q13.3 Please explain whether this sustaining project extends the useful life of the existing transmission system or simply a preventative maintenance project?

A13.3 This program extends the life of the transmission system by the removal of hazard trees which have a high probability of falling directly onto an energized line, or when removal is more economical than cyclical trimming or brushing.

Q13.4 Please confirm that this sustaining project is necessary to keep the transmission system in normal operating condition and to maintain reliable service to existing customers.

A13.4 This project will maintain normal operating conditions of the system and extend the life of the asset.

Q13.5 Please clearly explain why this sustaining project should be considered a capital expenditure rather than a regular operating expense?

A13.5 Please refer to the response to BCUC IR1 Q13.1 above.

Q14.0 Reference: Exhibit B-1, Section 3 Transmission and Stations, pp.29-30 Sustaining Projects – Transmission Pine Beetle Kill Hazard Tree Removal

"This project involves removal of hazard tress killed by the Mountain Pine Beetles ("MPB") that have a high probability of falling directly onto energized transmission lines"

Q14.1 Please explain whether this sustaining project involves the installation of a new part that is betterment to the old part of the transmission system?

A14.1 Please refer to the response to BCUC IR1 Q13.2.

Q14.2 Please explain whether this sustaining project extends the useful life of the existing transmission system or simply a preventative maintenance project?

A14.2 Please refer to the response to BCUC IR1 Q13.3.

Q14.3 Please confirm that this sustaining project is necessary to keep the transmission system in normal operating condition and to maintain reliable service to existing customers.

A14.3 Please refer to the response to BCUC IR1 Q13.4.

Q14.4 Please clearly explain why this sustaining project should be considered a capital expenditure rather than a regular operating expense?

A14.4 Please refer to the response to BCUC IR1 Q13.1.

Q15.0 Reference: Exhibit B-1, Section 3 Transmission and Stations, pp.30-34 Sustaining Projects – Station Sustaining Programs and Projects

"These projects are necessary to ensure continuous service of the substation system which includes transformers, breakers, batteries, ground grids and related equipment."

Q15.1 Please explain whether the replacement of battery banks will extend the life of substation protection and control equipment?

A15.1 The purpose of replacing the battery banks is not to extend the life of the protection and control equipment, but is a capital requirement related to the battery system itself which has reached its end of life.

Q15.1.1 Provide the list of stations involved, the age of the batteries and the condition assessment indicating the need.

A15.1.1 There is one battery bank replacement planned for 2011, at the Huth substation in Penticton. The bank was installed in 1980, and the bank was tested at 34.9 per cent of rated capacity (150 amp-hour bank, measured at 52.4 amp-hour). The IEEE 450 standard "Recommended Practice for Maintenance, Testing, and Replacement of Vented Lead-Acid Batteries for Stationary Applications" recommends replacing battery banks when they fall below 80 per cent of their capacity rating.

Q15.1.2 Include the cost per station in the listing.

A15.1.2 The cost per station is approximately $100,000.

Q15.2 Since it was explained that the replacement of "aging and failing Gap-Type Surge Arresters will provide greater protection for existing assets," does FortisBC agree that this expenditure is a type of preventative maintenance?

A15.2 The replacement of the gap-type surge arresters with metal oxide varistor (MOV) arrestors are a betterment/upgrade to the protection system as opposed to maintenance of the protection system.

Q15.2.1 Please confirm that the replacement of arrestors is simply to keep the substation infrastructure in normal operating condition?

A15.2.1 The replacement of the existing arresters with upgraded arresters will enhance the operating condition of the system and extend the life of the asset.

Q15.2.2 Please clearly explain why the replacement of arrestors should be considered a capital expenditure rather than a regular operating expense?

A15.2.2 The replacement of Silicon Carbide Gapped Type Surge Arresters is a planned replacement of a particular type of equipment. This philosophy is consistent with other projects which capitalizes equipment replacements (such as breakers, tapchangers, transformers, etc). As well, the replacement of these surge arresters will extend the life of the existing plant. This program was previously approved by Order G-11-09 in the FortisBC 2009/10 Capital Expenditure Plan.

Q15.2.3 Please provide FortisBC evidence to substantiate the statement "There are two reliability issues involving gapped surge arresters; adequacy of protection and consequential damage resulting from in service failure." and identify if these are station class arresters or not.

A15.2.3 The reliability issues referred to are twofold:

1. Gap-type surge arresters provide reduced equipment protection compared to newer MOV arresters
    - MOV-type arresters utilize solid zinc-oxide blocks with no internal gaps.
    - The gaps in older style arresters could become contaminated and/or eroded over time; this would affect the conduction threshold of the device which could impair their performance.
    - In contrast, in MOV-arresters the surge voltage conduction starts and stops promptly at a precise voltage level which improves equipment protection.
2. Gap-type surge arresters can fail violently which can result in damage to adjacent equipment.
    - As an example of the damage and reliability impact that can result from a gap-type arrester failure, in July 2008 at the Coffee Creek Terminal station an arrester failed as a result of a lightning strike.

- The arrester failed violently and also damaged the adjacent bus, resulting in 2,195 customer-hours of load loss.

The arresters to be addressed by this program are station-class arresters.

Q15.3 The Station Urgent Repairs forecast is based on a three-year historical average as identified by FortisBC and therefore does not appear to be extraordinary repairs (large significant expenditures). Please clearly explain why these repairs should be considered a capital expenditure rather than a regular operating expense?

A15.3 As each of these unforeseen failures occurs, it is evaluated to ensure that only those repairs that meet the capitalization policy are capitalized. There is a long term benefit from this program, which has previously been approved as capital by the Commission, at minimum, since the Company entered into the current term of the Performance Based Regulation mechanism (Order G-58-06), and therefore the treatment of this capital component cannot be changed without impacting the Operating and Maintenance component in revenue requirements.

Q15.3.1 Why would FortisBC not manage these undefined projects through a deferral account to be recovered in a revenue requirements application? Please explain.

A15.3.1 Station Urgent Repairs are not discretionary in nature. These projects are capital in nature and the introduction of deferral accounts would only create an administrative

burden for work that has to be completed regardless. Please also refer to the response to BCUC IR1 Q8.1 above.

Q15.4 Station Condition Assessments and Minor Planned Projects - Addition of Arc-Flash Detection to Legacy Metal-Clad Switchgear

"In 2011 the Company plans to implement a program of installing arc-flash detector relays in legacy metal-clad switchgear installations."

Q15.4.1 What are the ages of the legacy metal-clad switchgear installations? Please provide a listing of age and station location.

A15.4.1 Please refer to Table BCUC IR1 A15.4.1

Table BCUC IR1 A15.4.1

Station	Location	Age	Number of Cells
DGB - (D.G.) Bell Terminal	Kelowna	1995	7
BEP - Beaver Park	Montrose	2004	2
BLU - Blueberry	Blueberry Creek	1960s	2
CAS - Castlegar	Castlegar	1960s	3
CRA - Crawford Bay	Crawford Bay	1960s	7
CRE - Creston	Creston	1960s	2
DUC - Duck Lake	Winfield	1994	3
FRU - Fruitvale	Fruitvale	1967	2
GLM - Glenmerry	Trail	1995	7
HED - Hedley	Hedley	1960s	1
HOL - Hollywood	Kelowna	1969-2003	12
HUT - Huth	Penticton	1996	5
JOR - Joe Rich	Kelowna	1992	3
OKM - OK Mission	Kelowna	1981	9
PIN - Pine Street	Oliver	1995	5
PLA - Playmor	South Slocan	1969	8
RUC - Ruckles	Grand Forks	1961, 1972	2
SAL - Salmo	Salmo	1960s	2
SEX - Sexsmith	Kelowna	1989	7

Q15.4.2 Please provide an estimate for each location.

A15.4.2 To date, preliminary estimates have been prepared for three substations, representing a low (3 cells), medium (7 cells), and high (12 cells) number of switchgear cells. The estimate for Duck Lake (3 cells) is $80,000. The estimate for Crawford Bay (7 cells) is $126,000. The estimate for Hollywood (12 cells) is $180,000.

Once a number of stations have been completed it will be possible to produce more accurate estimates for the work at the remaining stations to complete the program.

Q15.4.3 Please provide the level of risk of injury to operating personnel if proper safety procedures are followed.

A15.4.3 The level of risk of injury to operating personnel is difficult to quantify. The sites identified have switchgear installed that, for the most part, has no engineered safeguards such as arc-resistant enclosures. Proper safety procedures include only working on de-energized equipment (which may have reliability impacts) and wearing personal protective equipment. However, personal protective equipment is considered to be a “last line of defence” and should not be relied upon as the only method of personal protection. Relying solely on personal protective equipment increases the risk of injury to employees as it only provides one barrier.

Q16.0 Reference: Exhibit B-1, Section 4 Distribution, p. 36
Distribution Growth Projects-Unplanned Growth Projects

Q16.1 Using the table below, please fill in the information for the past years 2007, 2008 and 2009.

Year	2007	2008	2009	2010	2011
Actual Costs (000s)	1,063	832	596		
Forecast Cost ($000s)				994	948
Variance in %					

A16.1 Please see Table BCUC IR1 A16.1 below.

Table BCUC IR1 A16.1
Distribution Growth Projects – Unplanned Growth Projects

Year	2007	2008	2009	2010	2011
Actual Costs ($000s)	**1,063**	**832**	**596**		
Forecast Cost ($000s)	G-147-06		G-11-09		
	685	713	974	**994**	**948**
Variance in %	55.2%	16.7%	-38.8%		

By their nature, unplanned growth projects cannot be accurately scoped or estimated at the time of the Capital Plan submission. In addition, the exercise of scoping and engineering this type of work in advance would add significant costs to the projects themselves. For this reason FortisBC estimates future expenditures based on historical averages, and actual expenditures may vary significantly compared to forecast.

Q17.0 Reference: Exhibit B-1, Section 4 Distribution, pp.37-38
Distribution Sustaining Programs and Projects - Distribution Urgent Repairs

Q17.1 The Distribution Urgent Repairs forecast is based on a three-year historical average as identified by FortisBC and therefore does not appear to be extraordinary repairs (large significant expenditures). Please clearly explain why these repairs should be considered a capital expenditure rather than a regular operating expense?

A17.1 Please refer to the response to BCUC IR1 Q15.3 above.

Q18.0 Reference: Exhibit B-1, Section 4 Distribution, pp.38-40 Distribution Sustaining Programs and Projects - Distribution Line Condition Assessment

Q18.1 Please clearly explain how FortisBC determines which Distribution Line Condition Assessment expenses are related to "extending the life of the pole" and which expenses are simply required to "ensure the integrity of the lines?"

A18.1 Please refer to the response to BCUC IR1 Q11.2 above.

Q18.2 When FortisBC conducts the "test and treat" component of the program wherein pole treatment is inserted into the pole, how long does this treatment add to the life of the distribution pole?

A18.2 Please refer to the response to BCUC IR1 Q11.3 above.

Q18.3 Please explain why the "above ground visual inspection" component of this program should be treated as a capital expenditure as oppose to an operating expense?

A18.3 Please refer to BCUC IR1 Q11.4 above.

Q18.4 Using the table below, please fill in the information for the past years 2007, 2008 and 2009.

Year	2007	2008	2009	2010	2011
Actual Cost ($000s)	928	692	659		
Forecast Cost ($000s)				667	938
Variance in %					

A18.4 Please see Table BCUC IR1 A18.4 below.

Table BCUC IR1 A18.4
Distribution Sustaining Projects – Distribution Condition Line Assessment

Year	2007	2008	2009	2010	2011
Actual Costs ($000s)	**928**	**692**	**659**		
Forecast Cost ($000s)	G-147-06		G-11-09		
	637	678	599	**667**	**938**
Variance in %	45.7%	2.1%	10.0%		

Cost of performing condition assessments vary from line to line, depending upon factors including the length of line segment being addressed, the proportion of the line requiring treatment, and the terrain. For this reason FortisBC estimates future expenditures based on historical averages, and actual expenditures may vary significantly compared to forecast.

Q19.0 Reference: Exhibit B-1, Section 4, Distribution, pp.40
Distribution Sustaining Programs and Projects - Distribution Line Rehabilitation

Commission Decision to Order G-11-09, dated February 27, 2009 makes reference to Order G-165-08 where the Copper Conductor Replacement Project CPCN was denied. This project included specific conditions in FortisBC's legacy system, where factors such as hot taps were denied. In that Decision, the Commission Panel's belief was that FortisBC should be addressing these items in the normal course of the operations and maintenance of its system.

Q19.1 Please explain why FortisBC believes that additional expenditures for the "Hot Tap Connector Replacement" project was approved in Order G-11-09?

A19.1 FortisBC's 2009-2010 Capital Expenditure Plan sought approval for expenditures of $2.848 million in 2009 and $3.209 million in 2010 for Distribution Line Rehabilitation [as amended in response to BCOAPO Q16.2 (Exhibit B-4)]. The application at pages 89 – 90 stated that

> ".. the Company plans to replace connectors in priority areas in 2009 and 2010, and then replace connectors in conjunction with its normal rehabilitation cycle. Additional funds of $750,000 per year have been included in the Distribution Line Rehabilitation project for 2009 and 2010. It is anticipated that approximately $500,000 per year will be required for the following six years, until such time as the Company completes on full eight year rehabilitation cycle".

The Commission's Decision issued concurrently with Order G-11-09 did not contain any adjustments or other determinations with regard

to the Distribution Line Rehabilitation expenditures.

Q19.2 Using the table below, please fill in the information for the past years 2007, 2008 and 2009.

Year	2007	2008	2009	2010	2011
Actual Cost ($000s)	1,231	3,000	2,634		
Forecast Cost ($000s)				3,209	2,331
Variance in %					

A19.2 Please see Table BCUC IR1 A19.2 below.

Table BCUC IR1 A19.2
Distribution Sustaining Projects – Distribution Line Rehabilitation

Year	2007	2008	2009	2010	2011
Actual Costs ($000s)	**1,231**	**3,000**	**2,634**		
Forecast Cost ($000s)	G-147-06		G-11-09		
	1,606	1,645	2,848	**3,209**	**2,331**
Variance in %	-23.3%	82.4%	-7.5%		

As this category contains a number of discrete projects, the effort required to undertake detailed cost estimations for each would be significant compared to the value of the projects themselves. In addition, the exercise of scoping and engineering this type of work in advance would add significant costs to the projects themselves. For this reason FortisBC estimates future expenditures based on historical averages, and actual expenditures may vary significantly compared to forecast.

Q20.0 Reference: Exhibit B-1, Section 4 Distribution, p.41
Distribution Sustaining Programs and Projects - Distribution Line Rebuilds

"This project involves the replacement of aged and/or deteriorated equipment."

Q20.1 Please confirm that the replacement of deteriorated equipment is simply to keep the distribution system in normal operating condition?

A20.1 Please refer to the response to BCUC IR Q12.3 above.

Q20.2 Please clearly explain why the replacement of deteriorated equipment should be considered a capital expenditure rather than a regular operating expense?

A20.2 Please refer to the response to BCUC IR Q12.4 above.

Q20.3 Using the table below, please fill in the information for the past years 2007, 2008 and 2009.

Year	2007	2008	2009	2010	2011
Actual Cost ($000s)	1,470	1,284	1,056		
Forecast Cost ($000s)				1,167	1,783
Variance in %					

A20.3 Please see Table BCUC IR1 A20.3 below.

Table BCUC IR1 A20.3
Distribution Sustaining Projects – Distribution Line Rebuilds

Year	2007	2008	2009	2010	2011
Actual Costs ($000s)	**1,470**	**1,284**	**1,056**		
Forecast Cost ($000s)	G-147-06		G-11-09		
	1,576	1,945	1,178	**1,167**	**1,783**
Variance in %	-6.7%	-34.0%	-10.4%		

As this category contains a number of discrete projects, the effort required to undertake detailed cost estimations for each would be significant compared to the value of the projects themselves. In addition, the exercise of scoping and engineering this type of work in advance would add significant costs to the projects themselves. For this reason FortisBC estimates future expenditures based on historical averages, and actual expenditures may vary significantly compared to forecast.

Q21.0 Reference: Exhibit B-1, Section 4 Distribution, pp.41-42
Distribution Sustaining Programs and Projects - Distribution Right-of-Way Reclamation

Q21.1 Please explain whether this sustaining project involves the installation of a new part that is betterment to the old part of the transmission system?

A21.1 Please refer to the response to BCUC IR Q13.2 above.

Q21.2 Please explain whether this sustaining project extends the useful life of the existing distribution system or simply a preventative maintenance project?

A21.2 Please refer to the response to BCUC IR Q13.3 above.

Q21.3 Please confirm that this sustaining project is necessary to keep the distribution system in normal operating condition and to maintain reliable service to existing customers.

A21.3 Please refer to the response to BCUC IR Q13.4 above.

Q21.4 Please clearly explain why this sustaining project should be considered a capital expenditure rather than a regular operating expense?

A21.4 Please refer to the response to BCUC IR Q13.1 above.

Q21.5 Using the table below, please fill in the information for the past years 2007, 2008 and 2009.

Year	2007	2008	2009	2010	2011
Actual Cost ($000s)	641	327	558		
Forecast Cost ($000s)				646	578
Variance in %					

A21.5 Please see Table BCUC IR1 A21.5 below.

Table BCUC IR1 A21.5
Distribution Sustaining Projects – Distribution Right-of-Way Reclamation

Year	2007	2008	2009	2010	2011
Actual Costs ($000s)	**641**	**327**	**558**		
Forecast Cost ($000s)	G-147-06		G-11-09		
	609	593	621	**646**	**578**
Variance in %	5.3%	-44.9%	-10.1%		

Right-of-Way Reclamation is typically undertaken upon identification of the need, and cannot be accurately scoped or estimated prior to submission of Capital Expenditure Plans. For his reason FortisBC estimates future expenditures based on historical averages, and actual expenditures may vary significantly compared to forecast.

Q22.0 Reference: Exhibit B-1, Section 4 Distribution, p.42
Distribution Sustaining Programs and Projects - Distribution Pine Beetle Kill Hazard Tree Removal

"This project involves removal of hazard tress killed by the Mountain Pine Beetles ("MPB") that have a high probability of falling directly onto energized distribution lines"

Q22.1 Please explain whether this sustaining project involves the installation of a new part that is betterment to the old part of the distribution system?

A22.1 Please refer to the response to BCUC IR Q13.2 above.

Q22.2 Please explain whether this sustaining project extends the useful life of the existing distribution system or simply a preventative maintenance project?

A22.2 Please refer to the response to BCUC IR Q13.3 above.

Q22.3 Please confirm that this sustaining project is necessary to keep the distribution system in normal operating condition and to maintain reliable service to existing customers.

A22.3 Please refer to the response to BCUC IR Q13.4 above.

Q22.4 Please clearly explain why this sustaining project should be considered a capital expenditure rather than a regular operating expense?

A22.4 Please refer to the response to BCUC IR Q13.1 above.

Q22.5 Using the table below, please fill in the information for the past year 2009.

Year	2009	2010	2011
Actual Cost ($000s)	1,721		
Forecast Cost ($000s)		551	1,913
Variance in %			

A22.5 Please see Table BCUC IR1 A22.5 below.

Table BCUC IR1 A22.5
Distribution Sustaining Projects –Pine Beetle Kill Hazard Tree Removal

Year	2009	2010	2011
Actual Costs ($000s)	1,721		
Forecast Cost ($000s)	G-11-09		
	722	551	1,913
Variance in %	138.4%		

Please also refer to the response to BCUC IR1 Q22.6 below.

Q22.6 Explain the forecasted drop in 2010 to $551,000 and the subsequent rise to $1,913,000 in 2011 taking into consideration the risks identified.

A22.6 Initially in the 2009/2010 CEP it was felt that the greatest risk/exposure was with the transmission system. After detailed assessments were completed it was determined that the risk/exposure more closely approximated to the ratio between the kilometers of the distribution to transmission infrastructure. As a result approximately $1 million of the amount initially forecast for the transmission pine beetle program was shifted to the distribution pine beetle program. It is expected that a significant portion of the 2010

transmission pine beetle program budget will be moved again this year and as such it will represent a more consistent spend with what is being requested in the 2011 plan.

It should also be noted that the expectation was that beetle infestation and activity would decrease. However, recent warmer winters have resulted in low beetle mortality and as a result beetle activity and associated infestations have increased within FortisBC service territory. British Columbia Ministry of Forests survey and research results indicate that current activity levels will continue for the foreseeable future and as a result 2011 spending is forecast to be higher than previous years.

Q23.0 Reference: Exhibit B-1, Section 4 Distribution, p.43
Distribution Sustaining Programs and Projects - Small Planned Capital

FortisBC explains that these repairs are required to maintain a safe and reliable distribution system and are generally non-urgent in nature.

Q23.1 Please clearly explain why this sustaining project should be considered a capital expenditure rather than a regular operating expense?

A23.1 Please refer to the response to BCUC IR1 Q12.4 above.

Q23.1.1 As small planned capital consists of undefined/unscoped projects that are generally non-urgent in nature, why are they not included in maintenance budgets or elsewhere in deferral accounts?

A23.1.1 These projects consist of similar work identified through the condition assessment program, however the work is identified in an off-cycle assessment. As this work is identified, it is evaluated to ensure that only those repairs that meet the capitalization policy are capitalized. Please also refer to the response to BCUC IR1 Q15.3 above.

Q23.2 Using the table below, please fill in the information for the past years 2007, 2008 and 2009.

Year	2007	2008	2009	2010	2011
Actual Cost ($000s)	1,030	481	596		
Forecast Cost ($000s)				747	802
Variance in %					

A23.2 Please see Table BCUC IR1 A23.2 below.

Table BCUC IR1 A23.2
Distribution Sustaining Projects – Small Planned Capital

Year	2007	2008	2009	2010	2011
Actual Costs ($000s)	**1,030**	**481**	**596**		
Forecast Cost ($000s)	G-147-06		G-11-09		
	339	378	668	**747**	**802**
Variance in %	203.8%	27.2%	-10.8%		

As this category contains a number of discrete projects, the effort required to undertake detailed cost estimations for each would be significant compared to the value of the projects themselves. In addition, the exercise of scoping and engineering this type of work in advance would add significant costs to the projects themselves. For this reason FortisBC estimates future expenditures based on historical averages, and actual expenditures may vary significantly compared to forecast.

Q24.0 Reference: Exhibit B-1, Section 4 Distribution, p.43
Distribution Sustaining Programs and Projects - Forces Upgrade and Line Moves

Q24.1 As these distribution upgrades are driven by third party requests, why are these upgrades not funded by the third party?

A24.1 FortisBC does ensure that line moves are funded by the party requesting the move, except in specific circumstances. The majority of the work included in this category is required to accommodate road widening or relocation projects by the provincial Ministry of Transportation and Infrastructure. Under agreement with the Ministry, the Company is granted permits to build within the road rights of way at no cost, provided that, if necessary, the lines are moved by the Company. This arrangement is beneficial to customers, compared to the acquisition of rights of way for transmission and distribution lines along all of the roadways within FortisBC's service territory. Please also see the responses to BCUC IR1 Q24.2 and Q24.3.1 below.

Q24.2 Does this include line move requests where FortisBC does not have sufficient land rights?

A24.2 Yes, this does include infrequent line move requests where FortisBC does not have sufficient land rights for facilities located on customer property.

Q24.3 "Miscellaneous customer line move requests where FortisBC does not have sufficient land rights for the facilities located on customer property are also included in this program"

Q24.3.1 Please explain why FortisBC considers customer requested moves a ratepayers cost.

A24.3.1 Ratepayers have historically benefited as they did not have to pay for a right-of-way initially.

Q24.4 Using the table below, please fill in the information for the past years 2007, 2008 and 2009.

Year	2007	2008	2009	2010	2011
Actual Cost ($000s)	1,564	385	1,908		
Forecast Cost ($000s)				1,461	1,456
Variance in %					

A24.4 Please see Table BCUC IR1 A24.4 below.

Table BCUC IR A24.4
Distribution Sustaining Projects – Forced Upgrades and Line Moves

Year	2007	2008	2009	2010	2011
Actual Costs ($000s)	**1,564**	**385**	**1,908**		
Forecast Cost ($000s)	G-147-06		G-11-09		
	1,168	1,400	1,255	**1,461**	**1,456**
Variance in %	33.9%	-72.5%	52.0%		

By their nature and timing, forced upgrades and line moves cannot be accurately scoped or estimated at the time of the Capital Plan submission, and actual expenditures can vary significantly compared to forecast. For this reason FortisBC estimates future expenditures based on historical averages.

Q25.0 Reference: Exhibit B-1, Section 5 Telecommunications, SCADA, and Protection and Control Projects, p. 46
Growth Projects – Distribution Substation Automation Program

Q25.1 Please provide the latest estimated forecast total to complete the project approved by C-11-07.

A25.1 The current forecast to project completion is $6.617 million.

Q25.2 Order C-11-07 previously approved $6,506,000 for the Distribution Substation Automation Program and the project completes in 2011 (used and useful), the project will enter into rates (if prudent) at that time. Is this FortisBC's understanding?

A25.2 No. The Distribution Substation Automation Program involves upgrades to a number of substations, to be completed over the period 2008 – 2011. As work is completed at each substation, the project component is placed into rate base. It is not necessary for the entire project to be completed for the components to become used and useful. Additions to Plant in Service from the Distribution Substation Automation Program are identified in annual Revenue Requirements applications and have been approved by Orders G-193-08 (2009 Revenue Requirements) and G-162-09 (2010 Revenue Requirements).

Q25.3 As the total project cost for all SCADA systems is now approaching $27 million, does FortisBC wish to submit this growth capital expenditure as a CPCN for Kelowna 138 kV Loop Fibre Installation and Grand Forks to Warfield Fibre Installation? If not, please explain why not.

A25.3 It is not clear as to which projects the statement "…the total project cost for all SCADA systems is now approaching $27 million…" is referring. The total expenditures proposed for the Telecommunications, SCADA, and Protection and Control projects identified in Table 5.1 of the Application is $12.106 million and this includes previously approved work. Notwithstanding this, each project in this section of the Application is independent of the remaining projects. The individual projects are required to meet a specific need and will have standalone benefits with respect to improved safety and reliability and reduced operating costs. On that basis it would be incorrect to aggregate the costs into a single number as this would imply that all projects need to be completed in order to achieve any project benefits. Thus, FortisBC would decline to file an umbrella CPCN application for this work considering that each project is significantly below the $20 million guideline threshold for requiring a CPCN. As well, all of the work is confined to existing system physical infrastructure and it is not expected that there would be any significant public impacts.

Q26.0 Reference: Exhibit B-1, Section 5 Telecommunications, SCADA, and Protection and Control Projects, pp. 46 - 50
Growth Projects – Kelowna 138 kV Loop Fibre Installation

Q26.1 Please complete the following table (estimate costs for stages 2 and 3).

Stage	Year	Scope	Estimated Cost (million)
Stage 1	2011	Install 25 kilometres of overhead fibre-optic cable in the Kelowna area to interconnect all distribution substations.	$3.382
Stage 2	2012	Install fibre-optic multiplexing equipment at seven distribution substations for SCADA, voice and tele-protection communications.	
Stage 3	2013 to 2016	Install protection relays and perform necessary station modifications to allow the Kelowna 138 kV subtransmission system to be operated fully meshed.	
Total for Kelowna 138 kV Loop Fibre Installation			

A26.1 Please see Table BCUC IR1 A26.1 below.

Table BCUC IR1 A26.1

Stage	Year	Scope	Estimated Cost (million)
Stage 1	2011	Install 25 kilometres of overhead fibre-optic cable in the Kelowna area to interconnect all distribution substations.	$3.382
Stage 2	2012	Install fibre-optic multiplexing equipment at seven distribution substations for SCADA, voice and tele-protection communications.	**$1.1**
Stage 3	2013 to 2016	Install protection relays and perform necessary station modifications to allow the Kelowna 138 kV subtransmission system to be operated fully meshed.	**$11.3**
Total for Kelowna 138 kV Loop Fibre Installation			**$15.8**

FortisBC states "Additionally, completion of all phases of this project will provide high-bandwidth communications for current-day operations as well as support future Smart Grid initiatives such as FortisBC's planned Advanced Metering Infrastructure project or distribution network automation."

Q26.2 Please include these costs as part of the AMI/Smart Grid costs when submitting the AMI application.

A26.2 The AMI application will include all incremental costs related to the implementation of that system, including any communication infrastructure costs. This project is independent of AMI or Smart Grid initiatives; FortisBC is requesting approval as part of the 2011 Capital Expenditure Plan.

FortisBC states "FortisBC estimates that approximately $50,000 of operating and maintenance costs have been incurred maintaining and troubleshooting problems with this system since 2006."

Q26.3 Please provide a cost/benefit analysis for this project and include all stages.

A26.3 In general, a simple financial cost/benefit analysis is not definitive when evaluating reliability-driven projects. This is because it can be difficult to translate the costs of an avoided customer outage into financial terms. As well, in this case the cost/benefit analysis needs to consider an option analysis to assist in determining the appropriate selection of a long-term solution.

It must be recognized that the existing wireless communications system in Kelowna has reached end-of-life and requires replacing in order to maintain existing service levels. On that basis, the Do Nothing option is not applicable as the system will eventually fail and repair parts are no longer available.

Note that for the discussion below, only the Stage 1 and Stage 2 proposed projects have been specifically considered in the justification exercise. The need and justification for the incremental reliability enhancements provided by Stage 3 will be developed and presented in a subsequent application. The outcome of this future application does not affect the justification for the currently proposed project as there is sufficient information to justify the project on a standalone basis. Notwithstanding this, recognition is given to options which are capable of supporting the future reliability enhancements provided by Stage 3.

For the combined cost/benefit and options analysis the following

assumptions were used:

- The system availability of the existing FortisBC-owned wireless communications network is approximately 99.5% (e.g. the system is unavailable for approx. 2 days per year) and decreasing as the equipment continues to age and failures become more frequent. The system availability of third-party leased communications services is approximately 99.5% (e.g. the system is unavailable for approx. 2 days per year).
- The system availability of new communications systems ranges from approximately 99.9% (for wireless) to 99.999% (fibre optic).
- The customer cost of interruption resulting from a one hour outage to all Kelowna load is approximately $5 million (for 250 MW of load in 2007 – Reference: response to BCUC IR1 Q18.4 in the Okanagan Transmission Project evidentiary record). This figure represents the costs to customers due to an extended supply outage (such as lost production, business disruption, societal impact, etc.); it is not simply the value of unsupplied electricity service by the utility.
- Based on historical performance, failures of the currently installed communications systems will sometimes affect the ability to remotely restore the power system. As a result, what could be a short-duration outage (< 5 minutes) instead results in an extended outage. On average, this will result in an additional one hour outage affecting approximately 100 MW of load every 2 years.

Thus, on average, failures of the existing communications system results in interruption costs to customers in Kelowna representing approximately $1 million per year. In other words, if the Kelowna

communications system was replaced with equipment that could be considered near fully available, then communications failures would have no negative impact on the duration of power system outages. Customer outages would still occur, however they would not be unnecessarily extended by failures of the communications system. Elimination of this impact on reliability would thus represent a savings to customers of approximately $1 million per year through reduced outage impacts.

The reliability of the system could be further enhanced in the future by operating the Kelowna-area transmission system fully meshed (as contemplated in Stage 3 of the proposed project). This would result in additional customer outage savings beyond the $1 million discussed above. This is because a single-contingency transmission outage would not result in even the momentary loss of any load and consequently customer outages would be less frequent. These additional savings are recognized, but are not quantifiable at this time.

To evaluate the possible project alternatives the following options were considered:

Option A: Replace the existing Kelowna wireless system with similar equipment of modern vintage.
Pros: • Provides basic communications functionality for SCADA remote control • No dependence on third-parties for operational communications
Cons: • No system capacity for future upgrades to support inter-station teleprotection (unable to provide full N-1 transmission reliability for over 250 MW of load) • No system capacity for future Smart Grid initiatives (AMI, etc.) • Requires relocation of existing mountain-top repeater site to reduce undesirable system interference • Dependent on mountain-top repeater equipment which is difficult to access and maintain during the winter • Lower reliability due to minimal equipment redundancy (approximately 99.9% system availability) • Third-party leased services still required for corporate WAN communications
Costs: • Capital costs (+100/-50% accuracy): $1.5 million • Ongoing leased communications for corporate WAN: $60k per year
Benefits: • Reduced outage duration costs: $1 million per year

Option B: Replace the existing Kelowna wireless system with power-line carrier equipment.
Pros: • Provides basic communications functionality for SCADA remote control • Provides basic teleprotection communications between substations to support future meshing of transmission system • All communications equipment would be located in existing substation sites • No dependence on third-parties for operational communications
Cons: • No system capacity for future Smart Grid initiatives (AMI, etc.) • Lower reliability due to minimal equipment redundancy (approximately 99.9% system availability) • Power-line carrier is considered somewhat outmoded technology by many utilities due to its low system capacity compared to other communications technologies • Third-party leased services still required for corporate WAN communications
Costs: • Capital costs (+100/-50% accuracy): $5 million • Ongoing leased communications for corporate WAN: $60k per year
Benefits: • Reduced outage duration costs: $1 million per year (for communications upgrade only – additional future savings would be possible by meshing the transmission system)

Option C: Replace the existing Kelowna wireless system with point-to-point wireless communications.
Pros: • Provides communications functionality for SCADA remote control • Provides basic teleprotection communications between substations to support future meshing of transmission system • All communications equipment would be located in existing substation sites • Increased reliability due to redundant equipment installation (approximately 99.95% system availability) • No dependence on third-parties for operational communications
Cons: • Minimal system capacity for future upgrades to support Smart Grid initiatives (AMI, etc.) • Could be technically infeasible if line-of-sight is not available between all locations • Third-party leased services still required for corporate WAN communications
Costs: • Capital costs (+100/-50% accuracy): $5 million • Ongoing leased communications for corporate WAN: $60k per year
Benefits: • Reduced outage duration costs: $1 million per year (for communications upgrade only – additional future savings would be possible by meshing the transmission system)

Option D: Replace the existing Kelowna wireless system with leased communications from a telecommunication service provider
Pros: • Provides communications functionality for SCADA remote control • Provides basic teleprotection communications between substations • Sufficient system capacity for future upgrades to support Smart Grid initiatives (AMI, etc.)
Cons: • Complete dependence on third parties for operational and corporate communications • Lower reliability due to minimal equipment redundancy (approximately 99.5% system availability) • FortisBC standards currently prohibit the use of third-party communications for teleprotection functions
Costs: • Capital costs (+100/-50% accuracy): $2 million • Ongoing leased communications for corporate WAN: $60k per year • Ongoing lease costs for operational communications (unknown, but minimum of $100k per year) • Outage costs due to lower reliability levels of leased systems: $1 million per year
Benefits: • No identified cost benefits

Option E: Replace existing wireless communication systems with fibre-optic cable and multiplexing equipment
Pros: • Provides full communications functionality for SCADA remote control • Provides full teleprotection communications between substations to support future meshing of transmission system • Abundant system capacity for future upgrades to support Smart Grid initiatives (AMI, etc.) • No dependence on third-parties for operational or corporate WAN communications • Highest reliability due to use of redundant equipment and fibre optic paths (approximately 99.999% system availability)
Cons: • None identified
Costs: • Capital costs (±25% accuracy): $4.5 million (for Stage 1 and Stage 2 only)
Benefits: • Reduced operating costs for corporate WAN: $60k per year • Reduced outage duration costs: $1 million per year (for communications upgrade only – additional future savings would be possible by meshing the transmission system)

Based on the options presented above, Option E was selected as, on the balance, it has the greatest system benefits for customers with costs effectively equivalent to the other alternatives with lesser current and future functionality.

Q27.0 Reference: Exhibit B-1, Section 5 Telecommunications, SCADA, and Protection and Control Projects, pp. 50 - 52
Growth Projects – Grand Forks to Warfield Fibre Installation

Q27.1 Please confirm that the total costs for this project is as shown in the following table.

Stage	Year	Scope	Estimated Cost (million)
Stage 1	2011	FortisBC is seeking approval for engineering and final estimating for this project in 2011	$0.667
Stage 2	Future	Expenditures for the execution of the project will be the subject of a future application	$4.4
Total for Grand Forks to Warfield Fibre Installation			$5.067

A27.1 Confirmed.

Q28.0 Reference: Exhibit B-1, Section 5 Telecommunications, SCADA, and Protection and Control Projects, pp. 52 - 53
Sustaining Projects – Lee to Vernon 230 kV Line Protection and Communication Upgrades

FortisBC states "The estimated expenditure for this project is $1.286 million in 2011."

Q28.1 What is the total estimated cost for the protection and control project including the cost for the telecommunications project?

A28.1 The Lee to Vernon 230 kV Line Protection Upgrades project also includes any required telecommunications upgrades. As stated in the Application, the total project cost for both aspects is $1.286 million. This project is not dependent on any other proposed projects.

Q28.2 Why is this project not a growth project as it is similar to Stage 3 of the Communication Upgrades Kelowna 138 kV Loop Fibre Installation?

A28.2 Stage 3 of the Kelowna 138 kV Loop Fibre Installation project includes the installation of transmission line protection relays at the Kelowna-area distribution substations. Presently, none of these stations have transmission line protection. Since this project involves the installation of equipment where none currently exists, this work is classified as Telecommunications Growth. The Lee to Vernon 230 kV Line Protection Upgrades project involves upgrading and replacing existing protection and telecommunications equipment; on this basis it is classified as Telecommunications Sustaining.

Q29.0 Reference: Exhibit B-1, Section 6 General Plant, pp. 54-55
General Plant Projects

FortisBC explains that the "General Plant Projects" support British Columbia's energy objectives as defined in the Clean Energy Act, in particular the objectives:

…(h) to encourage the switching from one kind of energy source or use to another that decreases greenhouse gas emission in British Columbia." (p. 54)

Q29.1 Given the current deflated gas prices (compare to previous years), is FortisBC finding its customers switching from electric to natural gas? Please comment.

A29.1 FortisBC would not generally be informed, nor does it keep records if informed, regarding customers switching from electric to natural gas.

Q29.1.1 If yes, does FortisBC encourage this type of energy switching of its existing customer in order to support various components of the Clean Energy Act?

A29.1.1 FortisBC does not provide incentives for customers to switch from electricity to natural gas.

Q29.2 Please identify which specific General Plant Project (and how these projects) supports the kind of energy source switching as described in the Application.

A29.2 The vehicle replacement project supports energy source switching through the use of hybrid vehicles.

Q29.3 Why does table 6.1 not include the forecast for 2010?

A29.3 Table 6.1 summarizes the expenditures for which approval is being sought through the 2011 Capital Plan, or which have been previously approved. Please see the response to BCUC IR1 Q29.4 below for historical cost data, including the 2010 forecast.

Q29.4 Provide cost data for the years 2007 through 2012 for Table 6.1.

A29.4 Please see Table BCUC IR1 A29.4 below.

Table BCUC IR1 A29.4
Table 6.1 from Exhibit B-1

General Plant	2007 Actual	2008 Actual	2009 Actual	2010 Forecast	As per CEP 2011 Filing	2012	Total
	($000s)						
Mandatory Reliability Standards Compliance	-	-	-	1,688	595	-	**2,283**
Vehicles	4,431	1,628	2,342	2,000	2,000	-	**12,401**
Meter Inventory	542	278	431	559	213	-	**2,023**
Information Systems	6,655	4,543	4,768	4,351	5,550	-	**25,867**
Telecommunications	221	258	90	101	358	-	**1,028**
Buildings	1,565	1,527	1,270	1,062	1,244	-	**6,668**
Kootenay Operations Centre	-	-	-	-	485	-	**485**
Kelowna Long Term Solution	-	-	-	-	489	-	**489**
Furniture and Fixtures	248	237	294	354	176	-	**1,309**
Tools and Equipment	936	587	525	523	601	-	**3,172**
PCB Environmental Compliance	-	-	-	-	1,852	-	**1,852**
Total	**14,598**	**9,058**	**9,720**	**10,638**	**13,563**	**-**	**57,577**

Q29.5 Provide cost data for the years 2007 through 2012 for all tables in section 6.

A29.5 Please see Tables BCUC IR1 A29.5a and A29.5b below.

Table BCUC IR1 A29.5a
Table 6.3 from Exhibit B-1

Information System Projects	2007 Actual	2008 Actual	2009 Actual	2010 Forecast	As per CEP 2011 Filing	2012	Total
	($000s)						
Infrastructure Upgrade	358	273	733	794	939	-	**3,097**
Desktop Infrastructure Upgrade	657	240	783	780	1,010	-	**3,470**
SAP & Operations System Enhancements	1,559	1,140	1,252	953	1,198	-	**6,102**
AM/FM Enhancements	-	938	192	423	493	-	**2,045**
Customer Service Systems Enhancements	139	-	871	794	904	-	**2,708**
SCADA Enhancements	212	91	800	619	528	-	**2,250**
HR Payroll Conversion	-	-	-	-	478	-	**478**
Distribution Design Software	-	-	135	(11)	-	-	**124**
AP Document Imaging	-	351	-	-	-	-	**351**
Microsoft Office & Windows Upgrade	-	500	-	-	-	-	**500**
Integraph Upgrade	1,863	-	-	-	-	-	**1,863**
IT Disaster Recovery Phase 2	470	33	-	-	-	-	**503**
MVRS Handheld Upgrade	237	(10)	-	-	-	-	**227**
Intranet Enhancements	94	144	-	-	-	-	**238**
Internet Enhancements	115	124	-	-	-	-	**239**
Dispatch Software Consolidation	231	86	-	-	-	-	**317**
HR Training & Events	241	15	-	-	-	-	**256**
CIS+ Enhancements	273	620	-	-	-	-	**893**
Records Management	121	-	-	-	-	-	**121**
Procurement Card Software Upgrade to Centresuite	7	-	-	-	-	-	**7**
Trail Drafting Plotter/Copier/Scanner	76	-	-	-	-	-	**76**
General Plant Telecom	2	-	-	-	-	-	**2**
Total	**6,655**	**4,543**	**4,768**	**4,351**	**5,550**	**-**	**25,867**

1 **Table BCUC IR1 A29.5b**
2 **Table 6.4 from Exhibit B-1**

Building Projects	2007 Actual	2008 Actual	2009 Actual	2010 Forecast	As per CEP 2011 Filing	2012	Total
	($000s)						
Warfield Operations Drainage	-	-	-	-	173	-	**173**
SCC UPS Replacement	-	-	-	-	115	-	**115**
Racking Upgrades	-	-	-	-	130	-	**130**
Emergency Building Upgrades	-	-	-	-	106	-	**106**
Projects under $100,000	317	348	138	442	720	-	**1,965**
Kelowna Springfield	491	272	218	135	-	-	**1,116**
Generation	126	240	-		-	-	**366**
Warfield	453	169	-		-	-	**622**
Trail	178	-	-		-	-	**178**
Kelowna Enterprise	-	301	-	-	-	-	**301**
Kelowna Benvoulin	-	197	-	-	-	-	**197**
Creston	-	-	103	-	-	-	**103**
Oliver	-	-	238	205	-	-	**443**
Trail	-	-	115	150	-	-	**265**
Warfield	-	-	458	130	-	-	**588**
Total	**1,565**	**1 ,527**	**1 ,270**	**1,062**	**1,244**	**-**	**6,668**

Q30.0 Reference: Exhibit B-1, Section 6 General Plant, p. 55
Mandatory reliability Standards Compliance

FortisBC states "Capital expenditures for 2010 were included in FortisBC's 2010 Revenue Requirements Application, approved by Commission Order G-162-09. The project will be completed in 2011 with estimated expenditures of $0.595 million."

Q30.1 Please provide the total amount of funding provided by Order G-162-09.

A30.1 As set out in Table 1-A-1 in Order G-162-09, $2.399 million was allocated for Mandatory Reliability Compliance in 2010.

Q30.2 Please explain how lockable cabinets and access card readers are part of MRS compliance.

A30.2 CIP-006-1 (Physical Security) Requirement R1.1 states that *all Cyber Assets within an Electronic Security Perimeter also reside within an identified Physical Security Perimeter. Where a completely enclosed ("six-wall") border cannot be established, the Responsible Entity shall deploy and document alternative measures to control physical access to the Critical Cyber Assets.* FortisBC's alternative measures include lockable cabinets that house the critical cyber assets. These cabinets will contain door contacts that will alarm should the cabinet be opened. The keys to these cabinets will be restricted (as per CIP-006-1 R2.2 Special Locks) and kept in a secure lock box that will contain a card strike. The card strike will provide access control to the restricted keys. A combination of this access control and the door alarms will provide logging of who accessed what Critical Cyber Assets and at what time they were accessed. As the facility is older and contains many access points: windows (used for ventilation and

cooling) and doors, FortisBC proposed the lockable cabinet solution as a cost effective measure that still falls within the requirements and will provide good physical security for cyber assets identified as critical.

Q30.3 Will $ 2.595 million be the total cost of compliance as no forecast for 2012 has been supplied in table 6.1?

A30.3 $2.595 million is the capital cost identified to be compliant with the current Mandatory Reliability Standards. The company expects to complete during 2011 those capital improvements identified in the MRS mitigation plans filed in June, 2010 and should not require future funding unless the Commission determines that additional changes to FortisBC's infrastructure are required to meet the current standards, or unless those standards are revised or additional standards implemented in British Columbia.

Q31.0 Reference: Exhibit B-1, Section 6 General Plant, p. 55-57
Vehicles

"This project involves the replacement and/or addition of heavy fleet vehicles, service vehicles, passenger vehicles, equipment and off road vehicles…" (p. 55, lines 15-16)

"In F2011, FortisBC plans to replace twenty-three units" with the cost of $2 million. (p. 56, line 1 and 14)

Q31.1 Please confirm that the entire $2 million is for the replacement of vehicle units. Please explain whether there are additional costs for "adding" new units.

A31.1 The $2 million figure includes $1.9 million to cover the costs of planned vehicle replacements. A contingency fund of $100,000 is included to cover any unanticipated requirements, unplanned vehicle additions/replacements, or to upgrade an existing vehicle.

Q31.2 Please fill in the following vehicle continuity tables for each of the years 2007 – 2011. F2011 is partially filled out as an example.

F2011	Beginning Year Balance		Replacements / New Additions		Written offs / removed from fleet		Ending Year Balance	
Category	$	#	$	#	$	#	$	#
Heavy Fleet Vehicles				3				
Service Vehicles				17				
Passenger Vehicles				0				
Off-Road Vehicles/Trailers				3				
Subtotal			1,900	23				
Contingency			100	-				
Total			2,000	23				

A31.2 Please refer to Table BCUC IR1 A31.2 below.

Table BCUC IR1 A31.2

2007	Beginning year balance		Replacements/Additions		Written Off Removed from fleet		Ending Year Balance	
Category	**$000s**	**#**	**$000s**	**#**	**$000s**	**#**	**$000s**	**#**
Heavy Fleet	5,427	45	2,685	10	165	3	7,947	52
Service Vehicles	4,018	88	638	7	335	10	4,321	85
Passenger Vehicles	1,627	59	719	16	125	6	2,221	69
Off-Road/Trailers	1593	82	389	11	24	4	1,958	89
Subtotal	12,665	274	4,431	44	649	23	16,447	295
Contingency	0		0				0	0
Total	12,665	274	4,431	44	649	23	16,447	295

2008	Beginning year balance		Replacements/Additions		Written Off Removed from fleet		Ending Year Balance	
Category	**$000s**	**#**	**$000s**	**#**	**$000s**	**#**	**$000s**	**#**
Heavy Fleet	7,947	52	644	9	779	8	7,812	53
Service Vehicles	4,321	85	316	8	511	12	4,126	81
Passenger Vehicles	2,221	69	511	17	177	9	2,555	77
Off-Road/Trailers	1,958	89	157	3	45	4	2,070	88
Subtotal	16,447	295	1,628	37	1,512	33	16,563	299
Contingency	0	0	0				0	0
Total	16,447	295	1,628	37	1,512	33	16,563	299

2009	Beginning year balance		Replacements/Additions		Written Off Removed from fleet		Ending Year Balance	
Category	**$000s**	**#**	**$000s**	**#**	**$000s**	**#**	**$000s**	**#**
Heavy Fleet	7,812	53	1,184	5	958	8	8,038	50
Service Vehicles	4,126	81	505	3	135	5	4,496	79
Passenger Vehicles	2,555	77	159	9	215	11	2,499	75
Off-Road/Trailers	2,070	88	494	7	45	2	2,519	93
Subtotal	16,563	299	2,342	24	1,353	26	17,552	297
Contingency	0	0	0				0	0
Total	16,563	299	2,342	24	1,353	26	17,552	297

2010	Beginning year balance		Replacements/Additions		Written Off Removed from fleet		Ending Year Balance	
Category	**$000s**	**#**	**$000s**	**#**	**$000s**	**#**	**$000s**	**#**
Heavy Fleet	8,038	50	1,276	5	958	5	8,356	50
Service Vehicles	4,496	79	205	3	135	3	4,566	79
Passenger Vehicles	2,499	75	206	5	215	5	2,490	75
Off-Road/Trailers	2,519	93	213	4	45	4	2,687	93
Subtotal	17,552	297	1,900	17	1,353	17	18,099	297
Contingency	0	0	100				100	0
Total	17,552	297	2,000	17	1,353	17	18,199	297

2011	Beginning year balance		Replacements/Additions		Written Off Removed from fleet		Ending Year Balance	
Category	**$000s**	**#**	**$000s**	**#**	**$000s**	**#**	**$000s**	**#**
Heavy Fleet	8,356	50	940	3	958	3	8,338	50
Service Vehicles	4,566	79	905	17	135	17	5,336	79
Passenger Vehicles	2,490	75	0	0	215	0	2,275	75
Off-Road/Trailers	2,687	93	55	3	45	3	2,697	93
Subtotal	18,099	297	1,900	23	1,353	23	18,646	297
Contingency	100	0	100				200	0
Total	18,199	297	2,000	23	1,353	23	18,846	297

FortisBC explains that approximately $100,000 per year is required to address any unanticipated requirements. "This may include upgrading the specification on an existing vehicle that is to be replaced..." (p. 56, lines 15-16)

Q31.3 Should the above statement be interpreted that if/when an upgrade is available to an existing vehicle then it needs not replaced immediately, even if it is meets the replacement criteria trigger points.

A31.3 No, that is not the correct interpretation. The statement meant to suggest that when a vehicle is being replaced, and if it is prudent to do so, the Company may use some or the entire $100,000 contingency to upgrade the specification on the new replacement vehicle.

Q31.4 Does the above statement suggest that there should be avoided replacement costs in the year if/when an upgrade to an existing vehicle is available?

A31.4 No, please refer to the response to BCUC IR1 Q31.3 above.

"FortisBC has 346 units in its fleet, of which 280 units are owned and 66 units are leased." (p.55, line 18)

Q31.5 Please provide the average age of FortisBC's fleet for the categories: heavy fleet, service vehicles, passenger vehicles, equipment / off-road vehicles.

A31.5 Please see Table BCUC IR1 A31.5 below.

Table BCUC IR A31.5
Average Fleet Age by Category

Category	Average Age
Heavy Fleet	8 years
Service Vehicles	4 years
Passenger Vehicles	3 years
Equipment/Off Road	13 years

"the Company's fleet currently has four hybrid low emission passenger vehicles and a hybrid low emission service truck." (p. 56, lines 2-3)

Q31.6 Will any of the 23 replacement units in 2011 be hybrid low emission vehicles? Why or why not?

A31.6 The addition of low emission vehicles will be studied on a case by case basis. Higher incremental costs will have to offset fuel savings over the planned life of the vehicle. The Company now has 9 hybrid vehicles in the fleet (7 passenger vehicles, one ½ ton truck and one service truck).

Q31.7 Does FortisBC recognize any carbon credits? Please discuss.

A31.7 FortisBC does not realize any carbon credits, but is continuing to look at carbon reduction to support the federal and provincial greenhouse gas reduction initiatives.

Table 6.2(a) on page 56 lists FortisBC's Replacement Criteria Trigger guidelines.

Q31.8 Please discuss how FortisBC's equipment replacement guidelines (p. 56) compare to that of other utilities in Canada. Should the criteria include cost comparisons between upgrading an existing vehicle unit versus replacing with new?

A31.8 Data from other utilities is not readily available. However, comparing with two of FortisBC's affiliates yielded the following.

- FortisAlberta uses the same guidelines as FortisBC, except that it generally replace trailers in 10 years instead of the 20 year guideline FortisBC uses.

- Terasen Gas has a replacement threshold of 160,000 kilometers for gas vehicles, and 220,000 kilometers on diesel powered vehicles. There is an individual review on older units that have not yet met the km threshold.

The Transport Canada Motor Fleet Management Manual (Audit of Transport Canada Departmental Vehicle Use, File 1577-05-007) states that passenger cars and mini-vans should be considered for disposal after a four to six year and up to an 80,000 to 120,000 kilometer life cycle, while light trucks should be disposed of after a six to eight year and up to a 120,000 to 160,000 kilometre life cycle. The Transport Canada Audit of Departmental Vehicle Use can be found at the following link:

http://www.tc.gc.ca/eng/corporate-services/aas-audit-2007-201.htm

The Company is of the opinion that FortisBC's criterion enables FortisBC to maintain high vehicle safety standards by replacing units

that are becoming a reliability risk. Upgrading/modifying existing motor vehicles is already done on an “individual review”, and in most cases is not cost effective over the remaining life of most vehicles.

Q32.0 Reference: Exhibit B-1, Section 6 General Plant, p. 57
Meter Inventory

FortisBC estimates $0.213 million in 2011 for metering infrastructure capital including meters, current transformers, potential transformers and ancillary equipment. (p. 57, lines 4-8)

Q32.1 What is the 2011 estimated number of new meters driven by customer growth? Meter failure?

A32.1 The estimated number of new meters driven by customer growth is forecast at approximately 1,800. Approximately 2,500 meters are also forecast to be exchanged as part of the meter compliance program. FortisBC does not consider meter failures to be significant, and therefore they are not included in the forecast capital expenditure for meters.

Q32.2 Does FortisBC carry an inventory of used meters that may be deployed to meet customer growth and/or meter replacements for 2011? Why or why not?

A32.2 FortisBC does not carry an inventory of used single phase meters as it is not economical to re-use these particular meters. Any three phase electronic meters that are removed from service are sent for resealing, and are redeployed to meet customer growth and/or meter replacements as required.

Q32.3 What is the average life of these conventional meters?

A32.3 The term “conventional” is understood to refer to electromechanical meters. FortisBC has typically experienced an average life expectancy of 30 years for these types of meters. It should be noted that these types of meters are no longer installed by FortisBC.

For the electronic meters currently installed by FortisBC, it is difficult to ascertain the average life expectancy as the use of electronic meters is relatively new. It is estimated however that the average life expectancy for these types of meters should range from 30-35 years.

Q32.4 Please confirm that FortisBC's AMI project commencing in 2012 is intended to replace ALL existing revenue meters, regardless of their age / when they were put into service.

A32.4 FortisBC intends to replace all meters with the AMI project aside from a small number of existing interval meters for large customers.

Q33.0 Reference: Exhibit B-1, Section 6 General Plant, pp. 58 and 64
Information Systems – Table 6.3 and 6.3(f)

Q33.1 Please explain why SCADA enhancements for information systems are not part of the Growth Project costs.

A33.1 FortisBC does not consider the distinction between growth and sustaining to be useful in the context of the general plant projects.

Q33.2 Please explain if the SCADA enhancements include the transducers and monitoring equipment to provide the data to Cascade and the Control Center (or do the expenditures cover only the communication equipment?

A33.2 No, the SCADA Enhancements projects do not include the installation of any field equipment such as transducers or monitoring equipment. Refer also to the response to BCUC IR1 Q38.1.

Q34.0 Reference: Exhibit B-1, Section 6 General Plant, p. 59
Information Systems – Infrastructure Upgrade

Q34.1 Please confirm that "operating systems" is synonymous to "software," as described in the Application.

A34.1 Operating systems, as referred to in the Application, is the software that that forms the base for all systems to operate on. Operating systems, as referred to in the application, is only software.

Q34.2 What is the portion of hardware versus software in FortisBC's IS infrastructure capital?

A34.2 Of the approximately $2.9 million worth of hardware and software associated with the Company's Information Systems infrastructure, 57 per cent is hardware, and the remaining 43 per cent is software.

Q34.3 Please provide a breakdown of Table 6.3(a) into hardware and software upgrade expenditures.

A34.3 Please see Table BCUC IR1 A34.3 below.

Table BCUC IR1 A34.3
Software vs. Hardware Expenditures

	2009	2010	2011
Hardware Upgrades	285	185	350
Software Upgrades	448	609	589
Total	733	794	939

Q34.4 Assuming that the last operating systems upgrade was completed in 2009 and an upgrade is required every two years as stated in the Application, please explain why the IS infrastructure costs in 2011 are almost 30% more than 2009.

A34.4 The upgrade of operating systems is staggered so that not all systems are upgraded in a single year. This allows for a balanced expenditure and staffing levels without jeopardizing manufacturer support. The primary reason for the cost increase in 2011 is due to an additional $139,000 to address any contingency in infrastructure that may be discovered during the first Mandatory Reliability Standards audits.

Q35.0 Reference: Exhibit B-1, Section 6 General Plant, pp. 59-60
Information Systems – Desktop Infrastructure Upgrade

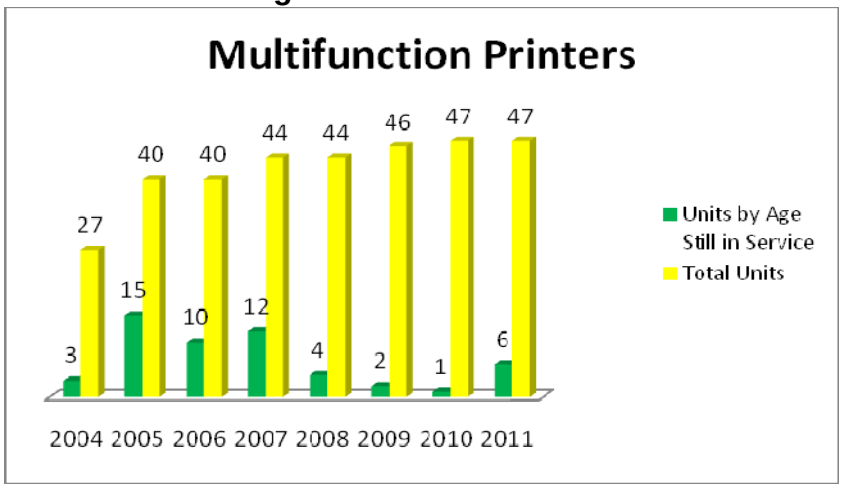
"The total value of FortisBC's desktop hardware and related peripherals is approximately $3 million. The Desktop Infrastructure Upgrade budget is based on a 20 percent replacement…" (p. 59, Lines 28-29)

"The estimate for 2011 is based on historical requirements." (p. 60, Line 9)

Q35.1 Please confirm whether the 2011 estimate is based on a 20% replacement (5 year life cycle) or based on historical requirements. Have the historical requirements in the last 5 years been more or less than 20% of the assets? Please discuss the reasons why.

A35.1 The 2011 estimate is based on an approximate five year life cycle. There is a spike in costs for 2011, as a higher number than usual of large multifunction printing devices have reached end of life. There were a large number of these devices purchased in 2005 that are experiencing high downtimes and now require replacing as shown below.

Figure BCUC IR1 A35.1



The historical asset replacement requirements of the last four years have averaged approximately 20 per cent of the assets in each year.

Q35.2 20% of the Desktop hardware and peripherals asset balance is ~ $600,000 ($3 million x 20%), but FortisBC's 2011 Plan estimates the capital expenditure to be $1 million. Is this suggesting that the actual desktop infrastructure life cycle is less than five years? Is so, are there any reasons why the desktop infrastructure do not last the maximum of five years?

A35.2 Please refer to the response to BCUC IR1 Q35.1 above.

Q35.3 Please provide the Desktop hardware and peripherals asset balance at the beginning of 2009 and 2010.

A35.3 Desktop infrastructure asset balance for Jan 1, 2009, and January 1, 2010 was approximately $2.8 million and $2.9 million respectively.

Q36.0 Reference: Exhibit B-1, Section 6 General Plant, pp. 61-62
Information Systems – AM / FM Enhancements

Q36.1 Please explain that 120% increase in AM/FM Enhancement expenses in 2010 compared to 2009.

A36.1 The AM/FM system was completed in 2008. 2009 was the second year that the AM/FM was fully implemented and the software's operations in relation to the FortisBC business processes, particularly in the field, highlighted enhancements opportunities that would provide productivity and data management benefits. These enhancement opportunities were documented during 2009 and the 2010 budget was allocated to implement the most beneficial or required enhancements, which included a version upgrade that streamlined field data updates.

Q36.2 Please provide a cost breakdown of the $493, 000 expenditures in 2001.

A36.2 Please see Table BCUC IR A36.2 below.

Table BCUC IR1 A36.2
AM/FM Enhancements

Expenditure Description	2011
Upgrades and support pack installation	$334,000
Enhancements	$159,000
Total	**$493,000**

Q37.0 Reference: Exhibit B-1 Section 6 General Plant, p. 63 Information Systems - Customer Service Systems Enhancements– Table 6.3(e)

Q37.1 Would the AMI application have a negative impact on this expenditure? Please explain.

A37.1 No. These expenditures are required whether or not AMI is implemented. Any additional expenditure required for changes to the Customer Information System to meet AMI requirements will be identified as part of the AMI project.

Q38.0 Reference: Exhibit B-1, Section 6 General Plant, p. 63-64
Information Systems – SCADA Enhancements

Q38.1 Please explain the difference in the SCADA budgets as discussed in Section 5 Telecommunications, SCADA, and Protection and Control Projects (pages 45-52) compared to the SCADA budgets as discussed in Section 6 General Plant.

A38.1 The SCADA budget in Section 5 refers to the field equipment that is installed for protection and controls, as well as the supporting communications infrastructure for that equipment. The SCADA Enhancement budget refers to the software and supporting computer hardware located at the System Control Centre used to control the SCADA equipment and store system related data.

Q39.0 Reference: Exhibit B-1, Section 6 General Plant, p. 64-65
Information Systems – Human Resource Payroll Conversion

"The estimated expenditures for (the Ceridian) project is $0.478 million in 2011."

Q39.1 Please confirm that the $0.478 million in 2011 includes all planning, testing, and implementation costs for the Ceridian project.

A39.1 Confirmed. The $0.478 million includes all planning, testing, and implementation costs for the Ceridian project.

Q39.2 When will the Ceridian system be implemented? Will there be any additional costs forecast for 2012?

A39.2 Ceridian will be implemented by the third quarter of 2011. There are no additional operating costs associated with Ceridian in 2012.

Q39.3 What are the estimated annual operating costs of the Ceridian system?

A39.3 The estimated annual operating costs of the Ceridian system are approximately $65,000.

Q40.0 Reference: Exhibit B-1, Section 6 General Plant, p. 65
Telecommunications

"The telecommunications capital budget is used to purchase new or replacement communications equipment"

"The estimated expenditure for this project is $0.358 million in 2011."

Q40.1 Please provide all actual telecommunication expenditures for 2008 and 2009. What is the forecast telecommunication expenditure for 2010?

A40.1 The actual Telecommunications expenditures for 2008 and 2009 were $258,000 and $90,000 respectively. The current forecasted telecommunications expenditure for 2010 is $101,000.

Q40.2 Please describe the difference in the 2011 telecommunications capital budget ($$0.358 million) compared to the Communication Upgrade project ($0.265 million) described on page 53 of the Application. Why are communication expenditures discussed separately?

A40.2 The Communications Upgrades projects identified in the Section 5 Telecommunications, SCADA, and Protection and Control budget includes installation and upgrades of equipment which is used to support direct operational protection and control of the power system. This includes equipment used for: transformer and transmission line protection, teleprotection between substations, substation remote terminal units (RTU), SCADA communications to substation sites, remote diagnostic access and remedial action schemes (RAS). In other words, these telecommunications systems are primarily used for data purposes.

The projects included in Section 6 General Plant

Telecommunications budget typically are used to install and upgrade equipment which supports inter-personnel voice communications in order to effectively operate and maintain the system. This includes equipment such as vehicle, handheld and base station VHF radios and voice links from the System Control Centre to remote sites and other utilities. In other words, these telecommunications systems are primarily used for voice purposes.

These projects have historically been separated as the former provides data communications for power system operations whereas the latter category provides voice communications for business purposes and is similar to other projects in the General Plant category.

Q40.3 FortisBC states "The communications budget also covers upgrades and/or replacement of equipment that is used for remote control and operation of field devices from the SCC."

Q40.3.1 Why is this not included with the SCADA Growth/Sustaining projects?

A40.3.1 Previously, the voice telecommunications systems included in the General Plant budget (such as the VHF radio system) were also used in some limited cases to provide data communications for control and monitoring of remote sites where no other communications method was feasible. Since that time, FortisBC has been taking advantage of new technologies, and – where it is cost effective – has been transferring this data communications to dedicated systems.

Q41.0 Reference: Exhibit B-1, Section 6 General Plant, p. 65
Buildings

"Site audits have been carried out at all facilities and the information has been utilized to identify deficiencies and upgrades to each facility."

Q41.1 Please file a copy of this audit, including a summary of the findings. Please include an execution schedule which outlines the timing and duration of the facilities upgrades. Please also include a column which identified the age and last upgrade of each facility on the schedule.

A41.1 The facilities audit is attached as an electronic Excel file (BCUC IR1 A41.1 FortisBC Facility Site Audits.xlsx) and as Appendix BCUC IR1 A41.1. The original audit was carried out in 2002 by The Integrated Facility Service Group, and updated in 2008/09 by FortisBC Facilities staff through site visits and review of previous capital plan improvements made from 2002 to 2008. The audits contain location, age, square footage and description of each building component including Estimated Life, Effective Life and Remaining Life.

The execution schedule remains as was presented in FortisBC's FortisBC 2009-10 Capital Expenditure Plan Compliance Filing dated May 27, 2009, filed in response to Commission Order G-11-09 (dated February 27, 2009), with the addition of $130,000 for Racking Upgrades as described on Page 66 of FortisBC's 2011 Capital Expenditure Plan (Exhibit B-1).

Q42.0 Reference: Exhibit B-1, Section 6 General Plant, p. 67
Long-Term Facilities Solutions

Kootenay Operation Center:

"Review of these facilities has resulted in the recommendation for a new Operations center in the Castlegar area…"

Q42.1 Who conducted this review and when?

A42.1 The review was conducted in 2009/10 by FortisBC management after receiving several pieces of information including:

- A Generation Facilities Condition Assessment performed by Redwood Engineering Ltd. In 2007/08 that resulted in high level estimate of approximately $4 million to address required environmental, safety and other upgrades at the South Slocan Generation Operations facilities;
- A System Control Center site audit, space review and compliance to NERC and Mandatory Reliability Standards preliminary review by Robert E. Lamb, Inc. 2009/10; and
- The Castlegar site audit and space review – conducted by Facilities 2009/10.

Q42.2 Does the development budget of $0.485 million include the cost of the audit?

A42.2 No, the development budget does not include the cost of the audit.

Q42.3 What is the age of the Kootenay Operations Centre and the Kelowna Operations Centre?

A42.3 There is no Kootenay Operations Centre today. The Kootenay Operations Centre is meant to consolidate Generation Operations

located in South Slocan, Network Operations in Castlegar and Trail, the System Control Centre and warehousing. The buildings at Generation range up to 87 years of age; the date of construction for Castlegar is unknown, however it has been owned by the Company for approximately 35 years; Warfield/SCC/Warehousing are approximately 35 years old with upgrades completed in 2003.

The Kelowna Operations Centre was originally constructed in 1979 and rebuilt in 2002.

With the exception of the generation facilities, the age of the remaining facilities is not the driver behind these projects. The primary drivers are the size of facilities (primarily land), location (access and egress issues), and operating efficiencies related to having multiple separated sites in the same local geographic area.

Q42.4 Does FortisBC have any order of magnitude estimate at this time on the total project costs to construct the new operations centre?

A42.4 The Company does not have enough information at this time to be able to provide an order of magnitude estimate.

Kelowna Operations Center:

Q42.5 What is the age of the Enterprise Road site? Benvoulin Road site? What is the distance between the two sites?

A42.5 The Enterprise Road site is a property that the Company has been leasing for about 4.5 years, with the lease expiring at the end of 2012. The Benvoulin Operations Centre was sited at its current location approximately 31 years ago in 1979. The two sites are located approximately 3.5 kilometres apart in a very congested area of Kelowna.

Q42.6 What are the annual operating costs of each site?

A42.6 The operating costs of the Benvoulin site include approximately $200,000 in general operating cost plus property taxes of about $120,000. The Enterprise facilities are leased for approximately $571,000 per year.

Q42.7 Please provide a breakdown of the requested expenditures of $0.489 million for the review of these sites.

A42.7 Please see the following tables.

Table BCUC IR A42.7a
Kootenay Operations Centre

Resource	Description	Approximate Cost
Consultant	Planning Study by Architect familiar with NERC/BC Mandatory Reliability Standards. Study to include: security, critical and non-critical infrastructure, space design (control room and associated functions), draft budget & timeline	$45,000
Consultant	Architect - High level space planning, building schematic, yard layout for Kootenay Operations Center, zoning. All options explored (i.e. Utilization of current facilities)	$210,000
Consultant	Land Appraisal - Castlegar Operations Center, Trail Office Building, potential site survey, Public works/infrastructure Planning	$30,000
Internal Costs	Staff expenses	$45,000
Legal Costs	Legal & Regulatory	$50,000
Consultant	Environmental	$20,000
	Subtotal	**$400,000**
	AFUDC and Capitalized Overhead	$85,000
	Total	**$485,000**

Table BCUC IR A42.7b
Kelowna Operations Centre

Resource	Description	Approximate Cost
Consultant	Architect - High level space planning, building schematic, yard layout All options explored (i.e. Utilization of current facilities)	$200,000
Consultant	Site appraisals, traffic and site access/egress review, zoning issues	$65,000
Internal Costs	Staff expenses	$65,000
Legal Costs	Legal & Regulatory	$50,000
Consultant	Environmental	$20,000
	Subtotal	**$400,000**
	AFUDC and Capitalized Overhead	$89,000
	Total	**$489,000**

Q42.8 Has FortisBC conducted a study on the hard cost-savings (reduced travel time, reduce administrative costs) that may be achieved with the potential combination of the two sites?

A42.8 As with the project costs, the Company does not have enough information at this time to be able to provide an order of magnitude estimate.

Q43.0 Reference: Exhibit B-1, Section 6 General Plant, p. 68
Tools and Equipment

Q43.1 What were the actual expenditures for Tools and Equipment in 2008 and 2009? What is the forecast expenditure in 2010?

A43.1 Actual expenditures in 2008 and 2009 were approximately $587,000 and $525,000 respectively. Expenditures of $523,000 are forecast for 2010.

Q43.2 Please explain what is included as "equipment" in this category? Do these include spare parts / equipments that are used as stand-by in case of equipment failures?

A43.2 The term "equipment" is used as a general term and includes items that would be used by line crews, substation maintenance crews, telecommunication technicians, and others in the performance of their respective jobs. This equipment would range from tools to complex test equipment. This budget is not used for spare parts.

Q43.3 Please comment on FortisBC's depreciation treatment for Tools and Equipment in 2011.

A43.3 FortisBC depreciates Tools and Work Equipment (BCUC Account 394) at the rate of 9.5 percent, pursuant to Commission Order G-58-06.

Q43.4 In the information request response to A106.1.1 in the previous capital plan review, FortisBC stated its policy in this regard conforms to the "The British Columbia Energy Commission Province Of British Columbia 15 Uniform System Of Accounts Prescribed For Electric Utilities" as prescribed in Commission Order G-28-80"

Q43.4.1 Please confirm whether FortisBC's capitalization policy applies to expenditures in excess of $1,000 or $500 as stated in the Application.

A43.4.1 FortisBC's Capitalization Policy applies to expenditures in excess of $1,000. Please refer to Errata No. 2.

Q43.4.2 Please explain why a limit of $500 established in 1980 should not be adjusted upwards in this application.

A43.4.2 Please refer to the response to BCUC IR1 Q43.4.1 above.

Q44.0 Reference: Exhibit B-1, Section 6 General Plant, p. 68-70

PCB Environmental Compliance

"The estimated cost to reach compliance for the station equipment by 2014 is currently expected to be in the range of $15 to $25 million."

Q44.1 Please discuss how this estimate compares to other utilities in Canada with similar requirements for PCB compliance.

A44.1 FortisBC is aware that BC Hydro, in its Application to Establish a Regulatory Asset Regarding Liability Provision for Environmental Compliance and Remediation, estimated the cost for compliance and remediation at $375 million on a present value basis (BC Hydro letter to BCUC dated April 1, 2010). The Company does not know the compliance costs for other utilities. Costs will vary with each utility based on a large number of variables including number of pieces of equipment in the pre 1980 era, outages required to access the equipment, PCB concentration found, replacement costs, and supply and demand pressure on equipment manufacturers.

Q44.2 Does FortisBC plan to file a separate CPCN application for PCB Compliance?

A44.2 The Company does not anticipate filing a CPCN for the PCB Compliance program because the scope of work is required by federal legislation. In addition the work will be carried out within the existing substations, therefore no significant public concern is anticipated. The 2012 submission of the Integrated System Plan will include further information on the execution of the PCB Compliance program.

Q44.3 Please provide the estimated costs in each year from 2011 – 2014 for this program.

A44.3 FortisBC is still developing these estimates and the $1.852 million requested for work done in 2011 will supply the information needed to make further detailed estimates. The costs will vary based on: the number of equipment items in the pre 1980 era, outages required to access the equipment, PCB concentrations found, replacement costs, and supply availability of equipment manufacturers.

Q45.0 Reference: Decision for Order G-11-09, Summary Project Report for Growth and Sustaining Capital Transmission and Distribution

Q45.1 Please provide project status report showing cost variance for the Transmission and Distribution Growth and Sustaining projects approved in the Decision for Order G-11-09.

A45.1 Please see Table BCUC IR1 A45.1 below.

Table BCUC IR1 A45.1

CAPITAL PROJECTS	Actual 2009	Budget 2009	Vaiance 2009	Forecast 2010	Budget 2010	Variance 2010	Variance explanation
Transmission Growth Plant:							
Okanagan Transmission Reinforcement	21,503	30,341	(8,838)	57,537	74,378	(16,842)	Non G-11-09 Project - approved CPCN (C-5-08)
Benvoulin Substation Capacity Increase	4,110	4,382	(272)	13,468	13,301	167	Non G-11-09 Project - approved CPCN (C-1-09)
Kelowna Distribution Capacity Requirements	271	518	(247)	674	517	157	Does not exceed the level of estimate accuracy of the estimated cost.
Big White Transmission and Substation	110	-	110				Non G-11-09 Project - approved CPCN (C-17-06)
Ellison Distribution Source	5,608	1,734	3,874	215	-	215	Non G-11-09 Project - approved CPCN (C-4-07)
Black Mountain Distribution Source	7,196	4,517	2,679	-	-	-	Non G-11-09 Project - approved CPCN (C-7-07)
Naramata Rehabilitation	3,654	3,962	(308)	(462)	-	(462)	Non G-11-09 Project - approved G-124-07
Tarrys Capacity Increase	265	403	(138)	51	-	51	Savings found in Labour and Material to complete scope of work.
Kettle Valley Distribution Source	473	-	473				Non G-11-09 Project - approved CPCN (C-5-06)
Recreation Capacity Increase	179	178	1	3,829	3,401	428	Does not exceed the level of estimate accuracy of the estimated cost.
30 Line Conversion	866	4,500	(3,634)	4,271	-	4,271	Does not exceed the level of estimate accuracy of the estimated cost.
Ootischenia	142	389	(247)				Non G-11-09 Project - approved CPCN (C-10-07)
Huth Split Bus	-	-		260	413	(153)	Forecasted savings due the use of internal engineering resources to complete the scope of work.
Transmission & Station Sustaining Plant:							
Transmission Line Sustaining	3,424	4,265	(841)	4,035	4,699	(664)	Does not exceed level of estimate accuracyof the estimated cost. The variance is due to the funds transfered to Distibution Sustaining (Distibution Pine Beetle project)
Station Sustaining	3,476	4,671	(1,195)	5,619	4,920	699	Does not exceed level of estimate accuracyof the estimated cost.
Others	(1,291)	-	(1,291)	(739)	-	(739)	
Subtotal Transmission Plant	**49,985**	**59,860**	**(9,875)**	**88,757**	**101,629**	**(12,872)**	
Distribution Growth Plant:							
Customer New Connections	8,692	9,788	(1,096)	9,495	10,670	(1,175)	Does not exceed the level of estimate accuracy of the estimated cost.
Distribution Growth	2,449	1,762	687	3,789	4,274	(485)	Does not exceed the level of estimate accuracy of the estimated cost.
Distribution Sustaining Plant:							
Distribution Sustaining	12,517	10,638	1,879	14,221	11,126	3,095	The variance is due to the funds transfered from Transmission Sustaining (Transmisssion Pine Beetle project) and work on legacy copper conductor replacements as per G-162-09
Subtotal Distribution Plant	**23,658**	**22,188**	**1,470**	**27,505**	**26,070**	**1,435**	
Total Transmission & Distribution	**73,643**	**82,048**	**(8,404)**	**116,262**	**127,699**	**(11,437)**	

Q45.2 Please provide an explanation for any variances that may be considered to exceed the level of accuracy of the estimated cost.

A45.2 Please refer to the response provided to BCUC IR1 Q45.1 above.

Q46.0 Reference: Exhibit B-1, Section 1 Introduction, p. 4
Public Consultation

FortisBC states "The following describes a typical cycle of consultation at the individual project level. For each project for which significant public interest or impact is possible, a consultation program is developed which involves greater detail as project planning and engineering advances."

Q46.1 Does FortisBC plan to undertake consultation at the individual project level for any of the projects in the 2011 Capital Plan? If so, please list the projects. If not, please explain why not.

A46.1 No, the Company does not plan on performing consultation at the individual project level for any of the projects in the 2011 Capital Plan. The only projects in the 2011 Capital Plan that have significant public interest or impact have already been the subject of thorough consultation and have previously been approved by the Commission.

Q47.0 Reference: Exhibit B-1, Section 1 Introduction, p. 5
First Nations Consultation

FortisBC states "FortisBC will advise First Nations prior to commencing work on any of the projects included in the 2011 Capital Plan that impact FortisBC facilities on or adjacent to any First Nations lands or reserves. Any issues or concerns identified by First Nations will be addressed by FortisBC as they arise."

Q47.1 Please list any of the projects in the 2011 Capital Plan that are on or adjacent to any First Nations lands or reserves.

A47.1 The projects in the 2011 Capital Plan that could possibly see work being performed adjacent to First Nations lands or reserves are the Transmission Right-of-Way Enhancements, Transmission Right-of-Way Reclamation, Transmission Pine Beetle Hazard Tree Removal, Distribution Right-of-Way Reclamation and Distribution Pine Beetle Hazard Tree Removal projects.

Q47.1.1 Can FortisBC foresee any issues arising from proximity to First Nations' lands?

A47.1.1 No. The Company has previously consulted with First Nations regarding these programs. In addition, the Company will notify any affected First Nation prior to commencing these types of works on their lands.

Q48.0 Reference: Exhibit B-1, Section 7 Demand Side Management, p. 71 and p.72

FortisBC states "Planned expenditures in 2011 at $5.764 million exceed approved 2010 expenditures by more than 100 percent on a net of tax basis. This expenditure increase reflects the major shift in provincial policy that places demand side management as the priority resource to meet growing electricity demand in BC and is reflected in the UCA and the DSM Regulation." (p.71)

Q48.1 Please compare the achieved energy savings in 2009 and 2010 with the planned savings in 2011. If spending in 2011 exceeds 2010 approved spending by more than 100% but the planned savings in GWh do not exceed 100% of the 2010 savings, please explain why.

A48.1 Please see Table BCUC IR1 A48.1 below.

Table BCUC IR1 A48.1

2009 Actual		2010 Plan		2011 Plan	
Expenditure	**Savings**	**Approved**	**Savings**	**Proposed**	**Savings**
($000s)	GWh	($000s)	GWh	($000s)	GWh
3,464	28.4	3,952	27.5	7,842	39.7

Although the 2011 plan costs are nominally twice that of approved 2010 plan, the plan savings increase by 44 per cent. This is a reflection of several factors, particularly diminishing returns and mandatory program requirements.

The FortisBC DSM program has been in the market for just over two decades and during that time has incented the programs with the highest TRC benefit cost ratios. Savings have been acquired at relatively low cost. As the program expands, it incents efficiency

products with lower (but still above unity) TRC benefit cost ratios. Higher incentives are offered in the 2011 DSM Plan in order to accelerate the program take-up and achieve the 50 per cent load growth offset target from the BC Energy Plan.

The 2008 UCA amendments mandated new DSM programs, such as low-income, rental and education programs in order for the DSM offerings to be considered adequate. These components increase costs as the utility shoulders a larger share, if not the full cost of such programs, but with proportionately smaller savings relative to the cost incurred.

Despite diminishing returns the 2011 DSM Plan is robust with a overall TRC Benefit/Cost ratio of 2.3 (Please see the revised Table 3.3.1 provided in Errata No. 2).

Q48.2 Please provide a table showing all new initiatives in the 2011 DSM Plan and the associated cost and planned energy savings. For completely new programs also include the TRC value. For enhanced programs, please identify the enhanced activities and break-out the cost of the 2011 enhancements from the programs features offered in 2010.

A48.2 Please refer to Tables 7.2 through 7.4 from the Application (Exhibit B-1) for the energy savings, costs, TRC and status of all 2011 plan programs, for both new and enhanced programs.

Please also refer to the response to BCUC IR1 Q55.2 which includes a working spreadsheet with additional detail on the TRC calculations. The response to BCUC IR1 Q106.1 provides further details of the DSM costs, in $/GWh, and the Rate Impact Measure (RIM) test.

As indicated in the response to BCUC IR1 Q48.1 the 2011 plan enhancements are primarily increased incentive levels.

Q49.0 Reference: Exhibit B-1, Section 7 Demand Side Management, pp. 71-72

FortisBC states "The 2011 DSM Plan supports British Columbia's energy objectives as defined in the Clean Energy Act, including the objective: (b) to take demand-side measures and to conserve energy, including the objective of the authority reducing its expected increase in demand for electricity by the year 2020 by at least 66%."

Q49.1 How specifically does FortisBC plan to achieve this objective? What measures will FortisBC compare between the 2010 and 2020 to achieve this objective?

A49.1 The 2011 DSM Plan clearly supports the Clean Energy Act objective to take demand-side measures and to conserve energy as demonstrated by the savings forecast in Table 7.1 (Exhibit B-1 as revised by Errata No. 2). While FortisBC has not yet committed to a 66 per cent reduction in demand for electricity in this submission, the expenditures requested in the 2011 DSM Plan will provide the base to move towards achievement of the target, which will be addressed in the 2012 DSM Plan.

Q50.0 Reference: Exhibit B-1, Appendix 3, Section 1.3, p. 5
Demand Side Management

FortisBC states "In May 2009, FortisBC filed its long-term Resource Plan and is currently preparing an evidentiary update...The Company also expects to file an Integrated System Plan which will include expenditures related to the Resource Plan Update ... FortisBC will submit the long-term 2012 DSM Plan (previously called the 2011 DSM Plan) in conjunction with the Resource Plan Update."

Q50.1 Please confirm that the long-term 2012 DSM Plan planned for filing with the Resource Plan Update is different than the DSM plan attached as Appendix 3 to the 2011 Capital Expenditure Plan in this proceeding.

A50.1 Confirmed.

Q50.2 Please provide estimates of when the Resource Plan Update and the Integrated System Plan will be filed with the Commission.

A50.2 FortisBC expects to file the Resource Plan Update and the Integrated System Plan in May 2011.

Q51.0 Reference: Exhibit B-1, Appendix 3, Section 2.1, p. 6
DSM Plan Development – Planning Principles

FortisBC states "The 2011 DSM Plan was created using the following guiding principles: ... 3. The DSM Plan will be inclusive of best practices..."

Q51.1 Please specify which best practices FortisBC used in creating the 2011 DSM Plan. If possible, provide the best practice documents or link to the documents.

A51.1 The best practice review included a literature review and primary research (as identified in Appendices A, B, C, D of the 2011 DSM Plan), as well as program design which follows disciplined marketing best practices. Some of the best practice tools identified to advance program take-up are:

- social marketing, which often features a combination of mass media appeals and participatory, community-based approaches that rely on social networks;
- information and education; and
- financial incentives and efforts to reduce transaction costs of taking the desired actions.

Community-Based Social Marketing (CBSM) best practices help to build normative conservation behaviour. The CBSM tactics to be used include: public relations, community outreach, strategic partnerships, direct marketing, behaviour pledges/commitments, product sampling, promotional contests, inter-active communications and targeted media advertising.

Several organizations that identify social marketing best practices

include:

- http://www.hc-sc.gc.ca/ahc-asc/activit/marketsoc/tutorial-guide/appendix-annexe_a-eng.php
- http://www.social-marketing.org/aboutus.html
- http://www.cbsm.com/pages/guide/preface
- Applying Behavior Insights to Efficiency Programs: Lessons from the Social Sciences, Consortium of Energy Efficiency, Monica Novius, May 2010.

Q52.0 Reference: Exhibit B-1, Appendix 3, Table 2.2.1, p. 7
DSM Planning Objectives 2011 - 2020

FortisBC states "The 2011 Plan achieves an estimated 42% offset of the anticipated load growth without codes and standards, and conservation rates" and "In addition to the Residential and Commercial End Use Surveys and the Conservation and Demand Potential Review that have been included in this document, further studies will be undertaken during 2011."

Q52.1 In what year does the 2011 DSM Plan achieve a 42% offset of anticipated load growth? What percentage is achieved in 2011?

A52.1 The 2011 DSM Plan expenditures are expected to result in savings of 39.7 GWh, which represents 42 per cent of 2011 load growth. Since DSM expenditures occur over the course of the calendar year, a portion of the associated savings will not be realized until 2012. In 2011, the estimated acquired energy savings are 19.5 GWh (49 per cent of the total savings).

Q52.2 What is the estimated offset of anticipated load growth including codes and standards and conservation rates?

A52.2 Codes and Standards effects are estimated at 7.6 GWh in 2011 or an 8 per cent load offset. Please see the response to BCUC IR1 A52.2.1 below regarding conservation rates.

Q52.2.1 Which conservation rates is FortisBC referring to? When is the estimated date of implementation?

A52.2.1 The conservation rates referred to are those contained in the 2009 Rate Design Application. These rates, if approved, are anticipated to come into effect January 1,

2011.

Q52.3 What further studies will be undertaken in 2011?

A52.3 FortisBC expects to complete an AMI Future Program Study report in 2010 that will investigate the conservation effects of time-based rates and other AMI-enabled conservation measures. Depending on the results of this study, further studies may be indicated in 2011 to include AMI-enabled programs in future DSM Plans.

Q53.0 Reference: Exhibit B-1, Appendix 3, Figures 2.2.2, 2.2.4, 2.2.6, pp.12-14 Comparison of Use in 2030

Q53.1 What estimate of achievable potential, including program savings, fuel switching measures, behavioural measures and customer owned renewable projects did FortisBC use for each of the residential, commercial and industrial customer classes and for the years 2011, 2015, 2020, 2025 and 2030?

A53.1 Please see Tables BCUC IR1 A53.1a and A53.1b below. Pleast note that Table 69 (p. 127 of CDPR) has been restated below with the units in the banner changed to GWh.

Table BCUC IR1 A53.1a

Program Achievable Potential, (Excluding fuel switching, behavioural measures, and customer-owned renewable)					
	2011	**2015**	**2020**	**2025**	**2030**
	GWh				
Residential	19	94	192	281	369
Commercial	10	53	107	142	177
Industrial	1	8	18	23	28
Irrigation	1	3	5	8	11
Total	**30**	**158**	**322**	**453**	**585**

Table BCUC IR1 A53.1b

Behavioural, Customer-Owned Renewable & Fuel Switching Potential (Unbundled)					
	2011	**2015**	**2020**	**2025**	**2030**
	GWh				
Behavioural	0.1	2.5	15.2	29.4	43.5
Fuel Switching	0.4	2.2	4.5	6.7	9.0
Customer Owned Renewable	0.5	6.6	22.8	75.0	191.1

For the base assessment of conservation potential, fuel switching, behavioural measures and customer-owned renewable were estimated separately (unbundled). All three of these potential types can overlap with traditional measures and therefore if implemented, would displace some potential. Fuel switching was not emphasized because of regulatory limitations, and customer-owned renewable estimates are provided, but excluded from program potential because they are not cost-effective. The estimates in the table above for Customer Owned Renewable (COR) assume a significant declining cost structure. COR should continue to be viewed as "Technical" potential until they become cost-effective.

Q53.1.1 Please report the achievable potential as per the question above but excluding fuel switching measures and customer owned renewable projects.

A53.1.1 Please see the response to BCUC IR1 A53.1 above.

Q53.2 What percentage of the estimates of achievable potential for each of the residential, commercial and industrial customer classes is shown in figures 2.2.2-2.2.6? In other words, what percentage of the estimated achievable potential energy savings does FortisBC plan to achieve by 2030?

A53.2 Please see Table BCUC IR1 A53.2 below.

Table BCUC IR1 A53.2

	Energy Efficiency Program Achievable Potential as % of Achievable Potential
Residential	80%
Commercial	88%
Industrial	100%

Q53.2.1 What percentage of the estimated of achievable potential for each of the residential, commercial and industrial customer classes is planned for 2011?

A53.2.1 Please see Table BCUC IR1 A53.2.1 below.

Table BCUC IR1 A53.2.1

	Energy Efficiency Program Achievable Potential as % of 20-year Achievable Potential
Residential	4%
Commercial	4%
Industrial	5%

Q54.0 Reference: Exhibit B-1, Appendix 3, Section 3.1, p.20
Selection of Plan Option

FortisBC states "The public consultation indicated strong support for increased DSM program spending and savings acquisition – 83 percent chose either the medium or high option."

Q54.1 Given the public consultation process that was undertaken, can FortisBC say that it has strong customer support for increased DSM spending? If so, can FortisBC say it has strong support from all customer classes?

A54.1 The Company received strong support for increased DSM spending from those that participated in the public consultation process and provided feedback through open house comments and surveys, as well as customer correspondence. It does not necessarily follow that there is strong support from all customer classes.

Although an invitation to review public consultation information and participate in the process was provided for all customer classes via newspaper advertising, a news release and invitation letters / emails, the majority of feedback came from those that identified themselves as residential customers.

Open house participants also identified themselves as residential (35), wholesale (one), commercial / business, (five), industrial (one), irrigation (one) and local government representatives (four). Seven participants did not identify their customer type.

Q55.0 Reference: Exhibit B-1, Section 3.2, pp. 21-23

Demand Side Management Plan Overview

Table 3.2.1: Residential Programs in the 2011 DSM Plan

Residential Programs				
Program Description	**MWh**	**Cost ($000s)**	**TRC**	**Status**
Building Envelope	5,460	1,379	1.7	Enhanced
Heat Pumps	3,397	694	1.4	Enhanced
Lighting	3,420	438	2.4	Enhanced
New Home	105	54	1.4	Enhanced
Appliances	680	245	1.4	New
Electronics	180	49	4.8	New
Water heating	960	162	2.1	New
Low Income	540	305	3.0	Enhanced
Behavioural	1,680	310	6.8	Enhanced
Residential Total	**16,422**	**3,636**	**1.8**	

Table 3.2.2: General Service Programs in the 2011 DSM Plan

General Service Programs				
Program Description	**MWh saved**	**Cost ($000s)**	**TRC**	**Status**
Lighting Street Lighting	7,130	1080	2.4	Enhanced New
Building Improvement Weatherization Building envelope Refrigeration HVAC Pumps and fans Compressed air	3,010	572	2.8	Enhanced
Computers Servers/Networks	240	34	2.6	Enhanced New
Municipal Wastewater Irrigation	3,560	432	3.9	Enhanced
General Service Total	**13,940**	**2,118**	**2.7**	

Table 3.2.3: Industrial Programs in the 2011 DSM Plan

Industrial Efficiency Programs				
Program Description	**MWh saved**	**Cost ($000s)**	**TRC**	**Status**
Integrated Building Optimization	80	10	0.5	New
Industrial Efficiency Lighting Pumps and fans Refrigeration Motor rewinds Compressed air Information systems	9,280	603	5.2	Enhanced
Industrial Total	**9,360**	**613**	**4.8**	

Q55.1 Please provide tables, in the style of Tables 3.2.1-3.2.3, for the Irrigation Sector Programs, the Residential Low-Income Households Programs, the Rental Accommodation Programs – Single and Multi-Family and the First Nations Residential Households Program. Include the years 2005-2011 and rows which show total Net Load (GWh), Savings (Percent) and Estimated Achiveable Potential for each of the years.

A55.1 Please see Table BCUC IR1 A55.1 below.

Table BCUC IR1 A55.1

Program	Savings (MWh)	Cost ($000s)	TRC	Status	Net Load (GWh)	Potential (GWh)	Savings (Percent)
Irrigation Hi/Med to Low Press pivot Pump Nozzle/Gasket Hi-efficiency motors	580	$40	7.1	new	50.0	10.8	5.4%

The Energy-Saving Kit (ESK) offer is made available to Residential Low-Income Households, Rental Accommodation (Single and Multi-Family), and First Nations Residential Households. The ESK program only started in 2010, so there is no historical information available. The separate market segments cannot be separated as requested since the customer groups are not identified in the FortisBC Customer Information System and have overlap between them in any case.

Q55.2 Please provide the detailed calculations for each TRC value. Please include all specific inputs for the calculations. If possible, please provide the calculations in an electronic spreadsheet.

A55.2 In the process of preparing the response requested for this question, an error in the calculation of the TRC benefit-cost ratios affecting the residential and commercial sectors was discovered. This error has been corrected in the electronic Excel spreadsheet attachment (Attachment BCUC IR1 A55.2 DSM TRC.xlsx) and Table BCUC IR1 A55.2 as provided below. Please also refer to Errata 2.

Table BCUC IR1 A55.2

Sector	Program	Measure	Unit Measure Savings (kWh)	Unit Cost ($/Unit)	EML (years)	Unit Benefit ($/unit)	No. Units	Total Cost ($)	Total Benefit ($)	Measure TRC B/C ratio
Residential										
	Bldg Envelope	Insulation R0 base	2.3	1.49	25	3.75	359,649	534,628	1,348,011	**2.5**
		R19 base	1.6	0.68	30	2.70	910,256	621,603	2,461,852	**4.0**
		Draftproofing - SFD	1,074	950	25	1,766	158	150,401	279,466	**1.9**
		Windows - single	23	24.45	20	34.0	57,778	1,412,740	1,965,593	**1.4**
		- dual	15	24.08	20	21.9	73,793	1,776,752	1,617,834	**0.9**
		T-stats	469	257	15	618	1,045	268,417	645,898	**2.4**
		furnace fan	109	145	20	165	1,743	252,914	287,279	**1.1**
	Ht Pumps	AS-conversion	6,276	8,369	20	9,489	252	2,106,977	2,388,952	**1.1**
		AS-upgrade	3,036	1,859	20	4,590	181	336,748	831,597	**2.5**
		AS-ductless	4,000	4,953	20	6,048	109	538,627	657,718	**1.2**
		Geo	10,014	10,880	30	17,361	83	903,941	1,442,437	**1.6**
	New Home	whole house - EG80	3,455	3,361	30	5,990	26	87,562	156,033	**1.8**
		- EG90	7,357	20,344	30	12,755	2	41,478	26,005	**0.6**
	Lighting	CFL screw-in	35	8	5	21.5	63,714	499,220	1,371,176	**2.7**
		hard-wired	71	30	15	93.6	3,521	106,751	329,540	**3.1**
		T8 upgrade	29	19	15	38.2	32,414	627,368	1,239,070	**2.0**
	Appliances	Clothes Washer	173	368	14	1,228	1,156	425,530	1,419,240	**3.3**
		Refrigerator	75	54	20	113	2,000	107,008	226,799	**2.1**
		P/U	840	179	14	1,066	214	38,410	228,530	**5.9**
		Freezer	54	53	20	82	741	38,906	60,480	**1.6**
		P/U	755	175	14	959	146	25,537	139,657	**5.5**
	Electronics	Electronics	176	29	8	156	908	26,536	141,597	**5.3**
		Computers etc.	136	37	5	84	147	5,512	12,298	**2.2**
	Wtr Heating	HPWH	2,001	794	15	2,638	90	71,469	237,269	**3.3**
		Other (watersavers)	407	44	10	421	1,572	69,215	661,346	**9.6**
		Solar Thermal	2,200	6,026	20	3,326	64	383,459	211,679	**0.6**
	Low Income	ESK + installs	377	78	5	232	1,600	124,444	370,894	**3.0**
	Behavioural	clotheslines	225	15	7	180	10,000	150,000	1,804,007	**12.0**
		Other	50	11	3	19.8	15,200	160,000	301,623	**1.9**
	Residential B/C ratios:							**$ 11,892,151**	**$ 22,863,882**	**1.9**

Table BCUC IR1 A55.2 cont'd

Sector	Program	Measure	Unit Measure Savings (kWh)	Unit Cost ($/Unit)	EML (years)	Unit Benefit ($/unit)	No. Units	Total Cost ($)	Total Benefit ($)	Measure TRC B/C ratio
General Service										
	Lighting	Existing - all but CMH	1.35	0.42	10.5	1.44	2,948,148	1,250,700	4246707.072	**3.4**
		- CMH	4.71	0.44	1.61	1.06	182,590	80,196	192929.0646	**2.4**
		New	1.41	0.50	15	1.86	468,085	232,471	869985.4138	**3.7**
		Controls	133	138	14	169	677	93,615	114265.1246	**1.2**
		Streetlights	321	384.9	16	438	2,336	899,288	1022333.137	**1.1**
		Parking Lights	579	337.3	10	597	1,364	460,164	814720.2799	**1.8**
	BIP	Whole Bldg (new)	4.8	3.08	30	8.32	235,000	723,881	1955612.06	**2.7**
		HVAC incl. EMIS	0.43	0.23	15	0.56	3,403,756	793,461	1911331.591	**2.4**
		Weatherization	11	5.73	20	16.4	18,488	106,008	302398.9401	**2.9**
		Refrigeration	1,248	299	10	1,272	713	213,276	907374.5296	**4.3**
	Computers	Servers	24,533	12,718	4	33,418	10	124,412	326924.4214	**2.6**
	Municipal	Wastewater	220,135	121,816	12	261,827	2	199,213	428181.4313	**2.1**
		Water	11,442	11,434	12	13,279	10	119,912	139266.7218	**1.2**
		CoK WWTP	1,929,165	486,955	12	2,294,536	1	631,043	2973483.414	**4.7**
	Irrigation	All	500	73	10	517	1,160	84,281	599344.4706	**7.1**
	Gen Svc B/C ratio:							**$ 6,011,922**	**$ 16,804,858**	**2.8**
Industrial										
	Integrated	EMIS et al	80,000	152,197	10	82,668	1	152,197	82668.20283	**0.5**
	All else	Ind Efficiency	1,840,000	216,521	10	1,901,369	1	216,521	1901368.665	**8.8**
		Celgar blk liquor	7,440,000	1,639,717	10	7,688,143	1	1,639,717	7688142.864	**4.7**
	Industrial B/C ratio:							**$ 2,008,435**	**$ 9,672,180**	**4.8**
Subtotal Programs								**$ 19,912,508**	**$ 49,340,919**	**2.5**
Supporting Initiatives								**$ 725,000**		
Planning and Evaluation								**$ 750,000**		
Total								**$ 21,387,508**	**$ 49,340,919**	**2.3**

Q55.3 What is the probability and confidence levels that the proposed DSM programs will achieve:

Q55.3.1 The forecast energy (MWh) savings?

A55.3.1 Table BCUC IR1 A55.3.1 below shows in summary format the plan and actual energy savings in GWh, since the inception of the FortisBC DSM programs. Based on this track record, the Company has a high level of confidence that the 2011 DSM plan savings will be achieved.

Table BCUC IR1 A55.3.1

Year	Plan	Actual	% of Plan
1989	0.7	0.2	29%
1990	4.3	1.0	23%
1991	13.3	7.9	59%
1992	15.6	16.3	104%
1993	26.1	24.1	92%
1994	14.2	12.9	91%
1995	18.3	15.6	85%
1996	16.3	17.0	104%
1997	14.4	14.2	99%
1998	13.6	13.1	96%
1999	11.6	13.5	116%
2000	12.0	17.5	146%
2001	12.5	16.9	135%
2002	14.1	16.3	116%
2003	15.6	18.5	119%
2004	14.7	21.3	145%
2005	19.0	23.9	126%
2006	20.4	23.1	113%
2007	21.8	27.9	128%
2008	19.5	27.3	140%
2009	25.3	28.4	112%
Cumulative Savings (GW.h)	**323**	**357**	**110%**

Q55.3.2 The forecast cost?

A55.3.2 Table BCUC IR1 A55.3.2 below shows in summary format the DSM budget, both plan and actual, in $000s, since the FortisBC DSM program inception. Based on this track record the Company is confident that the 2011 DSM Plan expenditures will meet the forecast cost.

Table BCUC IR1 A55.3.2

Year	Plan	Actual	% of Plan
1989	348	395	114%
1990	1,453	758	52%
1991	2,163	1,241	57%
1992	2,084	1,895	91%
1993	2,259	3,822	169%
1994	1,947	1,660	85%
1995	2,705	1,511	56%
1996	1,782	1,944	109%
1997	1,670	1,567	94%
1998	1,637	1,585	97%
1999	1,608	1,468	91%
2000	1,543	1,697	110%
2001	1,522	1,425	94%
2002	1,661	1,555	94%
2003	1,840	1,706	93%
2004	1,814	1,989	110%
2005	1,835	2,350	128%
2006	2,234	2,241	100%
2007	2,474	2,549	103%
2008	2,355	2,683	114%
2009	3,667	3,464	94%
Cumulative Costs	**40,601**	**39,505**	**97%**

Q56.0 Reference: Exhibit B-1, Section 7, p.71 and Appendix 3, Table 3.3.1, p.24

Summary of 2011 DSM Plan

Table 3.3.1: Summary of 2011 DSM Plan

Summary of 2011 Plan			
Sector/Component	**Savings (MWh)**	**Budget ($000s)**	**TRC B/C**
Residential	16,422	3,636	1.8
General Service	13,940	2,118	2.7
Industrial	9,360	613	4.8
Programs sub-total	**39,722**	6,367	**2.4**
Supporting Initiatives		725	
Planning & Evaluation		750	
Total Expenditure	**39,722**	**7,842**	**2.2**

Q56.1 Please confirm if 2.2 is the TRC value for FortisBC's complete portfolio of DSM programs? If not, what is the value and what are the measures missing from Table 3.3.1?

A56.1 Not confirmed. The TRC benefit-cost ratio is 2.3 as shown in the revised Table 3.3.1 provided below (also see Updated Page 24 of the Application as provided in Errata No. 2). FortisBC confirms that this is the value for the complete portfolio of DSM programs.

Table 3.3.1: Summary of 2011 DSM Plan

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Programs sub-total	**39,722**	6,367	**2.5**
Supporting Initiatives		725	
Planning & Evaluation		750	
Total Expenditure	**39,722**	**7,842**	**2.3**

Q56.2 What will be the rate impact of the planned expenditure of $7.842 million?

A56.2 The rate impact of the planned expenditure is 1.1 per cent.

FortisBC states "Planned expenditures in 2011 [are] $5.764 million..." (B-1, p.71).

Q56.3 Please explain the discrepancy between the expenditure amounts of $5.764 million and $7.842 million? Please confirm the total expenditure associated with the 2011 DSM plan.

A56.3 The $7.842 million figure is the projected total utility expenditure of the proposed 2011 DSM program. The $5.764 million figure is the net cost, after the income tax is deducted from the total. Please also see Table 7.1 in Exhibit B-1.

Q57.0 Reference: Exhibit B-1, Appendix 3, Section 3.4, pp. 25-27
Residential Sector Programs

Q57.1 For each of the Residential Sector Programs, please specify how the program is publicized and delivered to residential consumers.

A57.1 To ensure maximum reach and cost effectiveness, marketing for each program is targeted toward the market segment. For example, the multi-family programs are targeted exclusively to the developer and builder community, which means that collateral and communication channels used by this sector are used to send messaging. Messaging specifically speaks to each market segment's interests. In the case of the multi-family builders and developers, this messaging would include how the programs enhance marketability of homes, increase comfort and interest by potential buyers and improve builder reputation.

Similarly, the single-family programs are targeted to adults most likely to own, or to be building new, homes (i.e., adults 25 to 65) and the messaging is more colloquial and more about being comfortable in the home. Personal contact is used to reach builders and homeowners whenever it is efficient and fiscally prudent to do so. Other residential programs rely on partnerships, point-of-sale signage and more general audience marketing tactics.

Table BCUC IR1 A57.1 below provides an overview of programs, tactics and channels used to reach the targeted audiences.

1

Table BCUC IR1 A57.1

PROGRAM	OFFER/ CAMPAIGN	MARKETING TACTICS/CHANNELS	COLLATERAL
New Home – Single-family	Incentives • Rebates • Studies	Personal contact • Presentations to associations • Presentations to builders • Trade shows Direct mail/email • Trade associations • Builders Sponsorships/Advertising • Trade magazines • Trade associations Municipal Planning Dept. Partnerships Public Relations	• Brochures • PowerPoint Presentations • Speaking points • Letters • Website • Application forms • Promotional collateral • Display materials • Case studies • Print ads • Media release/earned media • Powerlines newsletters
Retrofit – Single-family	Incentives • Rebates	Personal contact • Presentations to associations • Presentations to builders • Trade shows Direct mail/email • Trade associations • Builders Sponsorships/Advertising • Trade magazines • Trade associations Municipal Planning Dept. Partnerships Public relations	• Brochures • PowerPoint Presentations • Speaking points • Letters • Website • Application forms • Display materials • Promotional collateral • Print ads • Case studies • Media release/earned media • Powerlines newsletters
Multi-Family (New & Retrofit)	Incentives • Rebates • Studies	Personal contact • Presentations to associations • Presentations to builders • Trade shows Direct mail/email • Trade associations • Builders Sponsorships/Advertising • Trade magazines • Trade associations Municipal Planning Dept. Partnerships Public Relations	• Brochures • PowerPoint Presentations • Speaking points • Letters • Website • Application forms • Promotional collateral • Display materials • Case studies • Print ads • Media release/earned media • Powerlines newsletters

2

1

Table BCUC IR1 A57.1 cont'd

Program	Offer/ Campaign	Marketing Tactics/Channels	Collateral
Electronics (Utility Partnership)	Incentives • Rebates	Point-of-Sale On-line Promotion Personal Contact • Electronics dealers Advertising Public Relations	• Posters/rack cards/clings • Website • Letters • Print and radio ads • Media release/earned media • Powerlines newsletter
Laundry (Utility Partnership – Terasen)	Incentives • Rebates • Product samples • Free product	Point of Sale Rebate forms On-line Promotion • Information • Contest Personal Contact • Appliance dealers • Product give-aways Municipal partnership Advertising Public Relations Contest	• Posters/flyers • Website • Letters • Rebates/brochures • Kick-off event (city halls) • Print and radio ads • Media release/earned media • Powerlines newsletter
Lighting	Incentives • Rebates	Point of Sale Rebate forms On-line Promotion • Information Personal Contact • Hardware stores Advertising Public Relations	• Point of Purchase Materials • Posters/flyers • Website • Rebates/brochures • Radio and print ads • Media release/earned media • Powerlines newsletter
Solar Hot Water	Incentives • Rebates	On-line Promotion Personal Contact • Presentations to builders and associations Sponsorships Municipal and organization partnerships Advertising Public Relations	• Brochures • Website • Media release/earned media • Powerlines newsletters

2

1 **Table BCUC IR1 A57.1 cont'd**

Program	Offer/ Campaign	Marketing Tactics/Channels	Collateral
Low Income/Rental	Free Product • Energy Saving Kits • CFLs • Clotheslines Rental Pilot Project	Direct Mail • Service organizations • Housing associations Public Relations Personal Contact • Service organizations • Housing associations • Health and Wellness trade shows • Food banks Public Relations	• Application forms • Letters • Posters • Website • Brochures • Media release/earned media • Powerlines newsletters
Conservation Culture	Events/Campaigns • Earth Hour • Earth Day • Cooling Campaign • Heating Campaign • Power Sense Month • Community Outreach • Tree planting	Personal Contact • Participation in community events Advertising Sponsorships Public Relations Municipal/Community Organization/Media Event Partnerships Contests Award Event	• Website • Collateral materials • Display materials • Radio and print ads • Media release/earned media • Powerlines newsletters

Q57.2 For each of the Residential Sector Programs where incentives are offered, please provide the level of incentive offered in 2010 and the incentive level planned under the 2011 DSM Plan.

A57.2 Please see Table BCUC IR1 A57.2 below. Please note, the Behavioural program is not an incentive-based program, thus is not listed.

Table BCUC IR1 A57.2

Program Name	2010 Incentive (¢/kWh)	2011 Incentive (¢/kWh)
Building Envelope	24.3	20.5
Heat Pumps	5.3	15.7
Lighting	4.5	8.1
New Home	13.9	46.7
Appliances	No program	31.3
Water Heating	30.9 (Solar only)	12.1
Low Income	10.0	35.8

Q57.2.1 Why does FortisBC believe incentives are an effective and cost-efficient demand side measure? Please provide any research or other support (i.e. survey results) which support FortisBC increasing incentive levels to achieve greater conservation from residential customers.

A57.2.1 No specific research was completed to determine the effect of increased incentives on DSM achievement in FortisBC's service territory. However, basic economic demand theory states that decreasing the price of a good will increase the quantity demanded. Please also refer to the Northwest Power and Conservation Council's white paper on achievability for an example of a study that

evaluates achievement when incentives are equal to 100 per cent of the incremental measure cost (provided as Appendix BCUC IR1 A57.2.1)

Q57.2.1.1 What do research and best practices say are the most effective and cost-efficient demand side measures for residential customers?

A57.2.1.1 The most cost-efficient demand-side measures for residential customers are those with the highest benefit-cost ratios. For FortisBC, those measures include:

- Efficient lighting (CFL);
- Showerheads:
- Replace single pane windows with Energy Star windows;
- Upgrade attic insulation;
- Efficient electric water heating technologies;
- Heat pumps;
- Energy Star TVs; and
- Efficient computer monitors.

All of the above measure categories have a benefit-cost ratio greater than 2.0. The top measures in this CDPR are consistent with research and best practices.

Q57.3 For each of the new residential programs (appliances, electronics and water heating) is FortisBC following the program model of any other utilities? If so, what are the energy savings achieved by these programs in other jurisdictions?

A57.3 FortisBC reviewed other utilities' programs and, in some cases, is mirroring successful programs to help build consistency in the marketplace. Similarly, it is planned that the appliance program provides the same levels of incentives as BC Hydro and Manitoba Hydro. Due to climatic difference, Solar Hot Water programs are not offered by many utilities, therefore FortisBC looked to Solar BC's program. FortisBC's program is consistent with Solar BC's and has adopted similar policy and application processes.

Most of the new residential programs are in the implementation planning stage and therefore comparisons to other jurisdictions would not be possible even if FortisBC had their data.

Q58.0 Reference: Exhibit B-1, Appendix 3, Section 3.4, p.25
Residential Sector Programs - Home Improvement Program

FortisBC states "The major component of the Home Improvement Program (HIP) is building envelope improvements (insulation, air sealing and Energy Star windows and doors). The HIP program will include increased incentive levels and a new measure, electronic thermostats, has also been introduced."

Q58.1 For which components of the program are incentives offered?

A58.1 Incentives are offered for all the major building envelope improvements: air sealing; attic, exterior wall, basement and crawl space insulation; windows; doors; and thermostats.

Q59.0 Reference: Exhibit B-1, Appendix 3, Section 3.4, p.25
Residential Sector Programs - Heat Pumps

FortisBC states "In addition to direct financial incentives, FortisBC will provide low-interest loans for qualifying customers to purchase the technology and pay back the loan over time."

Q59.1 Is FortisBC offering low-interest loans for heat pumps for the first time?

A59.1 The Company has offered heat pump loans since 1999.

Q59.1.1 Please provide more details of the program, including how customers will qualify for the loans and how the loans will be administered and accounted for.

A59.1.1 A qualifying customer, approved through a third-party credit rating agency, is eligible for a low-interest loan over 10 years to a maximum of $5,000. The loan is billed through the FortisBC billing system. The loan is accounted for as a long term receivable (with a current portion for those payments due within a year). The difference between the Company's Average Weighted Cost of Capital and the customer loan rate is charged as a DSM program incentive.

Q59.1.1.1 Please specify other jurisdictions that use loan programs for heat pumps or other energy efficient equipment. Discuss whether these jurisdictions found these programs to be effective and what problems they encountered in the loan program.

A59.1.1.1 Several utilities in Canada provide loans for heat pumps and other energy efficiency measures, including:

- SaskEnergy provides loans for furnaces up to $15,000.
- Manitoba Hydro provides several financing programs: up to $20,000 for geo-thermal installations; and up to $7500 for building envelope improvement and/or upgrading your furnace or water heater (including solar hot water).
- Conserve Nova Scotia provides financing up to $5,000 any energy efficiency upgrade. Program evaluation underway and results are not available yet.
- Prince Edward Island Office of Energy Efficiency offers up to $10,000, including a forgivable portion for low-income households (amount dependent upon household income).

A number of U.S. utility companies also offer loans. An analysis of problems with loan programs in other jurisdictions has not been conducted.

Q60.0 Reference: Exhibit B-1, Appendix 3, Section 3.4, p.26
Residential Sector Programs - Behaviour Programs

FortisBC states "Using Community-Based Social Marketing (CBSM) best practices to help build normative conservation behaviour, the programs will target specific time-sensitive or seasonal themes."

Q60.1 Are the Behaviour Programs referred to by FortisBC as "Conservation Culture" elsewhere in the application?

A60.1 "Behavioural", "Social Marketing", "Awareness" and "Customer Education and Delivery" are synonymous with "Conservation Culture" in the application.

Q61.0 Reference: Exhibit B-1, Appendix 3, Section 3.4, p.27

General Service Sector Programs

Q61.1 How are each of the General Service Sector Programs publicized and delivered to general service consumers?

A61.1 The residential program marketing principles articulated in A57.1 are followed to market the commercial sector programs: audience segmentation and channel selection, sector specific messaging, and a focus on face to face customer contact. Table BCUC IR1 A61.1 below illustrates the overview of the marketing plan.

1 **Table BCUC IR1 A61.1**

PROGRAM	OFFER/CAMPAIGN	MARKETING TACTICS/CHANNELS	COLLATERAL
Wholesale Lighting	Incentives • Instant Rebates	Point-of-Sale Personal Contact • Wholesale companies • Trade association events Advertising (industry publications) Public Relations	• Counter "Lunch & Learns"/Education • Point of Sale merchandising • Website • Brochures • Print ads • Media releases/earned media
Product Option (fixed rebate)	Incentives • Rebates	Personal Contact • Industrial/commercial/institutional customers • Trade association events Advertising (industry publications) Public Relations	• Brochures • Website • Display materials • Print ads • Case studies • Powerlines newsletters • Media releases/earned media
Partnership in Efficiency (PiE)	Incentives • Rebates • Studies	Personal Contact • Industrial/commercial/institutional customers • Trade association events Advertising (industry publications) Public Relations	• Brochures • Case studies • Website • Display materials • Print ads • Media release/earned media
Small Business Lighting Evaluations	Incentives • Rebates	Personal contact • Small business owners (energy evaluations) • Presentations to associations • Trade association events Direct mail/email • Small business owners Sponsorships/Advertising • Small business associations (i.e., chambers of commerce) Public Relations Municipal Partnerships (i.e., City of Penticton)	• Postcards (direct-mail pieces) • Personalized letters • Website • Case studies • Display materials • Print ads • Media releases/earned media

Q62.0 Reference: Exhibit B-1, Appendix 3, Section 3.4, p.27
General Service Sector Programs - Lighting

FortisBC states "Incentives for lighting measures are varied and range from $0.02 to $0.17 per kW.h savings, with the rebate limited to achieving a two-year payback on incremental cost."

Q62.1 How are the incentives for lighting measures determined within the specified range?

A62.1 The incentive range reflects the diversity of energy-efficient lighting products incented and the range of customer payback period. The incentives are adjusted to achieve reasonable customer payback periods and ensure customer participation.

Q63.0 Reference: Exhibit B-1, Appendix 3, Section 3.4, p.27
General Service Sector Programs – Building Improvements Program

FortisBC states "In addition, FortisBC will develop a suite of standardized fixed rebates (product option) for the most common heating, ventilation & air conditioning (HVAC) measures, pumps and motors, compressed air and refrigeration technologies."

Q63.1 How does FortisBC plan to develop the suite of rebates? Will FortisBC consult with General Service Sector consumers in the development of the suite of rebates? If so, how? If not, why not?

A63.1 Product rebates are used to standardize the incentive amount on a per unit basis. Many of the measures have been incented on a custom option basis in the past, and will be converted to a product option basis to simplify the application process for the customer and reduce program administration. The Company will consult with trade allies prior to launching this offer.

Q64.0 Reference: Exhibit B-1, Appendix 3, Section 3.4, p.28
General Service Sector Programs – Computers – Data Centre and Server Program

FortisBC states "To encourage the use of the most efficient technologies and measures, FortisBC will introduce a Data Centre and Server program to provide financial incentives and tools to help commercial customers identify and implement server consolidation solutions in their data centres."

Q64.1 Do other utilities offer this or a similar DSM program? If so, which utilities and what energy savings have they achieved?

A64.1 BCHydro has a number of similar programs, as reportedly do some US utilities. FortisBC is not aware of the level of savings those programs have achieved.

Q65.0 Reference: Ex. B-1, Appendix 3, Section 3.4, p.28
General Service Sector Programs – Municipal Programs

FortisBC states "In addition, municipalities are working to significantly reduce carbon emissions and are investigating innovative energy efficient technologies like community energy systems, which FortisBC will support if potential electrical savings are anticipated."

Q65.1 How will FortisBC support municipalities in investigating innovative energy efficient technologies? Will FortisBC support the investigation or the implementation of the technologies? How will the level of support be determined?

A65.1 FortisBC staff participate in municipal working groups and committees tasked to investigate the energy efficient technologies. As the initiatives progress, it is expected that the local governments will seek support funding for more detailed engineering and/or economic opportunities studies. On individual bases, FortisBC would evaluate the requests, and based on economic analysis would provide funding for studies or technology implementation. The level of funding would also be determined by an individual technical and economic analysis of each municipal initiative that would take into account technology maturity and Total Resource Cost benefit-cost ratios.

Q66.0 Reference: Exhibit B-1, Appendix 3, Section 3.4, p.28
Industrial Sector Programs – Integrated Programs

FortisBC states "FortisBC will provide financial incentives based on calculated energy savings and operational assistance for the purchase of building and process optimization technology, which will help to ensure larger commercial and industrial customers achieve maximum energy efficiency by monitoring and tracking their energy usage."

Q66.1 Please confirm whether "Integrated Programs" is referred to as "Integrated Building Optimization" in other parts of the application.

A66.1 Although the technology required for the programs is similar, the two programs are slightly different. "Integrated Programs" refers to building and manufacturing process optimization and applies to industrial customers, while "Integrated Building Optimization" applies to General Services buildings only.

Q66.1.1 If so, as a new program, does FortisBC know of other utilities that offer the same or a similar program? If so, what conservation results have other utilities achieved with these programs?

A66.1.1 The technology to provide Integrated Building Optimization is relatively new; however, a number of utilities have introduced programs within the last two years, including BC Hydro, Manitoba Hydro and NStar (Massachusetts). The programs have achieved an average of 8 per cent electrical and 20 per cent gas savings.

Q67.0 Reference: Exhibit B-1, Appendix 3, Section 3.4, p.28
Industrial Sector Programs – Industrial Efficiency

FortisBC states "FortisBC also will provide rebates towards the incremental cost of efficiency measures compared to standard "baseline" construction (the rebate entitlement is based on $0.05 to $0.12 per estimated annual kW.h savings, with the maximum rebate calculated to achieve a two-year payback on incremental cost)."

Q67.1 How will the rebates be determined within the specified range?

A67.1 The lower range of the incentive is applicable to projects which were committed to under the current industrial offer of five cents per annual kWh saved, subject to the two-year payback and 50 per cent of incremental cost limitation. The higher incentive is applicable to the new EMIS (Energy Management Information System) program which has a much longer payback period from a customer perspective in order to ensure program participation.

Q68.0 Reference: Exhibit B-1, Appendix 3, Section 3.4, p.29
Irrigation Sector Programs

FortisBC states "The maximum rebate is 50 percent of the incremental project cost or the amount required to provide the customer with a two-year payback, whichever is less."

Q68.1 Is the Irrigation Rebate program unique in FortisBC's DSM Plan in terms of offering a rebate of 50% of incremental project cost? If so, why do other FortisBC DSM programs offer a greater or 100% of project cost rebate?

A68.1 The incentive offering is common across all non-residential customer classes.

The applicable incentive rate for programs offered to industrial and general service customers, including those in the irrigation class, is capped as the lesser of:

(i) 50% of project costs in the case of retrofit, or
(ii) 100% of incremental cost for new construction, or
(iii) Amount sufficient to achieve a two-year payback.

Q69.0 Reference: Exhibit B-1, Appendix 3, Section 3.4, p.29
Residential Low-Income Households Program

FortisBC states "The Residential Low-Income Households program is an energy efficiency initiative that assists FortisBC's low-income customers in reducing their electricity bills. Phase 1 is the distribution of the popular Energy Saving Kits (ESKs) to qualified customers, which began in 2010 and will continue throughout 2011...PowerSense representatives will also promote the kits at health and seniors' trade shows and at events or functions targeting low-income households."

Q69.1 Please list the contents of an Energy Saving Kit. What is the cost of each kit?

A69.1 Table BCUC IR1 A69.1 below provides the details of the contents in each kit. The cost to FortisBC of each kit is $39.95 (retail for approximately $75), plus postage, which is approximately $10 per individual kit. Bulk shipments are less costly per unit and vary upon number of kits shipped.

Table BCUC IR1 A69.1

ITEMS	QUANTITY
N0413M 13 watt CFL spiral light bulbs	2
N0420M 20 watt CFL spiral light bulbs	1
N9189 Refrigerator/Freezer Temperature cards	2
N9010 Water Heater pipe wrap	3
S3151 Shower Flow Measuring Bag	1
N2915CH 1.5gpm Earth Massage Chrome Showerhead	1
N3115 1.5gpm Kitchen Swivel Aerator	1
N3104 1.5gpm Dual Basin Aerator	1
N4013V Outlet/Switch Foam Gaskets (8/4)	1
N4000 Outlet Safety Caps (12pk)	1
N8011N Weather Stripping (10m per kit)	1
N3030 Storm Window kits	2
N8001 Foam Tape for Door Insulation	2
N1202 Limelight Night Light	1
N181C Hot Water Gauge	1
Refrigerator Freezer Temperature Card Holder	1
Bubble Wrap for lightbulbs	1
Total Kit cost including Assembly and box	**$39.95**

Q69.1.1 How many kits does FortisBC plan to distribute in 2011? How many did it distribute in 2010?

A69.1.1 Table BCUC IR1 A69.1.1 below shows the anticipated distribution of the kits over a three year period, from 2010 to 2012. In 2010, approximately 1,800 kits will be distributed, slightly more than anticipated due primarily to interest from First Nations.

Table BCUC IR1 A69.1.1

Program Component - Participation	Yr 1	Yr 2	Yr 3	Total (3 yr)	Average Annual Participation	% participation in eligible population (annual)
Energy Saving Kits (Gross)	1,650	2,400	2,900	7,000	1,600	6%

Q69.2 What is Phase 2 of the Residential Low-Income Households Program?

A69.2 Phase 2 of the program is to provide installation of the kits. The details of this phase are still being determined, primarily because FortisBC is partnering with Terasen Gas and BC Hydro to deliver a consistent program throughout British Columbia.

Q69.3 Which events or functions targeting low-income households do Powersense representatives plan to attend?

A69.3 Although specific dates and functions have not been identified, it is intended that FortisBC participate in Health and Wellness events, information sessions provided by low-income service provider organizations (i.e., Kelowna Women's Shelter, Penticton and Kelowna Food Banks, Osoyoos Indian Band Housing Services). In addition, FortisBC plans to offer information sessions and energy saving kit installation instruction to groups that indicate interest in this service.

Q70.0 Reference: Exhibit B-1, Appendix 3, Section 3.4, p.30
Rental Accommodation Programs – Single- and Multi-Family

FortisBC states "In its second phase, to be introduced in mid-2011, the Company in collaboration with Terasen Gas and BC Hydro, will direct-market financial incentive offers to landlords, property managers and rental agencies to upgrade rental properties. Similar to the LiveSmart collaborative program, a suite of "whole home" rebates and incentives for energy building evaluations will be offered. Additional information collateral that target renters directly will also be provided to help inform landlords and renters."

Q70.1 Please explain how FortisBC will direct-market in collaboration with Terasen Gas and BC Hydro?

A70.1 Direct marketing collaboration will include the following:

- Identification of all service providers and advocacy organizations that focus services for lower income residents (i.e., governmental agencies, food banks, women's shelters, housing societies, addiction services);
- Letter of introduction of program to service providers;
- Direct contact with service providers (telephone and face-to-face) with offer to provide kits, information sessions and other services as needed; and
- Follow-up and delivery of identified service to be provided.

Q70.1.1 Is it only Rental Accommodation Programs that FortisBC will offer in collaboration with BC Hydro and Terasen Gas?

A70.1.1 No, FortisBC is working on other programs with BC Hydro and Terasen Gas: i.e., Low-Income program, First Nations program, Commercial and Industrial program (Building Optimization), and Residential Electronics program. FortisBC is also working with the Ministry of Energy Mines and Resources (MEMPR), BC Hydro and Terasen Gas to implement the LiveSmart BC retrofit incentive program, the LiveSmart BC Small Business direct install program, and a LiveSmart BC PAYS (paysamerica.org) program in mid-2011.

Q70.2 Will the suite of whole home rebates and incentives be offered in collaboration with BC Hydro and Terasen Gas?

A70.2 FortisBC is working collaboratively with BC Hydro and Terasen Gas on a variety of initiatives to provide consistent offerings where possible throughout the province. However, there are climatic, economic and other conditions that make different offers preferable in some instances.

Q71.0 Reference: Exhibit B-1, Appendix 3, Section 3.4, p.30
Improved Efficiencies

Q71.1 FortisBC lists six mass-delivery tactics and partnerships to increase efficiencies. For each tactic, please specify in which program in the 2011 DSM plan they will be used. For example, one tactic listed is "partnerships with non-profit organizations to deliver savings." Which FortisBC DSM program(s) will benefit from this tactic?

Q71.1 Table BCUC IR1 A71.1 below identifies the partnerships and the expected efficiencies to be achieved.

1 **Table BCUC IR1 A71.1**

Partnership Type	Benefits	Programs that Benefit
Partnerships with retailers and wholesalers for point-of-sale rebates	• Greater reach to customers (more outlets and "salespeople") • Reach customers at decision making point (greater results) • Less staff time to process individual rebates and/or customized offers	• Residential Electronics • Residential Appliances • Residential Lighting • General Service Lighting
Partnerships with other utilities and levels of government to collaboratively deliver programs and program messaging	• Less confusion in marketplace; makes it easier for customers to understand – and access incentives • Less staff time to process individual rebates and/or customized offers (LiveSmart BC program) • Share information so don't have to develop programs or best practices "from scratch" • Don't have to create new IT and administrative infrastructures • Don't have to do unique M&E studies • Greater reach to customers and contractors (collaborative marketing and communications)	• Residential Building envelope (LiveSmart BC for Homes, LiveSmart BC PAYS) • General Service Building Improvement (LiveSmart BC for Small Business, Building Optimization) • Residential Low-Income/Rental • Residential Electronics • Residential Appliances
Partnerships with trades organizations and individual trades people to deliver program messaging	• Able to communicate directly with trades people – two-way dialogue to understand issues and to help get FortisBC's message to customers • Greater reach to customers and contractors (collaborative marketing and communications) • Easier to help build trades' capacity through training opportunities	• General Service Lighting • General Service Building Improvement • Residential Building Envelope • Residential Heat Pump • Residential New Home
Partnerships with non-profit organizations to deliver savings	• Greater reach to customers and contractors (more outlets and "salespeople") • Reach customers at decision making point (greater results) • Less staff time to create partnerships with individual service providers and/or process individual rebates and/or customized offers	• Residential Low-Income • Industrial Efficiency • Residential Hot water • Residential New Home

More standardized rebates or product option offers	• Able to provide more customers rebates
	  • Less staff time required as no longer required to do individual "custom" rebates for every customer
	  • Easier for customers to understand the rebates and process
	• Reach customers at decision making point (greater results)
	• Rebate process can be automated
	  • Faster response for customers
	  • Less staff time required
	• M&E easier to complete; less variability
		• Residential Electronics
		• Residential Appliances
		• Residential Lighting
		• General Service Lighting
		• General Service Building Improvement
		• Residential Building Envelope
		• Residential Heat Pump
		• Residential New Home
		• Residential Water Heating

Improved application process (i.e., development of "one-stop" electronic rebate portal)	• Easier for customers to access application forms • Less "paper-work" for staff to complete • Better record keeping • Rebate process completed more quickly • M&E easier to complete	• Residential Appliances • Residential Lighting • Wholesale Lighting • Business Improvement (Product Incentive) • Residential Retrofit • Residential New Home • Residential Hot Water

Q72.0 Reference: Exhibit B-1, Appendix 3, Section 3.4, p. 31

Improved Efficiencies

Table 3.4.1: Program Delivery Costs as Percentage of Total Budget

Budget Allocation	2011	2010
Incentives	62%	52%
Program administration	19%	31%
Conservation culture	3%	4%
Community energy planning	3%	0%
Trades training	1%	0%
Education	2%	1%
Planning & Evaluation	10%	13%

Q72.1 In which budget allocation category(ies) are the savings from the improved efficiencies realized?

A72.1 The categories of Program Administration and Planning and Evaluation (Measurement and Evaluation) exhibit reductions in their respective percentage of total budget in 2011, while the relative amount paid out in program incentives increases. These improved delivery efficiencies result primarily from economies of scale in delivering the program.

Q73.0 Reference: Exhibit B-1, Appendix 3, Section 3.4, p.31
Collaborative Program Summary

FortisBC states "LiveSmart BC: partnership with BC Hydro, Terasen Gas and the BC Ministry of Energy, Mines, and Petroleum Resources. LiveSmart BC is a residential retrofit program that encourages customers to upgrade building envelopes (insulation, windows, doors, draft proofing) and upgrade home space and water heating systems".

Q73.1 Is FortisBC's participation in LiveSmart BC part of its Residential Sector Program – Home Improvement Programs? Where does FortisBC attribute the energy savings realized by customers in the LiveSmart program?

A73.1 The incentive costs incurred and energy savings realized by FortisBC customers are attributed to the residential program(s) associated with the measures installed.

Q73.2 What is the cost of FortisBC's participation in LiveSmart BC? To which FortisBC DSM program are these costs allocated? If they are a separate budget item, please show Table 3.2.1 with LiveSmart costs included.

A73.2 Please refer to the response to BCUC IR1 Q73.1 above. There is not a separate LiveSmart budget line item.

Q73.3 Other than the collaborative programs listed, what are other areas of potential collaboration for FortisBC? Is FortisBC planning any other partnerships in 2011?

A73.3 FortisBC remains open to additional collaborative partnerships. At this time discussions are underway with MEMPR for the extension of LiveSmart BC to small business and an enhanced energy efficiency loan program loan program. Please also see the response to BCUC IR1 Q70.2 above.

Q74.0 Reference: Exhibit B-1, Appendix 3, Section 3.5, pp.32-34 and Table 3.2.4, p.23

Supporting Components

Table 3.2.4: Supporting Initiatives

Component	Details	Budget ($000s)
Education	• Sponsorship of ENGO programs (schools) • Support and sponsorship of trades training	250
Awareness	• Direct and face-to-face information • Collateral • Product and sample give-aways • Targeted customer information campaigns • Public relations • Partnerships • Social networking	200
Codes & Standards Support	• Support of policy development initiatives	25
Community Engagement	• Support and sponsorship of community energy efficiency programs, workshops and events • Support and sponsorship of community events • Public consultation	250
Total		725

Q74.1 On pages 32-34 of its 2011 DSM Plan, FortisBC lists its Supporting Components as: Customer Education and Program Delivery; Education Programs; Community Energy Planning; Codes & Standards Support and Monitoring and Evaluation. Please provide a version of Table 3.2.4 using the Supporting Component titles as listed in pages 32-34. Please include the years 2005-2011. If any supporting component activities are missing in the table, please include them and provide a description of the activity.

A74.1 Table BCUC IR1 A74.1a illustrates the Supporting Components in the same formatted style as Table 3.2.4. FortisBC notes that it used a variety of terms to refer to the same programs and measures throughout the document, and has therefore included those synonymous descriptions in this table for clarity.

Table BCUC IR1 A74.1b illustrates Supporting Components budgets for the years 2005-2011.

Table BCUC IR1 A74.1a

Supportive Initiatives	Details	Budget (000s)
Customer Education & Program Delivery Conservation Culture Awareness	• Direct and face-to-face marketing • Collateral • General advertising • Public relations • Partnerships • Sponsorships	$200
Education Programs	• Sponsorship of ENGO programs (schools) • Support and sponsorship of trades training (post-secondary and trades accreditation)	$250
Codes & Standards Support	• Support of policy development initiatives	$25
Community Energy Planning Community Engagement	• Support and sponsorship of community energy efficiency programs, planning processes and workshops • Support and sponsorship of community events • Public consultation	$250
Monitoring and Evaluation Planning and Evaluation	• Incorporate new programs into program and perform studies on existing programs • Perform studies on existing programs • Establish M&E Plan for 2012 and beyond	$750

1 **Table BCUC IR1 A74.1b**

Supportive Initiatives	2005	2006	2007	2008	2009	2010	2011
Conservation Culture	NA	NA	NA	NA	$141	$148	$200
Education Programs	NA	NA	NA	NA	$91	$91	$250
Codes & Standards	NA	NA	NA	NA	NA	NA	$25
Community Engagement	NA	NA	NA	NA	NA	NA	$250
Planning & Evaluation	$363	$314	$324	$419	$503	$519	$750

Q75.0 Reference: Exhibit B-1, Appendix 3, Section 3.5, p.33
Supporting Components – Education Programs

Ministerial Order No. 271, Demand-Side Measures Regulation of November 2008 states "3. A public utility's plan portfolio is adequate for the purposes of section 44.1 (8) (c) of the Act only if the plan portfolio includes all of the following:...(d) if the plan portfolio is submitted on or after June 1, 2009, an education program for students enrolled in post-secondary institutions in the public utility's service area."

Q75.1 Does FortisBC have a program for students enrolled in post-secondary institutions as per section 3(d) of Ministerial Order 271?

A75.1 In 2010 FortisBC has coordinated and/or provided funding for training, as well as provided guest lecturers for a number of post-secondary and trade organization programs, including:

- Northern Lights and Okanagan Colleges: Accredited Solar Hot Water Installers course
- Okanagan College: sponsorship of SIFE program and projects (Green Business Awards, Growing Up Greener)
- Illuminating Engineering Society: Accredited IES Lighting course
- BC Electrical: Arc Flash training
- Selkirk College: School of Renewable Resources
    - Member of Advisory Panel
    - Guest lecturer for Integrated Environmental Planning program
    - Regularly loan technology and equipment
- NRCan: sponsorship of three industrial "Spot the Savings" Workshops

It is anticipated that FortisBC will continue to provide this same level of support for 2011. In addition, FortisBC is in discussion with Selkirk College and Okanagan College, as well as professional and trades organizations, to increase its support of further training and educational opportunities. Details of those discussions should be completed by the end of 2010.

Q76.0 Reference: Exhibit B-1, Appendix 3, Section 5, p.40
General Assumptions

FortisBC states "The Total Resource Cost test calculations, in the 2011 DSM Plan, were calculated using the following criteria...Discount Rate (Real) 8%, Line Losses 8.8%".

Q76.1 Please explain how FortisBC determined the figures of 8% and 8.8% for discount rate and line losses? What assumptions were made in determining these figures?

A76.1 The Company has used a nominal discount rate of 10 per cent and a real discount rate of 8 per cent (based on a 2 per cent level of inflation) in its rate impact and economic analysis impact studies for a number of years. The 8 per cent real discount rate is meant to represent the Company's long term Weighted Average Cost of Capital.

Supporting this, the use of a 10 per cent nominal and 8 per cent real discount rate was directed by the Commission in its Information Request No. 1 Question 12 to FortisBC regarding Project No. 3698493: Advanced Metering Infrastructure (AMI) Project.

Since the Total Resource Cost test calculations use current or real dollars, a real discount rate of 8 per cent was used.

Q77.0 Reference: Exhibit B-1, Appendix 3, Table 5.2.1, p.40

Avoided Power Purchase Costs

Table 5.2.1: Long-Term Avoided Power Purchase Costs

Component	Source	Long-term Avoided Cost	Proportion	Blended
Energy ($/MWh)	BC Hydro 2007 CPR	$140.78	28%	$154.15
	2009 Resource Plan	$159.35	72%	

Q77.1 Does the proportion of cost allocated at BC Hydro rates indicate that 28% of FortisBC's energy is procured from BC Hydro? If not, how was proportion allocated at 28%?

A77.1 The proportion is based on the 2010 forecast of 980 GWh purchased from BC Hydro, out of the total forecasted load of 3,539 GWh.

Q77.2 Does this estimate only include purchased power? If so, what is the avoided cost including the cost of FortisBC's generation?

A77.2 The long-term avoided cost is a forecast of the cost to deliver energy in the future as identified in the 2009 Resource Plan.

Q78.0 Reference: Exhibit B-1, Appendix 3, Section 2.2, pp.17-18 and Appendix A, p.A-3 – A-4
DSM Plan Public Consultation Process

FortisBC states "FortisBC received considerable feedback through the consultation process at the open houses and through written feedback. Key findings as recorded on the returned surveys (n=37)..." (Appendix 3, p.17)

FortisBC states "There were 8 attendees who signed in at the Creston open house, 23 in Castlegar, 5 in Osoyoos and 18 in Kelowna." (Appendix A, p.A-3)

FortisBC states "In total, 25 surveys were collected at the open houses and a further 12 surveys and 6 written responses were returned by mail or email." (Appendix A, p.A-4)

Q78.1 Please confirm that FortisBC received public feedback from 37 returned surveys, four public houses with 54 attendees, a DSM Advisory Committee and a City of Grand Forks Council Meeting.

A78.1 Confirmed. There were also an additional six written responses collected, which were not surveys.

Q78.1.1 Do the results of the public consultation represent all customer classes?

A78.1.1 Please refer to the response to BCUC IR1 Q54.1 above.

Q78.1.2 **Please discuss if the results obtained through these consultation methods may be biased. How could the results and conclusions made from those results be skewed?**

A78.1.2 The Company can't say whether or not the results are biased, the feedback provided was qualitative. Please also refer to the response to BCUC IR1 Q54.1 above.

Q78.1.3 **How can FortisBC increase its response rate to mail and email surveys and the attendance at Open Houses? In particular, how can FortisBC increase its feedback to get a representation of all customer classes?**

A78.1.3 FortisBC is committed to open dialogue with stakeholders, First Nations and all customer classes. During this public consultation process, open house participants included residential, industrial, irrigation, wholesale and commercial / business customers, as well as local government representatives.

The Company will continue to solicit input from all customer classes by providing a number of appropriate feedback opportunities in any given consultation process. The Company will consider using focus groups (as it has at times in the past) when participation in consultation when quantitative, statistically valid results are required.

Q79.0 Reference: Exhibit B-1, Appendix A, Section 5.0, p.A-6
DSM Plan Public Consultation Conclusions

FortisBC states "FortisBC's consultation on the 2011 DSM Plan enabled the Company to make the following conclusions based on the feedback received.

- **Feedback from open house participants and those who sent in written responses indicated that they are in support of the program and would be willing to contribute up to $20 million per year for DSM programs."**

Q79.1 Does FortisBC consider it now has the mandate from customers to spend up to $20 million per year on DSM programs?

A79.1 Although the majority of respondents did indicate a preference for the high option, FortisBC does not believe that this constitutes a mandate. All DSM expenditures require approval of the Commission.

Q79.2 FortisBC made eight conclusions based on public feedback. Please specify which programs in the 2011 DSM Plan address each of these conclusions. If no program in the 2011 plan addresses the conclusion, what does FortisBC plan to do in response?

A79.2 Table BCUC IR1 A79.2 below addresses each recommendation.

1 **Table BCUC IR1 A79.2**

Feedback Point	Action	Program Impacted
1. Feedback from open house participants and those who sent in written responses indicated that they are in support of the program and would be willing to contribute up to $20 million per year for DSM programs;	FortisBC has requested a significantly larger budget to deliver DSM programming for 2011. It did not seek a $20 million budget as it wants its DSM program to expand in a fiscally prudent and structured manner and to ensure there is adequate capacity to achieve the expanded goals.	• All programs
2. Additional programming is desired for low or fixed income residents and those in rental units;	Please refer to IR 69.2, 70.1 and 70.2 responses.	• Residential Low Income/Rental
3. Potential participants would like to see simple access to information and incentives – a "one stop shop";	FortisBC is collaboratively working with BC Hydro, Terasen Gas and MEMPR to provide this service for residential and small business sectors. Presently, the "one stop shop" is being administered through MEMPR's LiveSmart BC program. However, if the LiveSmart BC program should be jeopardized in the future, MEMPR has agreed to allow the utilities to assume the administrative function of this "one stop" shop. (It would allow the utilities to buy/assume the IT and administrative infrastructure.) FortisBC is presently assuming the customer information component for the LiveSmart BC program and will be providing that service at its Trail Contact Centre.	• Residential Building Envelope • Residential Heat Pumps • Residential New Home • General Service Building Improvement
4. Specific program components are supported such as appliances, lighting, heating systems, refrigeration and lighting (commercial), and some renewables such as solar hot water;	Request for rebate rate to increase to 40% of incremental costs in 2011, as well as introduce new programs that specifically address these measures. FortisBC will increase its support of renewable technologies like solar hot water, even though the measure does meet the TRC in 2011.	• Residential Appliances • Residential Lighting • Residential Heat Pumps • Residential Building Envelope • Residential New Home • Residential Water Heating • General Service Lighting • General Service Building Improvement • Industrial Efficiency • Integrated Building Optimization
5. There is support for additional information and education of DSM programs;	Customer Education/Program Delivery and Conservation Culture budgets are planned to increase.	• Residential Behavioural
6. An incentive increase from the current level is supported;	The incentive levels are planned to increase from 25% of incremental costs to 40%.	• All programs
7. There is considerable interest in renewable resources;	Presently, renewable energy sources do not meet the TRC and therefore, were not included in the Plan. However, the Opportunities Study shows that solar hot water should become cost effective by 2010 so a program for solar hot water is included in the Plan, embedded within the Residential Hot Water and C&I Business Improvement programs.	• Residential Water Heating • General Service Building Improvement
8. Societal benefits like reducing impact on the environment are supported in addition to the desire to lower electrical costs to program participants.	Decreasing electrical use benefits society - and the environment.	Messaging will be built into all programs' education materials.

Q80.0 Reference: Exhibit B-1, Appendix A10 to Appendix 3
Survey – Public Consultation Report

Q80.1 Was the survey used by FortisBC validated before it was sent out to the public? If so, please explain by what method or process it was validated? If not, please explain why not.

A80.1 Mail and email addresses were provided from the FortisBC Billing Database. The list was checked for duplicates and partial addresses. Any duplicates or partial addresses were removed prior to mailing.

Q81.0 Reference: Exhibit B-1, Appendix B to Appendix 3, p.7
2009 Customer End Use Study – Methodology

Q81.1 Were the surveys sent by mail and email validated before administration? If so, please explain by what method or process it was validated? If not, please explain why not.

A81.1 Please refer to the response to BCUC IR1 Q80.1 above.

Q82.0 Reference: Exhibit B-1, Appendix B to Appendix 3, p.7

2009 Customer End Use Study – Weighting the Data

The sample was weighted by region to ensure the collected sample matched the true composition of FortisBC's total customer base.

	Residential Customer Population				Unweighted Sample		Weighted Sample	
	Direct	Indirect	Total	%	Total	%	Total	%
Central Okanagan (Kelowna) including Big White	42276	12424	54700	39.74%	840	41.46%	805	39.73%
South Okanagan including Similakameen	20365	19783	40148	29.17%	549	27.10%	591	29.17%
West Kootenay/Boundary	32641	10166	42807	31.10%	637	31.44%	630	31.10%
Total	95282	42373	137655	100.00%	2026	100.00%	2026	100.00%

After applying the weights, the regional proportions in weighted sample match the regional proportions in the Population of FortisBC Customers.

Q82.1 Based on the table above, were only 805, 591 and 630 surveys considered for each of the three regions? If so, how were the surveys chosen from the total surveys returned? If not, how was the regional weighting applied to the survey results? Was the same weighting method used for the Customer End Use Study and the Commercial End Use Study?

A82.1 All customer surveys were used. The values presented in the column second from the right represent the "effective" regional survey counts. The "805" surveys, for example, are simply the number of surveys that would have been returned had they exactly matched the actual regional percentage of customers (39.74% x 2,026 = 805).

The weighted sample proportions are applied to regional survey results to restore their relative proportion (contribution) to survey totals to match the regional proportions evident in the survey population. They were required because the relative proportions of regional surveys received differed slightly from the regional

proportions of customers in FortisBC's customer base (population). Regional weighting does not affect survey results for any given region, or when one region is compared with another. They are required, however, when summarizing survey results at the total (FortisBC) customer level.

The same weighting methodology was used for Commercial data sets.

Q83.0 Reference: Exhibit B-1, Appendices B to Appendix 3, p.7 and Appendix C to Appendix 3, p.8

Comparison with BC Hydro 2006 Residential End Use Survey

FortisBC states "In 2006, BC Hydro completed a comprehensive mail survey (REUS) with their residential customers across BC. Throughout this report, comparisons are made with the response collected from 1144 BC Hydro customers in the Southern Interior of BC."

FortisBC states "In 2006, BC Hydro completed a comprehensive mail survey (CEUS) with their commercial customers across BC. Throughout this report, comparisons are made with the response collected from 1946 BC Hydro commercial customers across BC."

Q83.1 Many of FortisBC's 2009 survey results differ significantly from the BC Hydro survey results. Please discuss the reasons for the differences.

A83.1 With regard to sample population differences, FortisBC and BC Hydro service different regions. The BC Hydro sample has a higher percentage of residents living in cities. This means higher percentages of apartments, condominiums, and smaller single detached dwellings. The characteristics of electrical components and usage in smaller homes will account for some of the differences in the sample. Moreover, a large percentage of the FortisBC sample comes from the West Kootenay region where homes are older, on average, than the homes in the BC Hydro sample.

With regard to the differences between BC Hydro results obtained in 2006 and the FortisBC results obtained in 2009, usage of certain electrical appliances has changed considerably over 3 years. In decline are products such as incandescent light bulbs, top loading

clothes washers, and conventional (Cathode Ray Tube) televisions. Conversely, products such as compact fluorescents, front loading clothes washers and flat-screen LCD/plasma television screens are on the rise.

Q83.1.1 Do these differences indicate any bias in either survey?

A83.1.1 No, these difference do not indicate bias.

Q84.0 Reference: Exhibit B-1, Appendix C to Appendix 3, p.7
2009 Commercial End Use Study – Response Rate

Q84.1 Please discuss why the response rate is so much lower for the commercial customers (9.4% response rate) than for the residential customers (23.5% response rate).

A84.1 FortisBC cannot conclusively determine the cause of the lower response rate from commercial customers. However, the lower response rate may be related to the fact that the person that normally processes FortisBC correspondence, which is generally electricity bills, was not the person required to complete the survey (the business owner).

Q85.0 Reference: Exhibit B-1-1, Appendix D to Appendix 3, p.6 Conservation Demand and Potential Review (CDPR) – Data Requirements

The CDPR states "The inflation rate assumed is 2 percent annually with a utility nominal discount rate of 10 percent. "

Q85.1 Why does the CDPR assume a 10% discount rate when the TRC calculations for the 2011 DSM Plan assume an 8% discount rate?

A85.1 The CDPR escalates the marginal cost of energy in current dollars by the 2 per cent inflation to arrive at a future nominal marginal cost of energy and then discounts the annual energy cost using the nominal discount rate of 10 per cent. If the marginal cost of energy was not escalated, the appropriate discount rate would the real discount rate of 8 per cent.

Q86.0 Reference: Exhibit B-1-1, Appendix D to Appendix 3, p.7
CDPR – Basic Modelling Methodology

Q86.1 The CDPR report shows a methodology used to create its CDPR. What is the methodology used by other utilities to create a conservation and demand potential review?

A86.1 Other utilities often use similar methodology for evaluating demand-side resources. In the Pacific Northwest, utilities are required to evaluate energy efficiency using a Total Resource Cost test (TRC). The TRC is the most commonly accepted method for evaluating demand-side management resources. When sector end-use data are available (end-use surveys), other utilities often employ a bottom-up approach (similar to the methodology used in the CDPR) to evaluate potential savings. Other utilities may a top-down approach if regional studies are available to draw information from. In most cases, a top-down approach is used to evaluate industrial sector savings potential.

Q87.0 Reference: Ex. B-1-1, Appendix D to Appendix 3, pp.8-9
CDPR – Basic Modelling Methodology

The CDPR states "Specifically, the NWPCC uses an 85% achievability factor for all measures and has published a white paper describing the basis for using this value...There are many different types of achievability factors and many ways to apply them."

Q87.1 What do other utilities similar to FortisBC use as an achievability factor?

A87.1 In the Pacific Northwest United States, utilities use an 85 per cent achievability factor as well. For their 2007 Conservation Potential Review, BC Hydro evaluated achievability for each specific measure. Based on their external advisory committee advice, BC Hydro assigned achievability rates ranging up to 100 percent depending on the measure.

Q88.0 Reference: Exhibit B-1-1, Appendix D to Appendix 3, pp.11-12

CDPR – Historic Conservation Achievement

Figure 3
Historical Energy Efficiency Achievements

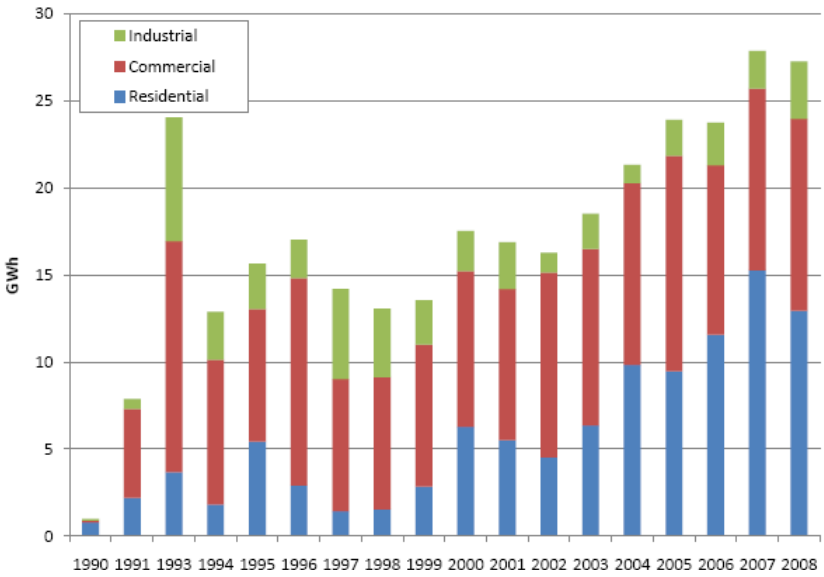
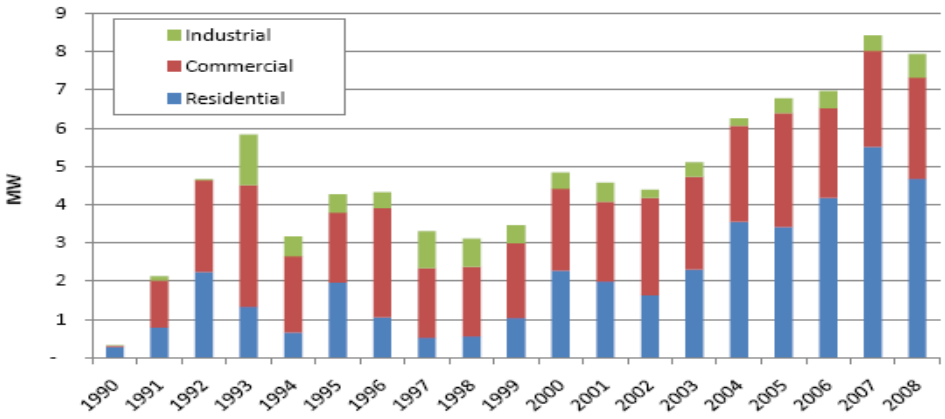


Figure 4
Peak Demand Savings



Q88.1 Please explain the spike in energy efficiency achievements and demand savings in 1993?

A88.1 There was an extraordinary industrial project in that a pulp mill in FortisBC's service territory was totally rebuilt and every motor replaced with a new high-efficiency model.

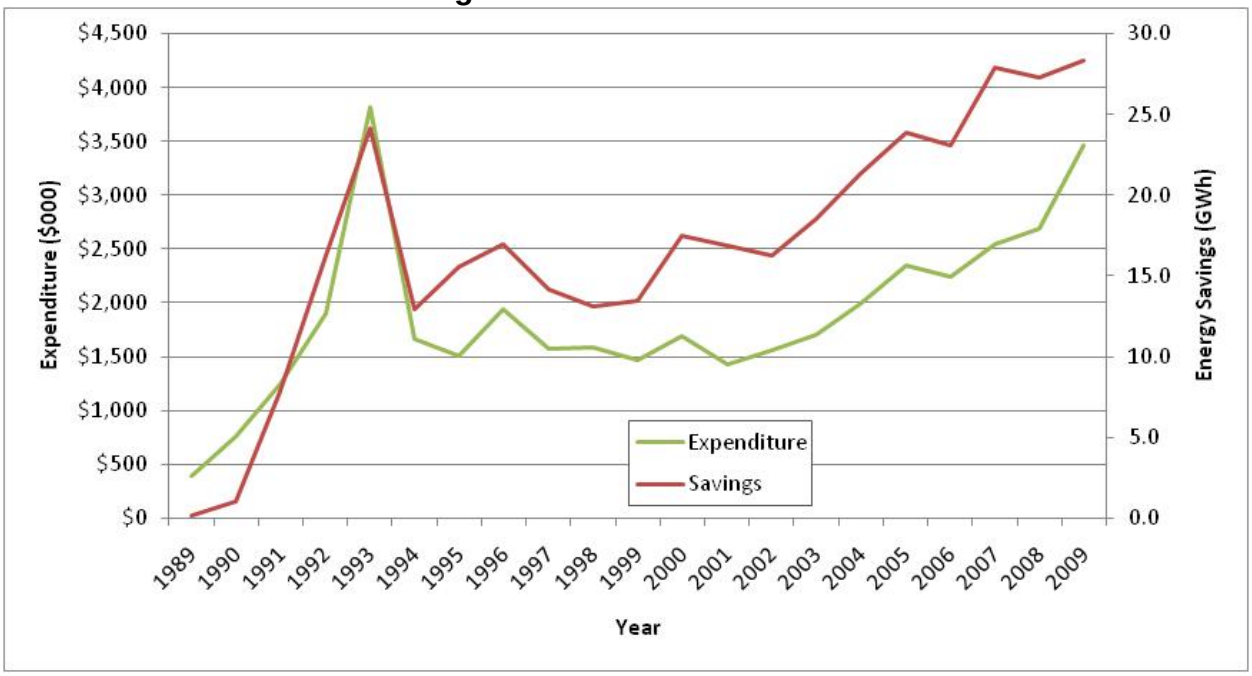
Q88.1.1 Please discuss what caused the second smaller spike seen in 2007.

A88.1.1 The residential programs experienced a surge of activity due to a building boom in the Okanagan. Residential programs also benefited from collaborative programs to incent EnergyStar windows and promote heat pumps.

Q88.2 What factors have contributed to the trend of increasing energy efficiency achievement and peak demand savings since 1998?

A88.2 The primary factor in increasing energy efficiency achievement and peak demand savings since 1998 has been increasing program expenditures. Energy efficiency achievements have closely tracked program expenditures, as can be seen in Figure BCUC IR1 A88.2 below.

Figure BCUC IR1 A88.2



Q88.2.1 What lessons from past historical achievement has FortisBC incorporated into its 2011 DSM plan and specifically into its new programs and enhancements to existing programs?

A88.2.1 Historical experience has shown that having a consistent long-term offer in the market and building working good working relationships trade allies and suppliers is critical to the success of the DSM program. In addition, Company will continue to pursue collaborative efforts with government, both local and senior, other public utilities, and environment non-governmental organizations.

Q89.0 Reference: Exhibit B-1-1, Appendix D to Appendix 3, p. 20
CDPR – End-Use Model

Historic building permit data was used to distribute the total customer growth rate among building types. Building permits for apartments have increased significantly since 2004.

Table 2
Average Annual Net Growth Rate(1)
Number of Buildings

	Single Family	Mobile Home	Apartment	Row	Total
2009-2012	0.52%	0.27%	5.03%	0.41%	1.46%
2009-2020	0.50%	0.28%	5.22%	0.41%	1.46%
2009-2030	0.50%	0.28%	5.64%	0.43%	1.18%

(1) Includes demolition rates.

Q89.1 What are the building growth rates and demolition rates estimated by the municipalities in FortisBC's service area?

A89.1 FortisBC does not have any information from the municipalities regarding building growth and demolition rates.

Q89.1.1 What are the trends influencing growth and demolition rates in FortisBC's service region?

A89.1.1 FortisBC does not have any information regarding building growth and demolition rates, but believes that the CDPR provides a reasonable forecast of the net growth in building rates in Table 2 (Appendix D to Appendix 3, Exhibit B-1). Both rates are affected by a complex interaction of economic effects, including property values, renovation costs, new construction costs and the supply and demand for buildings generally.

Q89.2 For each type of building, Single Family, Mobile Home, Apartment and Row, please identify the change in energy sales in GWh associated with a 1% increase in net growth rate.

A89.2 Without information on residential growth and demolition rates, as well as information on the energy intensity of new and demolished buildings, FortisBC cannot provide the requested information.

Q90.0 Reference: Exhibit B-1-1, Appendix D to Appendix 3, Table 3, p.21
CDPR – End Use Model

Q90.1 Is the data in Table 3 net of DSM (i.e. after DSM)? Is the data weather normalized?

A90.1 The data in Table 3 is weather normalized. The load forecast embeds historic DSM trends but does not include additional savings from new programs or efforts.

Q90.2 How will using the end use model estimates for the conservation potential review, which differ from the FortisBC load forecast used for other planning purposes, create discrepancies in FortisBC's planning?

A90.2 FortisBC does not foresee any issues due to discrepancies between the two forecasts.

Q91.0 Reference: Exhibit B-1-1, Appendix D to Appendix 3, Figure 8, p.19 and Figure 9, p.22

CDPR – End Use Model

Q91.1 Please list the specific sources of difference between the 1,720 GWh total in Figure 8 and the 2,247 GWh total in Figure 9. For each source, specify the Gwh associated.

A91.1 Please see Table BCUC IR1 A91.1 below.

Table BCUC IR1 A91.1

Residential End-Use	2008 GWh	2030 GWh	Difference GWh
Space Cooling	123	189	66
Space Heating	370	439	68
Ventilation	42	48	5
Water Heating	168	214	45
Cooking	139	170	31
Refrigerator	120	144	24
Freezer	62	72	9
Dishwasher	6	7	1
Clothes Washer	8	9	1
Clothes Dryer	88	103	15
Lighting	234	331	97
Computer	118	150	31
Television	62	162	100
TV Peripherals	68	76	8
Other Electronics	0	1	0
Pools & Hot tubs	11	13	1
Small Appliances & Other	99	122	23
Total	**1720**	**2247**	**528**

Q91.1.1 Discuss the assumptions in end use that were used to forecast end use in 2030? What data or support does FortisBC have for these assumptions?

A91.1.1 The following assumptions were made to compute the Residential End-Use Forecast:

- Building growth rates by type – based on historic building permits and subjective analysis of future growth;
- Appliance Saturations – based on residential end-use study completed in 2009 for FortisBC. Forecasted appliance saturations are based on historic data, trends, and subjective analysis; and
- Specific assumptions vary by end-use or appliance.

Q92.0 Reference: Exhibit B-1-1, Appendix D to Appendix 3, Figure 10, p.23 and Figure 11, p.24

CDPR – Winter Peak Methodology

Q92.1 Please list the sources of difference between the 427 MW total in Figure 10 and the 508 MW Total in Figure 11. For each source, specify the MW associated.

A92.1 Please see Table BCUC IR1 A92.1 below.

Table BCUC IR1 A92.1

Commercial End-Use	2008 MW	2030 MW	Difference MW
Space Cooling	0	0	0
Space Heating	165	196	31
Ventilation	31	37	6
Water Heating	19	23	4
Cooking	50	59	10
Refrigerator	14	16	2
Freezer	6	7	1
Dishwasher	2	2	0
Clothes Washer	2	3	0
Clothes Dryer	28	33	4
Lighting	58	73	14
Computer	8	9	2
Television	11	14	2
TV Peripherals	3	4	1
Other Electronics	3	4	1
Pools & Hot tubs	8	9	1
Small Appliances & Other	18	20	2
Total	**427**	**508**	**81**

Q92.1.1 Discuss the assumptions in end use that were used to forecast winter peak in 2030? What data or support does FortisBC have for these assumptions?

A92.1.1 The winter peak forecast was developed using the following assumptions:

- Peak demand is based on the forecast of energy by end-use;
- Peak demand is computed using load factors and forecasted energy;
- Load Factors are derived from the BC Hydro 2007 Conservation Potential Review data using their Peak #1 hour; and
- Load Factors for 2008 and 2030 by end-use are equal.

Q93.0 Reference: Exhibit B-1-1, Appendix D to Appendix 3, pp.24-26
CDPR – Summer Peak Methodology

$$\frac{kW_{peak}}{kWh_{annual}} \times kWh_{annual} = kW_{peak}$$

Q93.1 What was FortisBC's actual Summer Peak demand in 2008 and 2009? Why was the calculation above used to estimate the summer peak rather than estimating the end use breakdown from actual summer peak?

A93.1 The August 2008 actual system peak was 537 MW, and the July 2009 system peak was 561 MW. The CDPR end-use model estimated the 2008 base year summer peak as 543, a difference of 6 MW or 1 per cent, which was considered reasonable.

Q93.2 Please list the sources of difference in Summer Peak between the 271 MW total in Figure 12 and the 452 MW Total in Figure 13. For each source, specify the MW associated.

A93.2 Please see Table BCUC IR1 A93.2 below.

Table BCUC IR1 A93.2

Residential End-Use	2008 MW	2030 MW	Difference
Space Cooling	77	160	82
Space Heating	0	0	0
Ventilation	6	7	1
Water Heating	24	33	8
Cooking	33	69	36
Refrigerator	17	22	5
Freezer	10	12	2
Dishwasher	1	1	0
Clothes Washer	1	2	0
Clothes Dryer	16	20	4
Lighting	30	47	17
Computer	16	21	5
Television	10	27	17
TV Peripherals	11	13	2
Other Electronics	0	0	0
Pools & Hot tubs	2	3	0
Small Appliances & Other	16	17	1
Total	**271**	**452**	**182**

Q93.2.1 Discuss the assumptions in end use that were used to forecast summer peak in 2030? What data or support does FortisBC have for these assumptions?

Q93.2.1 The summer peak forecast was developed using the following assumptions:

- Peak demand is based on the forecast of energy by end-use;

- Peak demand is computed using load factors applied to forecasted energy;
- Load Factors are derived from the California load factors adjusted for CDD; and
- Load Factors for 2008 and 2030 by end-use are equal.

Q94.0 Reference: Exhibit B-1-1, Appendix D to Appendix 3, pp.26-33
CDPR – Commercial End-Use Forecast Methodology

Q94.1 Given the number of steps requiring estimations and assumptions and the margin of error in the Fortis Commercial End Use Study (±5.0%) please discuss the accuracy of the Commercial End Use Forecast. What are the largest sources of possible error? How would inaccurate estimates in these areas affect the final forecast and consequently the 2011 DSM Plan?

A94.1 The largest source of possible error in the Commercial end-use forecast is with the assumptions regarding the number of buildings and average square foot by building type. The accuracy, however, is not expected to greatly skew the results of the conservation assessment, particularly since average building size and number of buildings are calibrated to 2008 commercial class energy consumption using well-defined EUI (energy use intensity) data. Average building savings (kWh savings as percent of 2030 forecasted consumption) varies from 6 to 27 percent with the average savings per building type at 15 percent. Most of the savings from the study are from well-defined building categories such as small retail, small office, grocery, restaurant, warehouse, and other building types.

Q94.2 What methodology(ies) do other utilities use to estimate and forecast commercial end-use?

A94.2 Other utilities use similar methodologies to forecast commercial end-use consumption. Forecasts include the following: building growth rates, average square foot growth, and EUI.

Q94.3 What methodology was used to estimate the Commercial End Use Consumption, Base Year 2008 in Figure 15? Or are these direct results of the 2009 Commercial End Use Survey?

A94.3 The End-Use consumption forecast includes the following forecasts: building growth rates, average square foot growth, and EUI. The 2009 Commercial End-Use Survey characterized the building types and, to some degree, average square footage by building type. Base year EUI data was derived from BC Hydro's 2007 Conservation Potential Review.

Q94.4 Where were the "floor space growth rates in the Pacific Northwest" (p.33) used in Table 7 derived from?

A94.4 These growth rates are from the Pacific Northwest Power and Conservation Council's 5th Power Plan.

Q95.0 Reference: Exhibit B-1-1, Appendix D to Appendix 3, pp.32-35
CDPR – Commercial End-Use Forecast

Q95.1 Please list the sources of difference in Commercial End Use between the 1,033 GWh total in Figure 15 and the 1,456 GWh total in Figure 17. For each source, specify the GWh associated.

A95.1 Please see Table BCUC IR1 A95.1 below.

Table BCUC IR1 A95.1

Commercial End-Use	2008 GWh	2030 GWh	Difference GWh
Lighting	374	529	155
Plug Load	34	49	15
Computer Equipment	58	81	23
Food Service	22	30	8
Refrigeration	89	120	31
Misc	31	45	14
Elevators	3	4	1
Space Heating	145	207	61
Space Cooling	69	96	28
Water Heat	27	38	11
HVAC Fan & Pumps	181	255	75
Total	**1033**	**1456**	**423**

Q96.0 Reference: Exhibit B-1-1, Appendix D to Appendix 3, p.44
Industrial End Use Forecast - Methodology

The CDPR states:

> Consumption within each industrial process was disaggregated into end-use by applying percentages from sources such as the BC Hydro Conservation Potential Assessment and the Northwest Power and Conservation Council. The result is a top-down methodology for classifying energy consumption by end-use.

Q96.1 Why did FortisBC not commission an end use study of industrial customers?

A96.1 A top-down approach is a typical methodology for determining industrial end-use consumption data. Industrial customers are unlikely to know their energy consumption by primary process, so other data sources were used to provide consumption data as mentioned above.

Q96.2 Why is a top-down methodology appropriate for the industrial customer class but not used for the residential and commercial customer classes?

A96.2 Industrial energy consumption is generalized by the processes used. Energy consumption by process does not vary significantly by industrial customer of the same type (process). On the other hand, commercial and residential consumption patterns may vary significantly across regions based on climate, available energy sources, income, and other factors. Therefore, with the available data, a bottom-up approach in the commercial and residential sectors is more appropriate.

Q97.0 Reference: Exhibit B-1-1, Appendix D to Appendix 3, p.46
Industrial End Use Forecast - Methodology

The CDPR states:

> Industrial loads are expected to remain flat over the planning period. Therefore the 2030 end-use breakdown will be identical as the 2008 break-down in terms of share and total consumption.

Q97.1 Why are industrial loads expected to remain flat? Please discuss the growth and economic trends in FortisBC's service area.

A97.1 The FortisBC Industrial load is heavily weighted towards the forest products sector where there are only limited opportunities for business and load growth. As well, significant growth in other Industrial sectors such as mining, while possible, is not forecast.

Q98.0 Reference: Exhibit B-1-1, Appendix D to Appendix 3, p.46
Industrial End Use Forecast – Peak Demand Forecasts

The CDPR states "Winter and summer coincident peak demand for the industrial sector is estimated based on historical load factors by customer from FortisBC billing data as well as load factors for industries in California and British Columbia (BC Hydro)."

Q98.1 If FortisBC billing data was available, why were load factors from BC Hydro and California also used?

A98.1 Load factors by customer were available; however, load factors by end-use were not available for FortisBC customers. Load factors by end-use from other sources were used.

Q99.0 Reference: Exhibit B-1-1, Appendix D to Appendix 3, p.48
Total System

The CDPR states "It is assumed that lighting is not part of the summer peak demand."

Q99.1 Why was lighting excluded from the estimation of summer peak demand? Please justify this exclusion when, for example, lighting accounts for 41% of summer peak demand in the estimation for commercial customers in Figure 22, p.40.

A99.1 Lighting in this section refers to the Lighting Rate Class which refers to Street Lighting only. Street lighting is not part of summer peak demand since it is daylight at the time of summer peak (estimated to be early evening, 4 to 5 pm).

Q99.2 Is lighting included in the weather adjusted actual summer peak? If so, how would the difference between the 2008 End-Use Model and the Weather Adjusted Actual for Summer Peak change? Would it be higher or lower than 3.0%?

A99.2 Please refer to the response to BCUC IR1 Q99.1. Please also note that internal Building lighting is included in the estimation of summer peak demand.

Q100.0 Reference: Exhibit B-1-1, Appendix D to Appendix 3, p.55, 59, 62
Residential Energy Savings Potential - Potential Estimates

Q100.1 Please explain in detail, the methodology used in the CPDR to arrive at as estimate of total economic and achievable potential of 479 GWh annually.

A100.1 The End-Use forecast (developed from the 2009 end-use survey) is used to determine the baseline measure saturations as well as future growth. The End-Use forecast provides the number of units that may apply to the conservation measures analysed in the report.

Conservation measures are evaluated for cost-effectiveness using the TRC test. Several sources were referenced to obtain measure data such as the Northwest Power and Conservation Council, BC Hydro, and the Ontario Power Authority (OPA).

The number of applicable units by measure (as determined by the end-use survey and forecast) were multiplied by the savings of that measure to obtain technical potential (kWh).

Screening measure using only the cost-effectiveness test, the savings (kWh) are summed over the sector. This is Economic Potential.

Applying achievability rates to the economic potential produces savings potential that is both economic and achievable. Economic and achievable potential is 479 GWh annually by year 20 of the planning horizon.

Q100.1.1 Why are the economic and achievable potential equal?

A100.1.1 Economic potential and achievable potential are not equal. Potential that is both economic and achievable is presented in the results. The term "economic and achievable" is used to indicate the measures have passed both screens.

Q100.2 Please explain in detail, the methodology used in the CPDR to arrive at as estimate of total economic and achievable potential of 324 GWh annually from appliances. What assumptions were made to arrive at this estimate?

A100.2 The End-Use forecast (developed from the 2009 end-use survey) is used to determine the baseline measure saturations as well as future growth for appliances. The End-Use forecast provides the number of units that may apply to the conservation measures analysed in the report.

Conservation measures (like appliances) are evaluated for cost-effectiveness using the TRC test. Several sources were referenced to obtain measure data such as the Northwest Power and Conservation Council, BC Hydro, and the Ontario Energy Board.

The number of applicable units by measure (as determined by the end-use survey and forecast) were multiplied by the savings of that measure to obtain technical potential (kWh).

The appliance measures are then summed after screening using only the cost-effective measures. This is Economic Potential.

Applying achievability rates to the economic potential produces savings potential that is both economic and achievable. Economic

and achievable potential is 324 GWh annually by year 20 of the planning horizon.

Assumptions: There is one measure per application (i.e. low efficiency clothes washer). In the cases where more than one measure applies to an application, the number of potential upgrades is shared evenly across the measures.

Q100.3 Please explain in detail, the methodology used in the CPDR to arrive at as estimate of total economic and achievable potential of 156GWh annually from space conditioning. What assumptions were made to arrive at this estimate?

A100.3 The End-Use forecast (developed from the 2009 end-use survey) is used to determine the baseline measure saturations as well as future growth for space conditioning. The End-Use forecast provides the number of units that may apply to the conservation measures analysed in the report.

Conservation measures (such as high efficiency window AC units) are evaluated for cost-effectiveness using the TRC test. Several sources were referenced to obtain measure data such as the Northwest Power and Conservation Council, BC Hydro, and the Ontario Energy Board.

The number of applicable units by measure (as determined by the end-use survey and forecast) were multiplied by the savings of that measure to obtain technical potential (kWh).

The space conditioning measures are then summed after screening using only the cost-effective measures. This is economic potential.

Applying achievability rates to the economic potential produces savings potential that is both economic and achievable. Economic

and achievable potential is 156 GWh annually by year 20 of the planning horizon.

Assumptions: Only 5 per cent of single family homes have the capacity to install geothermal heat pumps. Only 15% of homes might be suitable for Electric Thermal Storage.

Q100.4 Please discuss how behaviour change theory was incorporated into the estimates. Or are all savings from behaviour change reported separately in the CDPR report at Table 66?

A100.4 Behavioural Program savings estimates are reported separately from energy efficiency measures savings in Tables 64 through 66.

Q100.5 Is it appropriate to include Fuel Switching in a CDPR given the directives in the *Clean Energy Act*?

A100.5 The scope of the CDPR, which was determined in the fall of 2009, pre-dated the CEA. The 2011 DSM Plan, which was finalized after the CEA, omitted Fuel Switching measures.

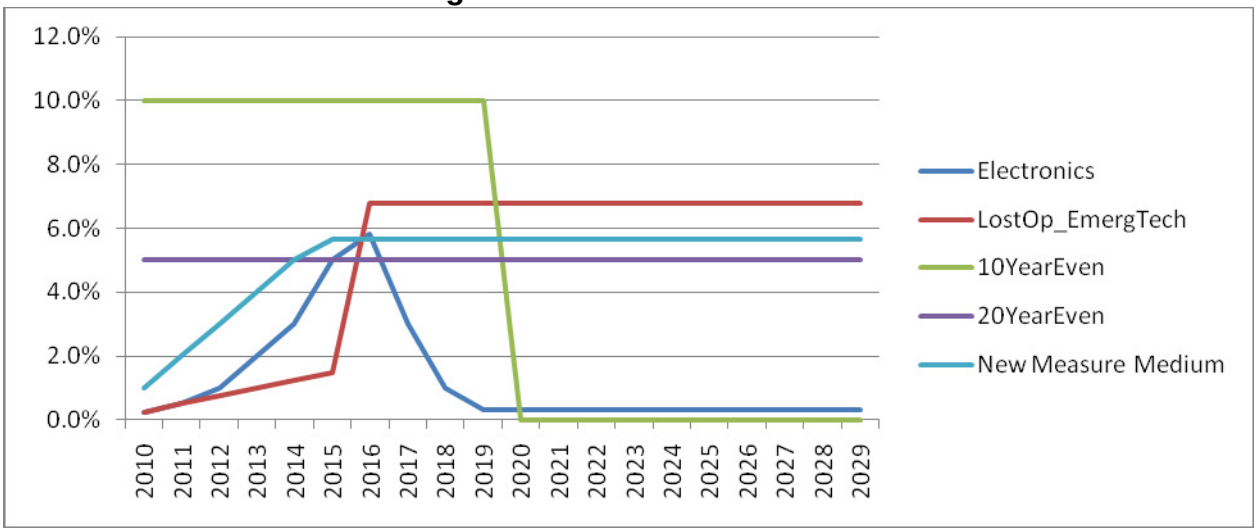
Q101.0 Reference: Exhibit B-1-1, Appendix D to Appendix 3, p.65, 81

Ramp Rates

Q101.1 Please define the Ramp Rates used in the Tables 19 and 29.

A101.1 Ramp rates define how fast the 20-year potential for a given measure can be achieved. The detailed ramp rate definitions can be found in Table D-1 of Appendix D to the CDPR Report. A few selected ramp rates are shown in Figure BCUC IR1 A101.1 below for illustration. For example, the 10-year even ramp rate means that 10% of the measure potential is achieved each year for the next 10 years until it is fully implemented. The "new measure medium" ramps up more slowly over 5 years and then is steadily implanted for the remaining 15 years. The final slate of ramp rates was chosen in consultation with FortisBC.

Figure BCUC IR1 A101.1



Q102.0 Reference: Exhibit B-1-1, Appendix D to Appendix 3, p.77
Commercial Energy Savings Potential - Potential Estimates

Q102.1 Please explain in detail, the methodology used in the CDPR to arrive at as estimate of total achievable potential of 201 GWh annually. What assumptions were made to arrive at this estimate?

A102.1 The same methodology and assumptions described in the response to BCUC IR1 Q100.1 were using to estimate of total achievable potential of 201 GWh annually.

Q103.0 Reference: Exhibit B-1-1, Appendix D to Appendix 3, p.127 and Exhibit B-1, p.72

Combined CDM Potential Summary

Table 69
Program Achievable Potential, MWh

	2011	2015	2020	2025	2030
Residential	19	94	192	281	369
Commercial[1]	10	53	107	142	177
Industrial	1	8	18	23	28
Irrigation	1	3	5	8	11
Total	**30**	**158**	**322**	**453**	**585**

(1) Includes street lighting potential

Table 7.1
2011 Demand Side Management Plan

	Sector/Component	Savings	Cost	TRC
2		MWh	($000s)	Benefit/Cost
3	Residential	16,422	3,636	1.8
4	General Service	13,940	2,118	2.7
5	Industrial	9,360	613	4.8
6	**Subtotal Programs**	**39,722**	**6,367**	**2.4**
7	Supporting Initiatives		725	
8	Planning and Evaluation		750	
9	**Total**	**39,722**	**7,842**	**2.2**
10	Income Tax Impact		(2,078)	
11	**Total (Net of Tax)**		**5,764**	

Q103.1 Are the tables above inconsistent? If so , please update the tables to correct the inconsistency(ies).

A103.1 Table 69, whose units are in fact GWh, not MWh as shown, is drawn from the CDPR which is a planning document. Please refer to Errata 2.

The CDPR utilizes a standardized set of ramp rates to model market take-up, which inherently smoothed. Table 7.1 is taken from the 2011 DSM Plan, which although fundamentally based on the CDPR, was modified based on internal expertise and local knowledge. For example, FortisBC was aware of upcoming projects at certain industrial customers that impacted the 2011 savings forecast.

Q103.2 For each of the customer classes, please summarize the top 3 categories of achievable energy savings?

A103.2 The following results are based on the 20-year potential:

Residential

- Lighting;
- Building Envelope; and
- Water Heating

Commercial

- Lighting;
- HVAC; and
- Refrigeration

Industrial

- Fans (cross-industry);
- Lighting;and
- Compressed air

Q104.0 Reference: Exhibit A2-1, FortisBC Strategic Demand Side Management Report

Objectives for the 2011 DSM Plan

FortisBC wrote "Objective 9: The 2011 DSM Plan should include...detailed business planning, with savings and demand reduction targets derived from the 5 conservation potential work and demand reduction investigation, in order to prepare business case analyses that set spending and investment levels sufficient to meet corporate and regulatory requirements."

Q104.1 Did FortisBC undertake detailed business planning to prepare business case analyses for each of its new DSM programs and enhancements to existing DSM programs?

A104.1 FortisBC did undertake detailed business planning when preparing the 2011 DSM Plan. It is presently building business implementation plans for its new and enhanced programs.

Q105.0 Reference: Exhibit A2-2, FortisBC DSM Monitoring and Evaluation Plan

M&E Studies for 2009 and 2010

Q105.1 The M&E plan states Residential Heat Pumps, Commercial New BIP and Industrial Program were scheduled to be evaluated in 2009. Please provide the results of the evaluation studies.

A105.1 The Residential Heat Pump M&E report was filed with the year-end 2009 Semi-annual DSM Report to the BCUC. The Commercial New BIP report will be completed and filed with the year-end 2010 Semi-annual DSM Report to the BCUC. The Industrial Program review has not yet been undertaken. The Company expects to fill its posting for an M&E Analyst in the 3rd quarter, which will increase FortisBC's M&E capacity.

Q105.1.1 What changes will FortisBC make to these programs to achieve more energy savings and/or improve the efficiency and cost-effectiveness of the programs? Are these changes included in the 2011 DSM Plan?

A105.1.1 FortisBC is reevaluating its program rebate offers. It is currently conducting informal interviews with industry representatives and researching other utilities' programming to determine best program design. It is also introducing a marketing campaign in September, 2010 to improve communication with contractors and customers. This includes greater face-to-face communication with contractors and improved collateral materials and messaging (brochures, info sheets, website; benefits of air source hat pumps, etc.) for contractors and

customers.

Q106.0 Reference: FortisBC 2009 Annual Review and 2010 Revenue Requirements Proceeding, Exhibit B-` 3, Fortis Response to BCUC IR 76.1 and FortisBC Response to BCUC IR 76.5

FortisBC wrote "The 2011 DSM Plan, to be filed in 2010, will provide a long term forecast of DSM savings and an estimate of the DSM costs. The DSM costs, and rate impacts thereof, will be filed as part of the Company's Capital Expenditure Plans." (IR 76.1)

FortisBC wrote "The period of 2011-2019 will be covered by the 2011 DSM Plan and the cost per GWh for that period will be included in that Application." (IR 76.5)

Q106.1 Please provide a table showing the DSM costs and rate impacts for the 2011 DSM plan programs.

A106.1 The following table shows the requested figures and ratios for fiscal year 2011. The Rate Impact Measure (RIM) is the ratio of: the PV of energy benefits [Measure Savings @ Utility x avoided long-term power purchase cost]; divided by the PV of Lost revenue [Measure savings @customer x retail customer rate] plus utility costs [Admin + Incentives].

Table BCUC IR1 A106.1

Program/Sector	RIM	Cost ($000s/GWh)
Building Envelope	1.53	253
Heat Pumps	1.54	204
Lighting	1.48	128
New Home	1.24	3,600
Appliances	1.11	360
Electronics	1.19	272
Water Heating	1.58	169
Low Income	1.17	391
Behavioural	1.23	185
Residential Total	**1.50**	**218**
Lighting	1.67	151
BIP	1.75	190
Computers	3.64	142
Muni Wtr/IRR	1.77	121
Gen Svc Total	**1.71**	**152**
EMIS	2.3	125
Ind. Efficiency	2.66	65
Industrial Total	**2.66**	**66**

Q106.2 What is the cost per GWh of DSM program savings for 2011-2019?

A106.2 Please see Table BCUC IR1 A106.1 for fiscal year 2011 only. The figures for subsequent years will be determined in the 2012 DSM Plan.

Appendix BCUC IR1 A41.1

FortisBC Facility Site Audits

Inspection Sheet

Building Name: Castlegar **Audit Date:** June 1, 2009

Address: 1037 - Columbia Avenue, Castlegar, B.C. V1N 1H5

Date Built: Unknown, purchased in 1975

Building Gross S.F.: 5875
Shop Area S.F.: 3775
Office Area S.F.: 2100
Mezzanine Area S.F.:

Building Description The builiding is a vertical steel with brick façade structure with the shop attached.

Component	Structural, Foundation and Substructures	Estimated Life	Effective Life	Remaining
	The basis foundation is slab on grade and showing no visible problems.			
	The basic structure itself consists of structural steel and is in good condition.	50	37	13
	The entrance to the shop has a concrete apron measuring 10'x48' and is in good condition.			
	There is a concrete pad to the front entrance of the building.	35	27	8

Deficiency Analysis: There is no deterioration indicated in the overall structure, foundation or substructure.

Component	Exterior Systems	Estimated Life	Effective Life	Remaining
	The exterior wall construction consists of vertical steel cladding with a front brick façade to the office and is in fair condition.	50	37	13
	There are three insulated metal overhead doors 12'x16' with vision panels	30	4	26
	There are two (2) 3'x7' glass aluminum doors to the vestibule. There are four (4) metal single doors 3'x7'. The two shop doors were replaced in 2009. The doors are in good condition.	20	1	19
	There are four operable (4) 3'10"x5'10" aluminum windows	30	32	-2
	one (1) 5'x3' and six (6) 5'x4' windows in the front office, (replaced in 2008)	30	1	29
	two (2) 5'x4'10" windows, one (1) 3'x4'10" window, one 3'x7' sidelight window and five (5) 3'x5' windows in the shop (replaced in 2006).	30	3	27

Deficiency Analysis: The exterior wall coating has deteriorated and should be repainted

The south door needs paint

Component	Roof Systems	Estimated Life	Effective Life	Remaining
	The entire roof system is steel and was replaced 12 years ago. The roof is in good condition. There is heat trace along the entire edge of the roof installed in 2008	20	12	8

Deficiency Analysis: No problems at this time.

Component	Ceiling Systems	Estimated Life	Effective Life	Remaining
	Office: The office ceilings consist of Tbar acoustic tile and drywall ceilings in the washrooms. The overall condition of the ceilings is good.	20	3	17
	Shop: The shop ceilings is steel beams with white vapour barrier backed insulation. The condition of the shop ceiling is good.			

Deficiency Analysis: No problems at this time.

Component	Floor Coverings	Estimated Life	Effective Life	Remaining
	Office: The general office is carpeted covering an area of 947 square feet, new in 2006. The hall, shower/bathroom and crew room floor consists of linoleum, new in 2006	15	3	12
	Shop: The shop floor consists of concrete covering an area of 3725 square feet plus a 3/4" plywood mezzanine covering an area of 653 square feet.	50	37	13

Deficiency Analysis: No problems at this time

Component	Interior Walls and Partitions	Estimated Life	Effective Life	Remaining
	Office: The office walls are painted vinyl partitions. The walls in the washrooms are an arborite finish to 4' high. The showers are floor to ceiling ceramic tileThere are ten (10) wooden doors 6'6"x3' with metal frame. The doors are in good condition.	20	15	5
	Shop: The shop walls a white vapour barrier backed insulation with steel joists.			
Deficiency Analysis:	The walls are in good condition. The shop walls need reinsulation and new vapour barrier			
Component	**Specialties and Accessories**			
	There is one Men's Room (renovated in 2006) consisting of two urinals, two toilets, one 12' counter with two sinks. The overall appearance is good.	40	3	37
	There is one Ladies' Room consisting of one toilet, one 4' counter with one sink. The overall appearance is good.			
	There is a change room with a shower. The overall appearance is good.			
	There is wall mounted signage on the building in good condition.			
	There are recycling containers used for waste management.			
	There is one kitchen with a 12' counter and double sinks. There are cabinets and dishwasher below the counter.			
	Vertical blinds are used for all the window coverings.	10	15	-5
Deficiency Analysis:	No problems at this time.			
Component	**HVAC**			
	There is one Resnor unit heater.	30	2	28
	There is one (1) Bryant (FB4NAK-080) heat pump	30	27	3
	There is one domestic hot water tank.	12	3	9
	There is one (1) exterior condenser.	20	2	18
		Estimated Life	**Effective Life**	**Remaining**
	There is one (1) Delhi fan.	30	27	3
	There is heating control in the slab and electrical ice control along the roof top. The controls for these systems are Environmental Tech AP3.	30	27	3
Deficiency Analysis:	No problems at this time.			
Component	**Plumbing**			
	The water and sanitary sewers are on the town system. No problems.	40	27	13
Component	**Electrical**			
	The service used is 120/208V and is in good condition.	50	27	23
	Office: There are thirty-five (35) 2'x4' three-tube lights using T-8's, eight (8) 1'x4' two-tube lights there are 10 florescent pot lights			
	Shop: There are ten high pressure sodium bay lights and one incandescent light over the mechanical area.			
Deficiency Analysis:	No problems at this time			
Component	**Safety Standards**			
	There is no fire alarm system and no sprinkler system.			
	The emergency exits are not marked. There is one exit directional sign in the corridor.			
	There is a DSC 4020 security system in place in good working condition. This building is card access controlled	20	4	16
Deficiency Analysis:	No problems at this time.			

Component	Site Work (Yard)	Estimated Life	Effective Life	Remaining
	There is a 6' high chain link fence with the back portion covering an area of 208 lineal feet with three string barbed fence. There is one 20-foot gate and two 8' gates all in good condition.	40	32	8
	The parking lot 7150 square feet consisting of asphalt.	30	37	-7
	The yard is asphalt covering an area of 11,920 square feet and also incorporates a 900 square foot concrete pad.	30	7	23
	There is also a small parking lot to the west side covering an area of 3,652 square feet.	30	36	-6

Deficiency Analysis: The parking lot and west side lot are in poor condition and requires repair and resurfacing.

Component	Landscaping			
	There is 3500 square feet on east side of the property. The landscaping consists of different kinds of plants such as cedars and grass area. There is a 4' concrete retaining wall which is 70' long. There are plant beds between the south and west side of the buildings. There is a Richo irrigation system which is in good working condition.	20	17	3

Deficiency Analysis: Improvements could be made to reduce water use and improve coverage.

Inspection Sheet

Building Name: Creston **Audit Date:** 1-Jun-09

Address: 300 - Erickson Road, Box 1189, Creston, B.C. V0B 1G0

Date Built: 1978

Building Gross S.F.: 6642
Shop Area S.F.: 2411
Office Area S.F.: 3316
Mezzanine Area S.F.: 915

Building Description: The building is a concrete block structure with two shop bays and beautiful exterior landscaping. It has a two tiered storage yard.

Component	Structural, Foundation and Substructures	Estimated Life	Effective Age	Remaining Life
	The basic foundation is concrete slab on grade and is in good condition.	50	31	19
	The shop areas are of block construction, as are the exterior walls to the office.			
	The ceiling to the office space form part of the structure and are constructed of wood creating a vaulted ceiling appearance.	50	31	19
	The shop was extended approximately twelve (12) years ago by 10 feet.	50	31	19
	There is on concrete apron 4'x50' and is in need of repair.	35	31	4
	There is a concrete pathway to the front entrance and is in good condition.	25	4	21

Deficiency Analysis: Structural repairs have been made to the south entry, and further repairs are required for the butresses

The exposed beams are beginning to rot at the ends, recommend treatment soon

Component	Exterior Systems	Estimated Life	Effective Age	Remaining Life
	The exterior wall construction consists of decorative block and is in good condition.	50	31	19
	The separation between the joists and the exterior wall are glass infills.	30	31	-1
	There are two (2) metal overhead doors measuring 13'x16' with seals all in good condition.	30	31	-1
	East door replaced 2007	30	2	28
	There is one metal shop door 3'x7' in good condition and one 4'x7' brushed aluminum	30	8	22
	exterior front door.	30	31	-1
	Windows There are aluminium sealed windows to the offices and kitchen	30	31	-1

Deficiency Analysis: The front door aluminum skin is delaminating and should be repaired or replaced

Component	Roof Systems			
	Shop: The shop roof is built-up covering an area of 2411 square feet and is in good conditio	25	27	-2
	Office: The office roof is seamed metal, and the skylights were removed in 2009	30	27	3

Deficiency Analysis: No problems at this time.

Component	Ceiling Systems			
	Office: The ceilings throughout the office areas are a vaulted painted wood. Separation between the ceiling joists and the washroom walls are glass inserts.	50	24	26
	Shop: The ceilings in the shop are exposed wood joists.	30	24	6

Deficiency Analysis: No problems at this time.

Component	Floor Coverings	Estimated Life	Effective Age	Remaining Life
	Office: On the west side offices there is a combination of linoleum and quarry tile. Private offices on the west and south are carpeted. The vestibule in the southwest corner is quarry tile. The kitchen, washrooms and locker roomon the east side are all quarry tile.	30 30	31 21	-1 9
	Shop: The shop and its associated office space are all concrete. The mezzanine is wood construction with half the area covered in carpet.	50	31	19

Deficiency Analysis: The linoleum flooring in the west crew office is in good condition. The mezzanine carpeted area is presently used for storage. Recommend not to replace at this time

The office carpet is in poor condition and should be replaced soon

Component	Interior Walls and Partitions			
	Office/ Shop: The walls of the office consist of decorative block around the shop. Private offices are constructed of painted drywall. There are nine (9) single wood doors with metal frames, there is one (1) single brushed aluminum door to the vestibule and there is one 4' pocket door from corridor to kitchen.	25	20	5

Deficiency Analysis: No problems at this time.

Component	Specialties and Accessories			
	There is one Men's Room consisting of two toilets and two urinals, a central stand with two sinks, quarry tile shower area and a separate locker room area. The Men's Room is in good condition.	40	31	9
	There is one Ladies' Room consisting of two recessed sinks and one toilet. The overall appearance is good.			
	There is wall mounted FortisBC exterior signage in good condition.			
	There is a 12' kitchen counter with double sink and cabinets above and below. The kitchen is in good condition.			
	There are vertical blinds used for window coverings and are in good condition.	10	9	1

Deficiency Analysis: No problems at this time.

Component	HVAC			
	There are three (3) Lennox heat pump systems providing underfloor HVAC. All three were replaced in the last two years	30	2	28
	There are two Rheem 7000 Watts commercial domestic water tanks.	15	17	-2
	There are two shop unit heaters.	30	31	-1

Deficiency Analysis: No problems at this time.

Component	Plumbing			
	Both water and sanitary sewers are on the town system. No problems.	40	31	9

Component	Electrical			
	The type of service used is 120/208V (ITE).	50	31	19
	Office: The west office uses 4 direct/reflective linear suspended fluorescents, and			

these are continued in the south hall
In the south offices lunchroom and vestibule there are 4' single fluorescents and 2-tube wrap fixtures

Shop: The mezzanine storage and office use 24 FW40's 34 watts. Under the mezzanine there are thirteen FW32 four foot double fixtures. The shop itself uses five high pressure sodium lights.

Electrical panels are well labeled.

		Estimated Life	Effective Age	Remaining Life

Deficiency Analysis: No problems at this time. Energy efficiency would be improved by changing the existing single and wrap fixtures to T8's with electronic ballast.

Component	Safety Standards			
	There is Edwards 6500 fire alarm system in the building. The fire extinguishers are all up to date and conform to the Fire Safety Codes.	30	31	-1
	The security system used is a DSC 4020 and is in good working order.	20	4	16

Deficiency Analysis: No problems at this time. Recommend updating and improving fire protection system

Component	Site Work (Yard)			
	There is an upper and lower yard. The upper yard including the slope is approximately 16,000 square feet consisting of dirt and the lower yard is approximately 11,520 square feet consisting of asphalt. East of the building there is a section of yard approximately 800 square feet. There is a metal stair in good condition between the two levels	30	27	3
	The yard has a 6' high chain link fence (portion 3 strand barbed wire) made up of 8'X85 sections (680 feet of linear fence). There is a 20' gate operated by the access control system	40	31	9
	There is an asphalt parking lot 5,810 square feet in front of the building for public parking.	30	27	3

Deficiency Analysis: Recommend paving the upper yard, installation of oil separator and drainage system
Recommend installing a roof over the transformer storage pad

Component	Landscaping	Estimated Life	Effective Age	Remaining Life
	There is extensive landscaping along the west and south portion of the building. There is also a lawn area along the roadways. All landscaping is mature and in fair condition.	20	15	5
	There is Rainbird RC7C irrigation system, needs replacement	20	25	-5

Deficiency Analysis: Irrigation controls unable to accommodate Town water restriction instructions

Inspection Sheet

Building Name: Grand Forks **Audit Date:** 1-Jun-09

Address: 6351 Highway 3B

Date Built: Assumption that the building is approximately 37 years old. No other data at this time.

Building Gross S.F.: 5834 SF
Shop Area S.F.: 2770 SF
Office Area S.F.: 3064 SF

Building Description The building is a painted block structure with the shop attached.

Component		Estimated Life	Effective Life	Remaining Life
	Structural, Foundation and Substructures			
	The construction is slab on grade with concrete pillars and wood roof joists. The canopy has steel post construction	50	37	13
	The entrance to the shop has a concrete apron measuring 16'x45' and is in good condition.	42	22	20

Deficiency Analysis: There is no deterioration in the overall structure, foundation and substructure.

Component		Estimated Life	Effective Life	Remaining Life
	Exterior Systems			
	The exterior wall construction consists of painted block. The concrete block should last the life span of the building.	50	37	13
	There are two (2) insulated metal overhead doors measuring 12'x14'. The doors are in good condition.	30	4	26
	There is one (1) double glass in aluminum and one (1) single steel door (new 2009).	30	1	29
	There are three (3) aluminum factory sealed window units, one 3'x2' aluminum factory sealed window unit, one 2'x2' aluminum factory sealed window unit and two (2) 15'x7' aluminum factory sealed window units. There is no visible leaks or cracks. The overall condition of the window units is good.	40	37	3
	There is a canopy (carport) measuring 80'x50' square feet.	40	37	3

Deficiency Analysis: No problems at this time

Component		Estimated Life	Effective Life	Remaining Life
	Roof Systems			
	Office: The office roof covers an area of 2040 square feet and is torch-on with moulded styrofoam insulation (2003) All roof drains are heat traced, and all rain gutters and drain pipes in good condition.	25	6	19
	Shop: The shop roof covers an area of 2560 square feet and is torch-on with moulded styrofoam insulation (2003)	25	6	19
	The canopy portion of the building is built-up and covers an area of 3200 square feet.	25	20	5

Deficiency Analysis: No problems at this time

Component		Estimated Life	Effective Life	Remaining Life
	Ceiling Systems			
	Office: The ceiling in the office consists of T-bar acoustic tile. The lunchroom and locker room have painted drywall ceiling.	20	6	14
	Shop: The shop and training area ceilings consist of tongue and goove cedar and are in good condition.	50	37	13

Deficiency Analysis: No problems at this time

Component		Estimated Life	Effective Life	Remaining Life
	Floor Coverings			
	Office: The office and meeting room floors are carpeted covering a total area of 2140 square feet and are in good condition.The crew room, washroom and lunchroom floors are vinyl tile covering a total area of 924 square feet and are in good condition.	20	6	14
	Shop: The shop floor consists of sealed concrete and is in good condition.	50	37	13

Deficiency Analysis: No problems at this time.

Component		Estimated Life	Effective Life	Remaining Life
	Interior Walls and Partitions			
	Office: The office area, meeting room, lunch room are painted drywall. There are five (5) wooden interior doors all in good condition, one set aluminum/glass front foyer doors and are in good condition.	25	19	6

Shop: The shop walls are concrete block and are in good condition.

Deficiency Analysis: There are no problems at this time.

Component	Specialties and Accessories	Estimated Life	Effective Life	Remaining Life
	There is one washroom (8'x6') off the Design room consisting of one toilet, a 4' counter with one sink, vinyl tile floor covering and painted drywall wall finish and is in fair condition.	40	37	3
	There is one Ladies' Room (8'x6') consisting of one toilet, a 4' counter with one sink, vinyl tile floor covering and painted drywall wall finish and is in fair condition.			
	There is one washroom (14'x16') in the Locker Room consisting of one toilet, one urinal (replaced 2004), a 6' counter with two sinks, one shower stall, vinyl tile floor covering and painted drywall wall finish.			
	There is a wall-mounted FortisBC sign on the front of the building.			
	There are metal waste handling containers and recycle bins.			
	There is one lunchroom (18'x16') with an 8' counter and one sink with cabinets below and a 5' counter with cabinets below in good condition.			
	Window coverings consist of vertical blinds and are in fair condition.	10	11	-1

Deficiency Analysis: The vinyl shower stall base is permanently stained and requires replacement.

Component	HVAC			
	There is one roof top heat pump, new in 2003.	25	6	19
	There are two (2) Inter City gas unit heaters in shop which are in good working order.	20	6	14
	There is gas detection and exhaust control in the shop area	20	3	17

Deficiency Analysis: No problems at this time.

Component	Plumbing			
	Water is from a well located in the yard and protected by a piece of galvanized cluvert standing vertically The pressure tank and filter is located under the stair to the mezzanine in the shop area Sewer is septic tank and field, tank located on east side of office, field in the yard beside	40	37	3

Deficiency Analysis: Driveway drainage needs to be sloped away from well

Component	Electrical	Estimated Life	Effective Life	Remaining Life
	There is a 240V single phase electrical feed	50	30	20
	The office uses 17 two-tube 2'x4' fluorescent lights with T-8's.			
	The meeting room, parts room and shop use a total of 23 two-tube 8' fluorescent lights with F40's.			
	The locker room, washrooms and lunchroom use a total of 6 four-lamp wrap 4' long with F40's.			
	There are six exterior incandescent lights, one HP sodium light (under the canopy) and 3 halogen lights (connected to the security system).			
	Labelling on the electrical panels is poor.			

Deficiency Analysis: Energy efficiency would be improved by changing the existing lights to T8's with electronic ballast.

Component	Safety Standards			
	There is no fire alarm or sprinkler system in place.	20	15	5
	The security system used is a keypad DSC 4020 with access control with 6 motion detectors.			
	Fire extinguishers are used in the building.			

Deficiency Analysis: The emergency exit doors are unmarked and require proper signage.

There is no fire safety plan in place

Component	Site Work (Yard)			
	The yard is gravel covering an area of 60,480 square feet and is in good condition.			
	The west side of the yard is asphalt and covers an area of 6,500 square feet and is in good condition.	30	19	11

	Estimated Life	Effective Life	Remaining Life
The yard has an 8' high barbed chainlink fence covering an area of 995 square feet and is in good condition. There is one northeast gate 18' long, one south gate 3', one west 12' gate and one 20' main gate with a gate operator. All gates are chainlink and barbed.	40	24	16
The parking lot is unmarked asphalt found on the northside covering an area of 8680 square feet and is in good condition.	30	19	11

Deficiency Analysis: There are no problems at this time.

Component **Landscaping**

There is no landscaping or irrigation system.

Pest Control

Continuous problems with spiders on the exterior of the building. There is a contractor in place for pest control and webs are cleaned off the building annually

Inspection Sheet

Building Name: Greenwood **Audit Date:** 1-Jun-09

Address: Everett Ave

Date Built: Property acquired 1957, building construction est 1975

Building Gross S.F.: 1492
Shop Area S.F.: 840
Office Area S.F.: 542
Mezzanine Area S.F.: 110

Building Description: The building is a metal cladded structure with the shop attached.

		Estimated Life	Effective Life	Remaining Life
Component	**Structural, Foundation and Substructures**			
	The basic construction is slab on grade.	50	34	16
	There is a concrete front ramp measuring 16'x13' and a concrete rear apron measuring 42'x16'	40	34	6
Deficiency Analysis:	The front ramp by the overhead door is cracked and requires patching or replacement.			
Component	**Exterior Systems**			
	The exterior wall construction consists of vertical metal cladding covering an area of 1840 square feet. The metal siding should last the life span of the building.	50	34	16
	There is one (1) steel overhead door measuring 12'x14' with 2" insulation and is in good condition.	40	34	6
	There is one (1) steel double receiving door measuring 6'x7' and is in good condition.	40	34	6
	There are two (2) painted steel exterior doors.	40	34	6
	There is one (1) factory double paned vinyl slider window measuring 2'x2'. There are three (3) factory double paned vinyl slider windows measuring 3'6"x5'. The windows are in good condition.	20	10	10
Deficiency Analysis:	The overhead door at the shop entrance requires painting.			
Component	**Roof Systems**	**Estimated Life**	**Effective Life**	**Remaining Life**
	The roof covers an area of 1690 square foot and is constructed of aluminum. The overall appearance of the roof is good.	40	34	6
Deficiency Analysis:	No problems at this time.			
Component	**Ceiling Systems**			
	Office: The ceiling in the office and crew room is textured drywall. The washrooms and receiving area are painted drywall. The ceilings are in good condition.	20	17	3
	Shop: The shop ceiling unfinished drywall and is in good condition.			
Deficiency Analysis:	No problems at this time.			
Component	**Floor Coverings**			
	Office: Floor covering in the office, crew room and washroom is vinyl tile covering an area of 577 square feet and is in good condition.	20	19	1
	Shop: The shop floor consists of concrete covering an area of 840 square feet and is in good condition. The mezzanine floor is plywood covering an area of 110 square feet and is in good condition.			
Deficiency Analysis:	No problems at this time. Clean Washroom floors of rust stains			
Component	**Interior Walls and Partitions**			
	Office: The office, crew room, washroom and receiving area all consist of painted drywall walls and are in good condition. There are two (2) wooden doors and two (2) steel doors on the interior and are in good condition.	25	21	4
	Shop: The shop walls consist of plywood and drywall.			
Deficiency Analysis:	No problems at this time.			

Estimated Life

Component	Specialties and Accessories	Estimated Life	Effective Life	Remaining Life
	There is one washroom measuring 7'x6' with one toilet, one shower stall (36"x36"), one (1) four foot counter with sink. The washroom is in good condition.	40	34	6
	There are no window coverings on any of the windows.			
	There is a kitchen with a 6' counter and one sink with cabinets below the counter.			
Deficiency Analysis:	No problems at this time.			
Component	**HVAC**			
	Office: The office and crew room use three (3) electric baseboard heaters to heat their areas. They are in good working order.	30	24	6
	Shop: Two Chromolox electric unit heaters, in new condition.	20	1	19
	NOTE: There is no gas detection in the shop area.			
Deficiency Analysis:	No problems at this time.			
Component	**Plumbing**			
	The water and sanitary sewers are on the town system. No problems.	40	34	6
Component	**Electrical**			
	Electrical feed: 120/240V single phase	50	34	16
	Office: The office and crew room use 4 two-tube 4' wrap fixtures. The washroom uses one keyless lampholder. They are in good condition.			
	Shop: The shop uses 6 two-tube 8' long fluorescent lights.			
Deficiency Analysis:	Energy efficiency would be improved by changing the existing lights to T8's with electronic ballast.			
Component	**Safety Standards**	**Estimated Life**	**Effective Life**	**Remaining Life**
	There is no fire alarm or sprinkler system in place.			
	The security system is DSC with keypad access using four (4) motion sensors and is in good operating condition.	20	8	12
	There are fire extinguishers used.			
Deficiency Analysis:	The emergency exits are unidentified and should be clearly marked.			
Component	**Site Work (Yard)**			
	The yard is covered with 18,020 square feet of gravel.			
	The parking lot covered with 3,200 square feet of gravel. The overall appearance is good.			
	The yard has a 6'6" high barbed chainlink fence covering an area of 604 lineal feet. There is one 16' main gate, two (2) 14' barbed gates west and south substations and one (1) 3' barbed gate.	40	24	16
Deficiency Analysis:	Fencing in front area in rough shape.			
Component	**Landscaping**			
	There is no landscaping or irrigation system in place.			
	Pest Control			
	There is a pest control contract in place.			

Inspection Sheet

Building Name: Kalso **Audit Date:** 1-Jun-09

Address: Highway 31 and J Avenue

Date Built: 1978

Building Gross S.F.: 2942
Shop Area S.F.: 792
Office Area S.F.: 750
Mezzanine Area S.F.: 750
Warehouse Area S.F 650

Building Description The building is a steel cladded insulated structure with the shop attached.

Component	Structural, Foundation and Substructures	Estimated Life	Effective Life	Remaining Life
	The basic structure itself consists of structural steel and is in good condition.	50	31	19
	The entrance to the shop has an apron measuring 4'x16' and is in good condition.	35	31	4

Deficiency Analysis: There is no deterioration evident throughout the foundation or structure.

Component	Exterior Systems			
	The exterior wall construction consists of metal cladding covering an area of 3200 square feet. The metal cladding should last the life span of the building.	50	31	19
	There are two (2) steel overhead doors with 2" insulation, both in good condition.	36	31	5
	There are two (2) steel exterior doors both in good condition.	36	31	5
	There are five (5) 3'x6' factory sealed aluminum window units and three (3) 3'x3' factory sealed aluminum window units. The overall appearance is good with no visible leaks or cracks.	36	31	5

Deficiency Analysis: There is some damage to the siding on the north side near the door.

Component	Roof Systems	Estimated Life	Effective Life	Remaining Life
	The roof is constructed of metal cladding covering an area of 2,470 square feet and is in good condition.	36	31	5

Deficiency Analysis: No problems at this time. Gutter on the east side of the roof only will require annual cleaning.

Component	Ceiling Systems			
	Office: The office ceilings are textured drywall and are in good condition.	20	12	8
	Shop: The shop, mezzanine and warehouse ceilings are foil backed insulation and are in good condition.			

Deficiency Analysis: No problems at this time.

Component	Floor Coverings			
	Office: The north office and washroom consists of linoleum flooring covering an area of 218 square feet. The south offices consist of carpeting and cover an area of 530 square feet. The overall appearance is good.	20	13	7
	Shop: The shop and warehouse floors consist of concrete covering an area of 792 square feet. The mezzanine floor is plywood covering an area of 750 square feet.	50	31	19

Deficiency Analysis: No problems at this time.

Component	Interior Walls and Partitions			
	The walls throughout are painted drywall. The partitions are steel stud and drywall. All are in good condition.	20	13	7
	There are four (4) hollow wood doors in good condition.	20	13	7

Deficiency Analysis: No problems at this time.

Component	Specialties and Accessories	Estimated Life	Effective Life	Remaining Life
	There is one washroom 8'6"x4'6" with one toilet and a 5' counter with one sink.	40	31	9
	There is exterior wall mounted signage on the building.			

	There are no window coverings on any of the windows.			
Deficiency Analysis:	No problems at this time.			
Component	**HVAC**			
	There are four (4) Chromolox electric heaters in the shop and baseboard heaters in the office are in good condition.	30	5	25
	There is one electric domestic water tank and is in good condition.	12	13	-1
Deficiency Analysis:	No problems at this time.			
Component	**Plumbing**			
	The water and sanitary sewers are on the town system. No problems.	40	31	9
Component	**Electrical**			
	There is an electrical feed both inside and outside of the building.	50	31	19
	The yard has four (4) high pressure sodium pole mounted light.			
	Office: The office uses 17 two-tube 4' wrap lights with F40CW. The office has two remote Emergilite for emergency lighting.			
	Shop: The shop uses 9 two-tube 8' strip lights with F40CW.			
Deficiency Analysis:	None at this time			
Component	**Safety Standards**	**Estimated Life**	**Effective Life**	**Remaining Life**
	There is no fire alarm or sprinkler system in place.			
	Fire extinguishers are used in the building.			
Deficiency Analysis:	Emergency exits are unmarked and require proper identification for safety reasons.			
Component	**Site Work (Yard)**			
	The south yard consists of gravel covering an area of 14,700 square feet.			
	The parking lot on the east side is asphalt covering an area of 600 square feet. There is no designated parking as the lot is unmarked. The parking lot on the north side is asphalt covering an area of 4200 square feet. There is no designated parking as the lot is unmarked.	30	22	8
	There is an 8' high barbed chainlink fence covering an area of 444 lineal feet. There is one 23' long barbed gate and one 24' long barbed gate. The fence is in good condition.	40	31	9
	There is a storage shed (2'x6') with metal roof and painted plywood exterior.			
Deficiency Analysis:	There is some slight damage to west fence behind the storage shed.			
Component	**Landscaping**			
	The landscaping consists of grass and trees.	20	15	5
	There is a three zone irrigation system			
Deficiency Analysis:	No problems at this time.			

Inspection Sheet

Building Name: **Benvoulin** **Audit Date:** **1-Aug-10**

Address: 2850 Benvouilin Rd, Kelowna, BC V1W 2E3

Date Built: 2002

Building Gross S.F.: 25,357sqft 2 Floors + shops
Parking Area S.F.:
Office space including common areas 15,810sqft

Building Description: Two Story Commercial Building with elevator and shops. P4 Zoning (Utilities)

		Estimated Life	Effective Life	Remaining Life
Component	Structural, Foundation and Substructures			
	The basic foundation/structure is concrete pile and beam and is in good condition.	55	16	39
	There is a sidewalk around the entire building covering an area of 2884 square feet and is in good condition, with ramps into all doorways.	35	16	19
Deficiency Analysis:	There is no deterioration indicated in the overall structure and substructure.			
Component	Exterior Systems			
	Concrete slab on grade	55	8	47
	8"concrete block walls with metal cladding,6" metal studs. Extensive glazing for office areas	30	8	22
Deficiency Analysis:	No problems at this time.			
Component	**Roof Systems**			
	Build up torched on roof.	30	8	22
Deficiency Analysis:	No problems at this time.			

		Estimated Life	Effective Life	Remaining Life
Component	**Ceiling Systems**			
	The ceiling is T-Bar with accoustic tiles.	30	8	22
Deficiency Analysis:	No problems at this time.			
Component	**Floor Coverings**			
	All washroom floors are a ceramic tile finish.	30	8	22
	Office 1st and 2nd floor are carpet tile	20	8	12
Deficiency Analysis:	Carpet shows wear and staining.			
Component	**Interior Walls and Partitions**			
	Painted drywall consist throughout the entire building. On the shower area on the second floor and each washroom there are ceramic tile walls.	20	8	12
	Double glazed panic doors interior & exterior fire rated main entrance	30	8	22
Deficiency Analysis:	No problems at this time.			
Component	**Specialties**			
	Changerooms/washrooms Extensive mens and ladies locker/change rooms and showers on the first floor. There is a handicapped accessable washroom on the first floor. There are men's and ladies' washrooms on the second floor. There is a washroom in Fleet Services There is a crew sink located in Fleet Services	30	8	22

Deficiency Analysis: No problems at this time.

		Estimated Life	Effective Life	Remaining Life
Component	**HVAC**			
	There are 13 Carrier roof top unit heat pumps, and one Trane heat pump serving the office areas.	30	8	22
	The shops are heated with two gas fired unit heaters each.	30	8	22
	The office lobby, entry, washroom and stairs have small electric fan forced heaters	20	8	12
	There are five exhaust fans: change room, print room, communications room, and two janitor rooms	20	8	12
	There are two Mitsubishi fan coil air conditioners for the communications rooms	20	8	12
	There is a building pressure control fan in the ceiling space of the first floor of the office on the south side.	20	8	12
	There is a Delta building automation system controlling HVAC and lighting, and it will control load shed if the generator approaches current limits	20	8	12
Deficiency Analysis:	The Carrier heat pumps are unable to operate as heat pumps below +5C			
Component	**Plumbing**			
	Water and sanitary sewers are on the town system. The water supply is at 150 psi, regulated to 70psi. 55psi	30	8	22
	Outside underground irrigation	30	8	22
	There are two 80 gallon natural gas fired Sandblaster Force hot water heaters	20	8	12
	There are two oil separators on the drainage systems: one serving the Fleet Services, and it drains into the sanitary sewer. The second is at the north west corner of the property in front of the garage, and it drains into a rock pit	55	8	47
Deficiency Analysis:	No problems at this time.			
Component	**Electrical**			
	3 phase 1200amp main electrical service with 5-200amp subpanels.	30	8	22

		Estimated Life	Effective Life	Remaining Life
	Dropped down multi vapour & high pressure sodium fixtures in the shop area.	30	8	22
	There is a 10Hp compressor with a 120 gallon tank	20	8	12
	Ceiling hung and recessed flourescent lighting in offices	20	8	12
	There is a natural gas fired 135kW Generac generator on the south side of the building The transfer switch is located in the second floor mechanical/electrical room	30	4	26
	Exterior pole-mount and building mount yard lights are controlled by the building automation and security systems	20	8	12
Deficiency Analysis:	No problems at this time.			
Component	**Safety/Security**			
	There are fire safety plans mounted by all exits.			
	There are no sprinkler systems in place			
	There is an Edwards Fire alarm panel There are smoke/heat detectors located in all enclosed electrical rooms, compressor room, elevator mechanical room, second floor mechanical room	20	8	12
	There is a DSC access control security system	20	8	12
	The property is fenced with 8' high chain link fence with barbed wire top rows. There is a 20' motorized gate controlled through the security system.	30	4	26
Deficiency Analysis:	No problems at this time.			

Component	Parking	Estimated Life	Effective Life	Remaining Life
	There are 63 parking stalls at the front of the building, along with an additional 30 stalls along the northern elevation. Within the compound there are 18 evening vehicle parking stalls along the northern boundary of the property.	30	8	22

Deficiency Analysis: No problems at this time.

Component	Site Improvements	Estimated Life	Effective Life	Remaining Life
	Include paved open parking leading to a 1,700 sqft 2 bay shop located in the northwest corner adjacent to a 4,850sqft 8 bay vehicle storage garage with two of the bays closed in. The metal framed garages include lights, and the closed in bays have garage door operators and electric unit heaters.	50	16	34

Deficiency Analysis: Shed roof in need of repairs.

Inspection Sheet

Building Name: Keremeos **Audit Date:** November 19, 2002

Address:

Date Built: Circa 1978. No other information available at this time. Assumed construction at same time as other buildings.

Building Gross S.F.: 3190
Shop Area S.F.: 910
Office Area S.F.: 196
Warehouse Area S.F.: 2084

Building Description The office/warehouse and storage area are one building constructed of block. The shop is separate and also constructed of block.

		Estimated Life	Effective Life	Remaining Life
Component	**Structural, Foundation and Substructures**			
	Slab on grade with steel post construction	50	31	19
	There is a concrete apron at the shop entrance measuring 2'x26' and a concrete apron at the warehouse entrance measuring 2'x27'.	35	31	4
Deficiency Analysis:	The apron at the shop entrance is cracked and requires either patching or replacement.			
	There is no visible deterioration to the basic structure or foundation of the building.			
Component	**Exterior Systems**			
	The shop is a metal clad wall structure and is in good condition. The metal siding should last the life span of the building.	50	31	19
	The warehouse consists of exposed block and is in good condition.	50	31	19
	Shop: The shop has one wooden overhead door with 1" styro insulation measuring 10'x14', one wooden overhead door with 1" styro insulation measuring 12'x14'. There is one single steel exterior door in good condition.	30	31	-1
	Warehouse: The warehouse has two (2) wooden overhead doors measuring 10'x12' . There are two single wooden exterior doors in good condition.	30	31	-1
		Estimated Life	**Effective Life**	**Remaining Life**
	The shop has six 4'x8' single pane window units with wood frames.	30	31	-1
	There is one 2'x3' double pane window unit with wood frame, one 16"x16" double pane window unit with wood frame , three 18"x60" double pane window units with wood frame and one 18"x24" double pane window unit with wood frame.	30	31	-1
Deficiency Analysis:	The exterior wood frames require painting. All exterior wood needs attention.			
	The overhead doors both in the warehouse and shop should be considered for replacement in the future. They are in fair condition.			
Component	**Roof Systems**			
	Shop: The shop is a built-up roof covering an area of 1036 square feet. The overall appearance is good.	25	31	-6
	Warehouse: The warehouse has a built-up roof covering an area of 1860 square feet.			
	NOTE: The roof over the office has been patched, apparently is does not leak now, but should be monitored.			
Deficiency Analysis:	No problems at this time.			
Component	**Ceiling Systems**			
	Shop: The shop ceiling consists of OSB strand board and is in good condition.			
	Warehouse: The warehouse ceiling consists of OSB strand board and is in good condition.			
	Office: The office, washroom and storage area all consist of fixed acoustic ceiling and are in good	20	4	16

condition.

Deficiency Analysis: No problems at this time.

		Estimated Life	Effective Life	Remaining Life
Component	**Floor Coverings**			
	The shop floor consists of concrete covering an area of 910 square feet and is in good condition.	35	31	4
	The warehouse floor consists of concrete and is in good condition.			
	The office and washroom consist of linoleum flooring in good condition	20	4	16

Deficiency Analysis: The overall condition of the office, washroom and storage area is good.

Component	**Interior Walls and Partitions**			
	The walls and partitions in the warehouse and storage areas is wood frame with painted plywood.	35	31	4
	There are two (2) wooden hollow doors in the office and washroom and one double wooden door in the warehouse. The overall condition of the doors is good.	35	31	4

Deficiency Analysis: The overall appearance of the walls is good.

Component	**Specialties and Accessories**			
	There is one washroom measuring 5'x13' with one toilet and one sink and is in good condition.	25	4	21
	There are metal containers to handle any waste.			

Deficiency Analysis: No problems at this time.

Component	**HVAC**			
	Shop: The shop has seven (7) Chromolox electric unit heaters which serves the shop, the warehouse and the storage area and are in good condition.	25	31	-6
	Office: The office uses the Westinghouse cabinet radiator as heat and is in good condition. The washroom has an electric baseboard heater.	35	31	4

Deficiency Analysis: No problems at this time.
There is no gas detector in the shop.

Component	**Plumbing**			
	The water and sanitary sewers are on the town system. No problems.	40	31	9

		Estimated Life	Effective Life	Remaining Life
Component	**Electrical**			
	There is an electrical feed both inside and outside of the building.	50	31	19
	Shop: The shop uses six 2x8ft fluorescent lights with T8's.			
	Warehouse/Office: The warehouse/office uses four 2x8ft fluorescent lights with T8's. The office area also uses two 2x4ft fluorescent lights with T8's.			
	The electrical panels are well labelled and in good condition.			

Deficiency Analysis: No problems at this time.

Component	**Safety Standards**			
	There is no fire alarm or sprinkler system in place.			
	The security system in place is a keypad DSC with three motion sensors.	20	10	10
	Fire extinguishers are used in the building.			

Deficiency Analysis: Fire extinguishers should have annual inspections to ensure they meet with Fire Safety Codes and are in

good operating condition.

No problems at this time.

Component **Site Work (Yard)**

The yard has a 7' three row barbed wire chainlink fence measuring 13,775 lineal feet. There is a 26' barbed chainlink gate in the east yard and 20' barbed chainlink gate in the west yard.	40	31	9

The yard consists of gravel covering an area of 13,340 square feet.

There is no designated parking lot.

Deficiency Analysis: No problems at this time.

Component **Landscaping**

There is no landscaping or irrigation system in place.

Inspection Sheet

Building Name: **Oliver** **Audit Date:** June11,2009

Date Built: 1987 Addition of 2-floor office area in 1994

Building Gross S.F.: 7168 SF
Shop Area S.F.: 1880 SF
Office Area S.F.: 4408 SF
Mezzanine Area S.F.: 880 SF

Building Description: The building is concrete block on grade single storey office with a small second storey office area on the south side and a stucco facade.

Component	Structural, Foundation and Substructures	Estimated Life	Effective Life	Remaining Life
	The basic foundation is concrete slab on grade and is in good condition.			
Deficiency Analysis:	No problems at this time.			

Component	Exterior Systems			
	The exterior wall construction consists of concrete block covering an area of 5850 square feet with a stucco façade covering an area of 1660 square feet.	50	23	27
	There are four 12'x14' metal overhead doors in good condition.	30	23	7
	There is one (1) double glass aluminum door at the front entrance in good condition. Two (2) steel doors in good condition and one (1) glass/aluminum door south employee entrance all in good condition.	30	23	7
	There are eighteen (18) factory sealed double glazed window units measuring 8'X6' all in good condition.	30	23	7
	There are exterior motorized blinds on the south facing windows of the office addition			
Deficiency Analysis:	No problems at this time.			

Component	Roof Systems	Estimated Life	Effective Life	Remaining Life
	Office: The office roof covers an area of 1770 square feet and is constructed of tar and gravel (built-up). The upper offices roof covers an area of 800 square feet and is constructed of asphalt.	25	27	-2
	Shop: The shop roof covers an area of 1880 square feet and is constructed of tar and gravel (built-up). There is a metal canopy and is in good condition.			
	The roof drain is plumbed into a rock pit under the north awning at the east end of the building			
Deficiency Analysis:	The overall condition of the roof is fair/poor, the upper office roof is bubbled and has been inspected. Replacement recommended.			

Component	Ceiling Systems			
	The ceilings in the office consist of Tbar acoustic tile and the shop, washrooms and mechanical room are painted drywall.	20	5	15
Deficiency Analysis:	No problems at this time			

Component	Floor Coverings			
	Office: The office areas are carpeted covering an area of 3840 square feet.	20	5	15
	The front entrance, washrooms and locker room are covered with linoleum covering an area of 340 sqft.	15	5	10
	Shop: The shop floor consists of concrete and is in good condition. The mezzanine area is plywood flooring and is in good condition.			
Deficiency Analysis:	None at this time			

		Estimated Life	Effective Life	Remaining Life
Component	**Interior Walls and Partitions**			
	The interior walls are painted drywall and in good condition.	20	5	15
	The shop walls are painted drywall and painted concrete block. The parts area is painted drywall.			
	The gang shower is ceramic tile covering an area of 280 square feet and is in good condition.			
	There are twenty-one (21) fire rated wooden doors and two (2) fire rated steel doors all in good condition.			
Deficiency Analysis:	No problems at this time.			
Component	**Specialties and Accessories**			
	There is one washroom consisting of one toilet and a 4' counter with one sink.	40	23	17
	There is one Ladies' Room with two toilets and one 6' counter with two sinks.			
	There is one Men's Room with one toilet, one urinal and one 5' counter with two sinks.			
	There is exterior wall/door mounted signage as well as fence mounted signage, all in good condition.			
	There are six (6) recycling/waste handling containers.			
	The offices and reception area have cloth vertical blinds as window coverings and are in fair condition.	12	10	2
	There is a lunchroom/crewroom 8'x14' with a a 12' counter, double sink and cabinets above and below. All in good condition.	10	2	8
Deficiency Analysis:	No problems at this time.			
Component	**HVAC**			
	There is one Lennox electric heating unit (fan coil) serving the west offices.	20	23	-3
	There is one Lennox electric heating unit (fan coil) serving the south offices and is in fair condition.	20	23	-3
	There is one remote Lennox heating pump serving the west office.	20	23	-3
	There is one remote Lennox heat pump serving the south offices and is in fair condition.	20	16	4
	There in one Carrier roof top unit serving the upper offices.	20	16	4
	The shop heaters are Chromolox electric and are in good condition.	25	23	2
Deficiency Analysis:	Consistant problems with temperature control in the office area, energy efficiency low			
	There is no heater in the south bay			
Component	**Plumbing**			
	The water and sanitary system are on the town system. No problems.	40	23	17
Component	**Electrical**	**Estimated Life**	**Effective Life**	**Remaining Life**
	300kVA transformer feed to the building	50	23	27
	150kVA emergency generator and transfer switch (2009)	30	0	30
	There are 3 exterior high pressure sodium wall mounted lights and two exterior high pressure sodium pole mounted lights.			
	The shop has 53 two-tube 4' long lights. The parts room has 24 two-tube 8' long lights. The mechanical room uses 8 two-tube 4' long lights.	25	23	2
	The office uses 43 four-tube 2x4 trougher lights and 37 two-tube 1x4 trougher lights.	25	23	2
	The shower room/locker room uses 8 two-tube 4' long vapour proof lights.			
	The electrical panels are in good condition and clearly labelled.			
Deficiency Analysis:	The transformer is oversized for the feed to the building			
Component	**Safety Standards**			

	There is no fire alarm or sprinkler system in place.			
	The security system is a card access DSC using 12 motion sensors. The yard has 8 motion sensors (yard beams).	20	7	13
	Emergency exits are marked clearly.			
	There is no gas detection in place.			
	Fire extinguishers are used in the building.			
Deficiency Analysis:	Carbon monoxide, propane and nitrogen dioxide sensors are required in the shops.			
	Recommend installation of fire alarm			
	No fire safety plan in place			
	Recommend installation of motion detection in yard			

Component	**Site Work (Yard)**	**Estimated Life**	**Effective Life**	**Remaining Life**
	The yard has a 7'6" high barbed chainlink fence covering an area of 720 lineal feet and is in good condition.	40	23	17
	There is one 16' long barbed chainlink gate and two 20' long barbed chainlink gates in good condition.			
	The parking lot is asphalt covering an area of 18,880 square feet with 24 parking stalls in good condition.	30	23	7
	The yard consists of asphalt covering an area of 38,900 square feet and is in good condition.			
Deficiency Analysis:	No problems at this time.			

Component	**Landscaping**			
	Landscaping consists of shrubs and decorative rock.	20	17	3
	There is a four (4) zone irrigation system in place.			
Deficiency Analysis:	Seasonal maintenance is required. No problems at this time.			

Inspection Sheet

Building Name: Penticton **Audit Date:** 1-Jun-09

Address: 1260 - Commercial Way, Penticton, British Columbia, V2A 3H5

Date Built: 1975

Building Gross S.F.: 4764
Shop Area S.F.: 1248
Office Area S.F.: 1884
Mezzanine Area S.F.: 384
Warehouse Area S.F. 1248

Building Description The building is a single storey office with attached shop and warehouse.

Component	Structural, Foundation and Substructures	Estimated Life	Effective Life	Remaining Life
	The basic foundation consists of slab on grade.	50	35	15
	The basic structure itself is concrete block.			
	The receiving area has a concrete apron measuring 9'x5' and is in good condition.			
	The shop apron is concrete measuring 35'x6' and is in good condition.	50	35	15
Deficiency Analysis:	There is no deterioration indicated in the overall structure, foundation and substructures.			

Component	Exterior Systems	Estimated Life	Effective Life	Remaining Life
	The exterior wall construction is concrete block covering an area of 3680 square feet and is in good condition.	50	35	15
	There is also cedar facia and siding on the building covering a total area of 2116 square feet.			
	There are cedar soffits as well, covering an area of 1410 square feet and is in good condition.			
	The office has one 3'x7' glass with steel frame door at the main entrance and one 3'x7' wood door with wood frame at the west entrance, both in good condition. Receiving has a 6'x7' wood door. The warehouse and shop each have one overhead door measuring 12'x14'. The shop has a 3'x7' steel mandoor in good condition.			
	There are 3'x8' factory sealed aluminum windows all in good condition.	30	21	9
Deficiency Analysis:	The cedar facia and siding both require painting.			
	The wooden doors at receiving, the shop and warehouse all require painting.			

Component	Roof Systems			
	Offices: The office roof covers an area of 3024 square feet and is constructed of tar/gravel. The overall condition of the roof is good.	25	19	6
	Shop/Warehouse: The shop/warehouse roof covers an area of 3240 square feet and is constructed of tar/gravel. The overall condition of the roof is good.			
Deficiency Analysis:	No problems at this time.			

Component	Ceiling Systems			
	The majority of the office ceilings consist of Tbar acoustic tile with the exception of the northeast office which is painted cedar and the southeast office which painted drywall. The crew room and washrooms consist of painted drywall ceilings and the shop ceiling is unfinished.	25	13	12
Deficiency Analysis:	All ceilings are in good condition. No problems at this time.			

Component	Floor Coverings			
	Office: Flooring covering in the offices consists of carpet covering an area of 1630 square feet. The crew room consists of vinyl tiles covering an area of 384 square feet. The kitchen, washrooms and halls are linoleum covering an area 450 square feet. All flooring is in good condition.	20	14	6

Shop/Warehouse: The shop and warehouse have concrete floors which are in good condition.

Deficiency Analysis: No problems at this time.

		Estimated Life	Effective Life	Remaining Life
Component	**Interior Walls and Partitions**			
	The interior office walls are painted drywall covering an area of 7360 square feet and is in good condition. The interior doors are wood with wood frame measuring 3'x6'8" and all are in good condition.	20	14	6

Deficiency Analysis: No problems at this time.

Component **Specialties and Accessories**

There is one Men's Room (13'x6') with one toilet and two urinals, one six (6) foot counter with two sinks. The overall appearance is good.

There is one Ladies' Room (12'x10') with one toilet, one six (6) foot counter with two sinks. The overall appearance is good.

There is a kitchen measuring 10'x7'6" with a 6'6" counter, one sink, two feet of upper cabinets and 6'6" of lower cabinets. The overall appearance is good.

Vertical blinds are used as window coverings and are in good condition.

Exterior wall mounted signage is found on the building and is in good condition.

Metal containers are used in the handling of waste.

Deficiency Analysis: No problems at this time.

Component **HVAC**

There is a Lennox (heat pump) roof top unit which services the offices and is in good condition.	30	25	5
There are Delhi exhaust fans (cabinet) in the washrooms.	30	25	5
There are three Chromolox electric unit heaters which service the shop, warehouse and storage.	30	25	5
There is a Westinghouse cabinet unit heater with services the southeast office and main entrance.	30	25	5

		Estimated Life	Effective Life	Remaining Life
Deficiency Analysis:	All HVAC equipment is in good working order. No problems at this time.	30	25	5

Component **Plumbing**

Both water and sanitary sewers are on the town system. No problems.	40	35	5

Component **Electrical**

Panel one is Square D, 208 Volt 3 Phase 200 Amp in good condition. Panel two and three are Square D, 208 Volt 1 Phase 100 Amp in good condition. Panel four is Square D, 208 Volt 3 Phase 100 Amp in good condition. All electrical panels are well labelled.	50	35	15

There are four (4) Homesafe battery operated emergency lights.

Office: The office has 16 Type A: 2 lamp 4' wrap lights, 24 Type B: 4 lamp 4' trougher lights, and 2 Type C: 4 lamp 2' trougher lights. All lighting is in good condition.

Shop: The shop has 28 Type A: 2 lamp 4' wrap lights and 12 Type B: 2 lamp, 4' strip lights.

There are seven (7) high pressure sodium exterior wall mounted lights and five (5) high pressure sodium pole mounted lights in the yard.

Deficiency Analysis: There are several lamps in the shop that are not working and the 4' wrap lights in the shop do not have any lens covers.

Component **Safety Standards**

	There is no fire alarm system in place.			
	There is a wet sprinkler system serviced by Fire Tech.	50	35	15
	Emergency exit is located on the west side of the building with clear access.			
	The security system used is DSC with keypad access. There are eight (8) motion sensors.	20	9	11
		Estimated Life	**Effective Life**	**Remaining Life**
Deficiency Analysis:	No problems at this time.			

Component	**Site Work (Yard)**			
	There is a 7' high barbed chainlink fence covering an area of 776 lineal feet. The main entrance has a 7'x24' wide barbed chainlink gate, the south gate is barbed chainlink and measures 7'x 17' wide and there is one 3'x7' chainlink on the north side. All fencing is in good condition.	40	25	15
	The parking lot is asphalt covering an area of 9480 square feet with 14 parking stalls and one handicapped stall. The parking lot is in good condition.	30	13	17
	The main yard is gravel covering an area of 44,448 square feet and is in good condition.			
Deficiency Analysis:	No problems at this time.			

Component	**Landscaping**			
	There is 2980 square feet of lawn, 3160 square feet of bark mulch and 1240 square feet of rock and shrubs. The overall condition is good.	20	19	1
	There is a Nelson 6 zone irrigation system in working order.			
Deficiency Analysis:	No problems at this time.			

Inspection Sheet

Building Name: Princeton **Audit Date:** 1-Jun-09

Address: 291 Old Copper Mountain Road

Date Built: Purchased with Princeton Light and Power in 2006. The original warehouse est. circa 1960, and the addition of the shop in 1985

Building Gross S.F.:	5846
Shop Area S.F.:	1600
Office Area S.F.:	954
Warehouse Area S.F.:	684
Covered Storage Area S.F.:	1680
Mezzanine Storage Area S.F.:	684

Building Description The warehouse area appears to be the original building. It is constructed of stick frame with metal cladding. The remainder of the building is of concrete block construction with engineered roof truss system.

		Estimated Life	Effective Life	Remaining Life
Component	**Structural, Foundation and Substructures**			
	Slab on grade with concrete block construction	50	24	26
	There is a concrete apron at the shop entrance measuring 3'x40' and a concrete apron at the warehouse entrance measuring 6"x18".	35	24	11
Deficiency Analysis:	The apron at the warehouse entrance is cracked and requires either patching or replacement.			
	There is no visible deterioration to the basic structure or foundation of the building.			
Component	**Exterior Systems**			
	The warehouse is a metal clad wall structure and is in poor condition. The metal siding should be replaced and the structure underneath inspected	20	24	-4
	The shop consists of exposed concrete block and is in good condition.	50	24	26
	Shop: The shop has two insulated metal overheads door measuring 10'x14', There are two steel exterior doors in good condition. The shop has five 4'x2' window units high on the east wall.	30	24	6
	Warehouse: The warehouse has one insulated metal overhead door measuring 8'x10' .	30	24	6
	Office: The office has one metal exterior door and a 4'x2.5' double pane window unit	30	10	20
		Estimated Life	**Effective Life**	**Remaining Life**
	Meter Shop: The meter shop has one exterior metal door and a 3'x2.5' wood framed sealed unit.	30	10	20
Deficiency Analysis:	The exterior wood window frames require painting.			
	The overhead doors both in the warehouse and shop should be considered for replacement in the future.			
	The cladding on the Warehouse should be replaced to protect the structure.			
Component	**Roof Systems**			
	Shop/office/covered storage: The shop is a built-up roof covering an area of 3866 square feet. The overall appearance is good.	25	24	1
	Warehouse: The warehouse has a built-up roof covering an area of 774 square feet.			
Deficiency Analysis:	No problems at this time.			
Component	**Ceiling Systems**			
	Shop: The shop ceiling consists of drywall and is in good condition.			
	Warehouse: The warehouse ceiling consists of drywall and is in fair condition.			
	Office: The office, washroom, and meter room area all consist of drywall ceiling and are in good condition.	30	24	6
Deficiency Analysis:	No problems at this time.			

Component	**Floor Coverings**			
	The shop floor consists of concrete covering an area of 1600 square feet and is in good condition.	40	24	16
	The warehouse floor consists of concrete covering an area of 684 square feet and is in fair condition, with some cracks.	40	40	0
	The office, washroom and meter room consist of linoleum flooring and cover an area of 954 square feet.	30	24	6
	The mezzanine floor consists of unpainted plywood.			
Deficiency Analysis:	The overall condition of the office, washroom and storage area flooring is fair. The warehouse floor cracks should be repaired.			

		Estimated Life	**Effective Life**	**Remaining Life**
Component	**Interior Walls and Partitions**			
	The walls and partitions in the warehouse, office/storage and washroom is wood frame with painted drywall.	35	24	11
	The exterior walls of the shop are painted concrete block			
	There 1 wooden hollow door in the washroom and one wood core door between the shop and office The overall condition of the doors is good.	35	24	11
Deficiency Analysis:	The overall appearance of the walls is good.			
Component	**Specialties and Accessories**			
	There is one washroom measuring 7'x10' with one toilet, one sink, and one shower, and is in good condition.	35	24	11
	There is a 6' kitchen counter with a single sink with cabinets and dishwasher below.			
	There are metal containers to handle waste.			
Deficiency Analysis:	No problems at this time.			
Component	**HVAC**			
	Shop: The shop has two new Chromolox electric unit heaters	25	1	24
	Warehouse: The warehouse has 2 older Chromolox electric unit heaters.	25	24	1
	Office: The office uses a cabinet heat storage radiator and is in good condition. The washroom has an electric wall heater.	30	24	6
Deficiency Analysis:	No problems at this time. There is no gas detector in the shop.			
Component	**Plumbing**			
	The water and sanitary sewers are on the town system. No problems.	40	24	16
	There are two hot water heaters. The washroom/kitchen water heater is located on the mezzanine floor. There is a 80-gallon hot water heater located in the shop.	20	3	17
	There is a sump pump controlled floor drain system in the shop.			
Component	**Electrical**			
	There is a new 400A electrical feed to the building.	50	1	49
	Shop: The shop uses twenty-eight 2x4ft fluorescent lights with T8's.			
	Warehouse: The warehouse/office uses ten 2x4ft fluorescent lights with T8's. The office area also uses ten 2x4ft fluorescent lights with T8's.			
	The electrical panels are well labelled and in good condition.			
Deficiency Analysis:	No problems at this time.			
Component	**Safety Standards**			
	There is an Edwards fire alarm panel with smoke/heat detectors and pull stations in place.	25	5	20

	There is no sprinkler system in place			
	The security system in place is a keypad DSC with four motion sensors.	20	8	12
	Fire extinguishers are used in the building.			
Deficiency Analysis:	Fire extinguishers should have annual inspections to ensure they meet with Fire Safety Codes and are in good operating condition.			
	No problems at this time.			
Component	**Site Work (Yard)**			
	The yard has a 7' three row barbed wire chainlink fence measuring 3,000 lineal feet. There is a 24' barbed chainlink gate.	40	24	16
	The yard consists of gravel covering an area of 2.4 acres.			
	There is no designated parking lot.			
Deficiency Analysis:	No problems at this time			
Component	**Landscaping**			
	There is no landscaping or irrigation system in place.			

Inspection Sheet

Building Name: Salmo **Audit Date:** 1-Jun-09

Address: 300 4th Street **This building is slated for demolition**

Date Built: Circa 1975

Building Gross S.F.:	1700
Shop Area S.F.:	240
Office Area S.F.:	640
Leased Area S.F.:	560
Attached Shed S.F.:	260

Building Description The building is a wood constructed structure with stucco walls and shop attached. There is a canopy to the west of the building. The front facia of the building is a stone finish.

		Estimated Life	Effective Life	Remaining Life
Component	**Structural, Foundation and Substructures**			
	The foundation consists of slab on grade and is good condition.	50	34	16
	The basic structure is wood and appears to be in fair condition.			
	There is a sidewalk in front of the building 20' long x 6' width.	35	34	1
Deficiency Analysis:	No deterioration is indicated in the overall structure, foundation and substructure.			
Component	**Exterior Systems**			
	The exterior wall construction consists of stucco with a vinyl facia around building.	25	34	-9
	The canopy is wood frame covering an area of 980 square feet and is in fair condition.			
	There is one (1) 9'x10' wood door in fair condition.	30	34	-4
	There is one single wood door with window 3'x7' on the east side, one single wood door 3'x7' on the east side, one 3/x7' single glass door on the north side and one 3'x7' wood door on the west side. All the exterior doors are in fair condition.	30	34	-4
	Rear office: There are two multipaned windows 3'x4', one multipaned window 2'x2' and two single paned windows 3'x4' all with wood frame and caulking in fair condition.	30	34	-4
	Office: There are five 3'x4' aluminum sealed window units (one of the windows' outside pane is broken) one 4'x6' aluminum sealed window unit and one 4'x9' double paned aluminum sealed window unit. All caulking is in fair condition.	30	34	-4
Deficiency Analysis:	The exterior stucco wall is in very poor condition and the vinyl facia although not damaged requires painting .			
	The false front is in poor condition			

		Estimated Life	Effective Life	Remaining Life
Component	**Roof Systems**			
	The roof is built-up covering an area of 1600 square feet and the canopy roof is steel covering an area of 980 square feet with no leaks.			
Deficiency Analysis:	Canopy roof has some damage Shed roof in poor condition			
Component	**Ceiling Systems**			
	Office: The office consists of acoustic Tbar ceiling tiles covering an area of 640 square feet and is in good condition. The leased area is stucco drywall covering an area of 560 square feet and is in good condition.	20	23	-3
	Shop: The shop ceilings are wood covering an area of 240 square feet and shed ceiling is wood covering an area of 240 square feet.	30	34	-4
Deficiency Analysis:	The ceilings in the shop and shed are in poor condition and require replacement.			
Component	**Floor Coverings**			
	Office: The office floor consists of stripped concrete. The rear office consists of linoleum.	20	34	-14
	Shop: The shop floor and the shed floor consists of concrete and are in good condition.			
Deficiency Analysis:	The office floor is in poor condition and requires repair. The rear office linoleum floor is in poor condition. Both require replacement.			
Component	**Interior Walls and Partitions**			

	Office: The office walls consist of 1260 square feet of painted drywall and 864 square feet of original wood panel. There is one 6'6"x3 Ingress wood door, two (2) 6'6"x3' door with glass windows and the leased area has four (4) 6'6"x3' wood doors in good condition.	20	34	-14
	Shop: The shop walls consists of drywall.			
Deficiency Analysis:	The Ingress wood door and the doors with windows require painting. Holes to plumbing require doors or drywall patch			
Component	**Specialties and Accessories**			
	The washroom measures 7'x7' consisting of one toilet, one 3' long counter with one sink. The floors are concrete and the walls are drywall.	20	28	-8
	There was no exterior signage.			
	Metal containers are used in the handling of waste and are in good condition.			
Deficiency Analysis:	The washroom requires painting and floors require resurfacing.			
Component	**HVAC**			
	AC unit located above closet across from bathroom, accessed from the shop area	30	34	-4
	The front office uses an electric baseboard heater.			
	A hot water tank is used to serve the washroom.	12	17	-5
	The shop uses a Chromalox heater in fair condition			
Deficiency Analysis:	No problems at this time.	**Estimated Life**	**Effective Life**	**Remaining Life**
Component	**Plumbing**			
	Both water and sanitary sewers are on the town system. No problems.	40	34	6
Component	**Electrical**			
	The type of service used is 120/240V and is in good condition. There are seven (7) single light incandescents, two (2) two-tube 4' lights using FW40's, six (6) four-tube surface mounted lights using FW40's and ten (10) four-tube recessed lights using FW40's.	50	34	16
Deficiency Analysis:	The surface mounted lights are in poor condition and should be replaced.			
	Energy efficiency would be improved by changing the existing lights to T8's with electronic ballast.			
Component	**Safety Standards**	**Estimated Life**	**Effective Life**	**Remaining Life**
	There is no fire alarm or sprinkler system.			
	The emergency exits are not marked.			
	There is no security system			
Deficiency Analysis:	No problems at this time.			
Component	**Site Work (Yard)**			
	The yard has a three-strand barbed wire frost fence seven (7) feet high. The fence covers an area of 237 lineal feet and is in very good condition. There are two sets of 7' high gates (4panels @10') with lock in very good condition.	40	15	25
	The yard consists of 3/4" stone covering an area of 6390 square feet and is in good condition.			
	The parking lot in front of the building is asphalt covering an area of 990 square feet.	30	34	-4
Deficiency Analysis:	The parking lot is in poor condition and should be resurfaced.			
Component	**Landscaping**			
	There is no landscaping or irrigation system.			

Inspection Sheet

Building Name: Trail **Audit Date:** 1-Jun-09

Address: 1290 - Esplanade Street, Trail, B.C.

Date Built: 1993

Building Gross S.F.: 62602 SF 4 Floors plus one parking floor area
Parking Area S.F.: 12850 Under Building
Office space including common areas 49752 SF

Building Description The building is a four storey office tower consisting of modular wall construction with surface parking on the main floor and a basement level parking area serviced by one elevator.

Component	Structural, Foundation and Substructures	Estimated Life	Effective Life	Remaining Life
	The basic foundation/structure is concrete pile and beam and is in good condition.	50	16	34
	There is a sidewalk around the entire building covering an area of 2884 square feet and is in good condition, with ramps into all doorways.	35	16	19

Deficiency Analysis: There is no deterioration indicated in the overall structure and substructure.

Component	Exterior Systems	Estimated Life	Effective Life	Remaining Life
	The exterior wall construction is modular, glass infill panels and composite panels. The stucco is in poor condition and will need recoating.	50	16	34
	There is a ceramic tile base covering an area of approximately 450 linear feet.	30	16	14
	There is 738 square feet of composite panel.	30	16	14
	There is 2214 square feet of glass panels.	30	16	14
	There are seven (7) sets of double glass aluminum doors, there is one single glass aluminum door with side light, two (2) single steel doors, and one (1) double steel door.	30	16	14
	There are two different types of windows, both are aluminum triple paned. There are one hundred and fourty-four 6'11'x5'4" high windows with a center mullion. There are thirteen 12'10"x5'4" high windows with a a center mullion. In the lobbies there is a total of 480 square feet of glass window excluding glass panels and doors.	30	16	14

Deficiency Analysis: The stucco finish is discoloring. The assumption at this time is that it is a by-product of the Trail industria plant. The river (east) side stucco needs recoating immediately.

Where the sidewalk meets the building, the ceramic tile requires proper caulking to eliminate any leaks.

Several of the corner office large windows have lost seal and should be replaced

Component	Roof Systems			
	The roof consists of rolled asphalt sheeting covering an area of approximately 12,852 square feet. This includes the elavator machine room.	20	16	4
	The roof has been recently repaired including the flashing.			

Deficiency Analysis: There are a number of bulges in the roofing which will need repair

Component	Ceiling Systems			
	The ceilings throughout are Tbar acoustic tile covering an area of 51,000 square feet and are in good condition. The ceiling to the parkade is approximately 12,850 square feet of steel mesh supported insulation under slab.	20	16	4

Deficiency Analysis: No problems at this time.

Component	Floor Coverings	Estimated Life	Effective Life	Remaining Life
	All washroom floors are a ceramic tile finish.			
	The main floor, second, third and fourth floor lobbies are ceramic tile. Some corridors on the first and second floor are ceramic tile. The ceramic tile covers a total area of 2,120 square feet.	30	16	14
	On the second floor there is vinyl tile covering an area of 1,761 square feet.	20	16	4
	The balance of the building is carpeted.	20	5	15

Deficiency Analysis: On the fourth floor, all office area carpet requires repair. The common area carpet is new.

		Estimated Life	Effective Life	Remaining Life
Component	**Interior Walls and Partitions**			
	Painted drywall consist throughout the entire building. On the shower area on the second floor and each washroom there are ceramic tile walls.	20	16	4
	There are approximately 148 single wood interior doors, two (2) double interior wood doors and two (2) double glass doors. There are approximately 45 (included) doors with glass sidelights to private offices. Most doors have built-up frames. This count was done according to drawings September 08, 1993. There are two types of finishes to the doors. One finish is a green blue and the other is a solid blue finish. All hardware is stainless steel.	30	16	14
Deficiency Analysis:	All walls and doors are in very good condition.			
Component	**Specialties and Accessories**			
	There is a handicap washroom on the first, second and fourth floors with specialty fixtures (grab bars, etc.) Each washroom has one toilet and one sink. The overall appearance is very good.	40	16	24
	There is one Men's Room on each floor. Each one has two sinks, two toilets, there is one urinal each on the mainfloor and second floor and two urinals each on the third and fourth floor. The overall appearance is very good.			
	There is one Ladies' Room on each floor. Each one as two sinks, four toilets each on the third and fourth floor and three toilets each on the main and second floor. The overall appearance is very good	40	16	24
	All washroom accessories are stainless steel. All partitions are standard steel partitions. All sink counters are arborite. All are in very good condition. Sinks and counters replaced 2007	40	16	24
	There are two (2) FortisBC signs over each entrance door and are in good condition.			
	There is a cardboard and regular waste containers used for the building.			
	All windows are covered with 1" venetian blinds which are in good condition.	20	16	4
	There is a lobby counter on each second third and fourth floors.	30	16	14
	There is one common kitchen with double stainless steel sink			
Deficiency Analysis:	No problems at this time.			
Component	**HVAC**			
	There are nine (9) main roof top units and four condenser units located on the roof.	30	16	14
	There are two (2) air handling units on the first floor northeast side. There are 10 VAV boxes associated with these units for the first floor	30	16	14
	There is one Mitsubishi air conditioner in the elevator penthouse.	40	16	24
	There is a 3-ton Datamate in the computer room	30	16	14
	There is a 6-ton air conditioner for the computer room	25	4	21
	There is a 5-ton air conditioner for the 2nd computer room	25	12	13
	There are 2 ceiling mounted air conditioners - one for the large 4th floor meeting room, and one for the 2nd floor UPS room	25	16	9
	There is a 1.5-ton Datamate in the 3rd floor UPS room	30	16	14
	There is a Fuji ductless airconditioner in the kitchen of the coffee shop on the first floor	20	6	14
	There are six exhaust fans in the parkade.	30	9	21
	There are two (2) 120 US gal. Hot water tanks located on the main floor.	20	9	11
	There are 17 exhaust fans located throughout the building	25	16	9
Deficiency Analysis:	The overall condition is good.			
Component	**Plumbing**			
	Water and sanitary sewers are on the town system. The water supply is at 150 psi, regulated to 70psi. No problems. There is a stand pipe system on the main floor to service the water main and the sprinkler system.	40	16	24
Component	**Electrical**			
	The main electrical room is located on the main floor. The entrance is 600A 347/600V with a 400A service to the mechanical.	50	16	34

The exterior lights, parkade exhausts, CO Monitor and tenant meters are located in this room.

The lights are mixture of FW32's and T8's.

The light fixtures were counted from the drawings and may have changed depending on tenant renovations. There are approximately 448 (20"x4") fixtures, approximately 168 pot lights including the lobby, there are 16 high pressure sodium lights in the parkade and six two-tube fluorescents in the parkade.

There is a power factor monitoring meter.

The labelling on the electrical panels is good.

On the second, third and fourth floor, each have their own step down transformer with lighting and utility power panels.

There is a 135kW natural gas fired generator located in the parking lot on the ground floor. It is protected with fencing.

Deficiency Analysis: All electrical is in good condition. Energy efficiency would be improved by changing all lights to T8's.

Component	**Safety Standards**			
	There is located in the lobby and is a Notifier Division of Pitman type system.	20	16	4
	There is a pre-action sprinkler system in place throughout the building, this includes the parkade.	40	16	24
	There is a DSC security system with six panels. There is a power panel DSC 832, one DSC PC510, two DSC PC4000 and two DSC PC 4020. These are located on the main floor electrical room and service the management and each floor.	20	16	4
	The emergency lights on the building are a power pack Ready Lite located on each floor including the electrical rooms.			

Deficiency Analysis: All safety equipment is in good operating condition.

Fire hose is missing from the parkade and is located in the inside parkade vestibule. A sign is required indicating location of fire hose.

		Estimated Life	**Effective Life**	**Remaining Life**
Component	**Parking**			
	There is 59,094 square feet of parking, 34,207 square feet is concrete located under & north of the building. 24,887 square feet is asphalt located on the main floor. This includes areas up to the retaining wall on the north and west side. This does not include anything on the north and west side of the retaining walls.	50	16	34
	The parking can be accessed from two staircases on the west side of the parking through two small buildings constructed over the staircase.	50	16	34
	There is a parkade vestibule with elevator access to the building.			

Deficiency Analysis:

Component	**Landscaping**
	There is a grassed area on the east side of the building. This area is part of the Esplanade and has five picnic tables with a sidewalk and barrier wall to the river.

Inspection Sheet

Building Name: **Warfield Fleet Services** **Audit Date:** **1-Aug-10**

Address: 100 Bingay Road, Trail, BC

Date Built: 1979 Renovated in 2003

Building Gross S.F.: 9,504 Offices, shops
Office space including common areas 2304
Shops area: 7200

Building Description Two storey commercial building, offices, shops

		Estimated Life	Effective Life	Remaining Life
Component	**Structural, Foundation and Substructures**			
	The basic foundation/structure is concrete block and is in good condition.	55	7	48

Deficiency Analysis: There is no deterioration indicated in the overall structure and substructure.

Component	**Exterior Systems**			
	Concrete slab on grade	55	31	24
	Concrete block walls with metal fascia, glazing for office areas	30	7	23
	There are seven motorized overhead doors	30	7	23
	There are eight 3'x7' metal doors	30	7	23

Deficiency Analysis: No problems at this time

Component	**Roof Systems**			
	Build up torched on roof in good condition	30	7	23

Deficiency Analysis: Roof drains end in rock pits on the south side of the building
No problems at this time

		Estimated Life	Effective Life	Remaining Life
Component	**Ceiling Systems**			
	Offices have painted drywall ceilings	30	7	23
	Shop ceiling exposed Q-deck			
	Second floor office and lunchroom have T-bar ceilings	30	7	23

Deficiency Analysis: No problems at this time.

Component	**Floor Coverings**			
	All washroom and change/shower room floors painted concrete	20	7	13
	Office floors are painted concrete	20	7	13

Deficiency Analysis: No problems at this time

Component	**Interior Walls and Partitions**			
	Painted drywall consist throughout central office areas and lunchroom. All exterior walls are exposed concrete block.	20	7	13

Deficiency Analysis: No problems at this time.

Component	**Specialties**			
	Changerooms/washroom Mens' locker/change room and showers There is a small washroom beside the central bay area. There is a washroom beside the east bay, with a gang sink, toilet and urinal	30	7	23

	There is a rail crane in the east bay area	30	7	23
	There is a hydraulic vehicle lift located in the centre bay	15	7	8
	There is a "C-can" skid storage building behind Fleet	35	7	28
	There is a double wall waste oil container behind Fleet.			

		Estimated Life	Effective Life	Remaining Life
	There is a large compressor in the 2nd floor electrical room, with an attached refrigerant air dryer	30	7	23
	There is a substantial vehicle exhaust evacuation system in place.			

Deficiency Analysis: The shower and wash rooms are rather dark and the walls are exposed painted rough concrete block, which collects dust quickly. Suggest drywall finish over the block for ease of cleaning

Component **HVAC**

	There are four PTAC through wall air conditioner/heater units for the 3 offices and the lunch room	30	7	23
	The large east bay is heated by a large Engineered Air electric heater	40	31	9
	The central bay is heated by a rooftop Engineered Air electric heater	40	31	9
	The old wash bay is heated by a Cromalox electric unit heater	20	5	15
	The new wash bay is heated by a rooftop Engineered Air electric heater	20	7	13
	The large, central, and old wash bay all have in floor electric heating	40	31	9

Deficiency Analysis: No problems at this time

Component **Plumbing**

	Water is on the village system. The sewer is septic tanks and field. Regular service insures correct operation.	30	7	23
	There is one 80 gallon electric hot water heater for the wash bay and a 45 gallon electric hot water heater for the shower and wash rooms	20	7	13

Deficiency Analysis: No problems at this time

Component	**Electrical**	Estimated Life	Effective Life	Remaining Life
	3 phase 600 amp main electrical service with multiple subpanels.	30	7	23
	Dropped down high pressure sodium fixtures in the shop and warehouse area.	30	7	23
	Ceiling hung and recessed flourescent lighting in offices	20	7	13
	Exterior building mount yard lights are controlled by light sensors	35	31	4

Deficiency Analysis: No problems at this time.

Component **Safety/Security**

	There are fire safety plans and fire extinguishers mounted by all exits.			
	There are no sprinkler systems in place			
	There is no fire alarm system			
	There is no security system			
	There is a gas detection and exhaust system installed in the central bay and the new wash	20	2	18

	bay			
	There are manually operated exhaust fans in the east bay	30	7	23

Deficiency Analysis: Access control needs to be brought up the the Company standard: card access and electric strikes on exterior doors.

Inspection Sheet

Building Name: **Warfield Operations** **Audit Date:** **1-Aug-10**

Address: 100 Bingay Road, Trail, BC

Date Built: 1979 Renovated in 2003

Building Gross S.F.: 22,199 Office, shops and warehouse with a mezzanine
Parking Area S.F.:
Office space including common areas 7108
Yard area: 15.72 acres

Building Description Single storey commercial building, offices, shops, parking bay, warehouse
Outbuildings include Coverall structures and special storage facilities

		Estimated Life	Effective Life	Remaining Life
Component	**Structural, Foundation and Substructures**			
	The basic foundation/structure is concrete block and is in good condition.	55	31	24
	There is a sidewalk at the front of the building, and it is in good condition with ramp from handicap parking	35	7	28

Deficiency Analysis: There is no deterioration indicated in the overall structure and substructure.

Component	**Exterior Systems**			
	Concrete slab on grade	55	31	24
	Concrete block walls with metal fascia, glazing for office areas	30	7	23
	There are five 14'x10' motorized overhead doors			
	There are nine 3'x7' metal doors and two double doors			

Deficiency Analysis: Windows can be difficult to seal

Component	**Roof Systems**			
	Build up torched on roof in good condition	30	7	23

		Estimated Life	Effective Life	Remaining Life
Deficiency Analysis:	Roof drains end in rock pits around building under pavement, and can back up into the building in extreme rain events			

Component	**Ceiling Systems**			
	The ceiling is T-Bar with accoustic tiles. Shop ceiling exposed Q-deck	30	7	23

Deficiency Analysis: No problems at this time.

Component	**Floor Coverings**			
	All washroom and change/shower room floors are a ceramic tile finish.	30	7	23
	Office is carpet tile	20	7	13

Deficiency Analysis: Carpet shows wear and staining.

Component	**Interior Walls and Partitions**			
	Painted drywall consist throughout the entire building. On the shower areas and in each washroom there are ceramic tile walls. All exterior walls in the shops are exposed concrete block.	20	7	13
	Double glazed panic doors interior & exterior fire rated main entrance	30	7	23

Deficiency Analysis: No problems at this time.

Component	Specialties			
	Changerooms/washrooms Extensive mens and ladies locker/change rooms and showers There are men's and ladies' washrooms in the office area	30	7	23
	There is a rail crane in the Transformer Repair shop	30	7	23
	There are 4 temporary structures on the property (Coverall), used for parking, material storage and transformer oil storage.	15	7	8
	There is a Station Services building on the south side of the property used for material storage	35	7	28
	There is a covered area storage for Warehousing, and multiple racks for material storage	30	7	23

Deficiency Analysis: The areas around the outside of the Coverall buildings must be clear of material for snow clearing

Component	HVAC	Estimated Life	Effective Life	Remaining Life
	There are 5 roof top unit heat pumps Trane and York and one split heat pump serving the office area. There are four York heat pumps serving the shops and warehouse office areas	30	7	23
	The Transformer Repair shop is heated with 4 radiant heaters, time dependent control	30	7	23
	The open area shops and Warehouse are heated with electric unit heaters.	20	7	13
	There are five exhaust fans: change rooms, washrooms, and janitor room	20	7	13
	There is a small split unit for the C&M offices in the shop area	20	7	13
	There is a large Engineered Air make up air unit on the mezzanine supplying the large open spaces with fresh, heated air	35	31	4

Deficiency Analysis: No problems at this time. Consider door contacts to shut down units with doors propped open to reduce repairs on overworked heat pumps.

Component	Plumbing			
	Water is on the village system. The sewer is septic tanks and field. Regular service insures correct operation.	30	7	23
	Outside underground irrigation	30	7	23
	There are three 80 gallon electric hot water heaters	20	7	13
		Estimated Life	Effective Life	Remaining Life
	There are four oil separators on the drainage systems: one serving the area near the Warehouse racking, and it drains into a rock pit. The second is at the east side of the property and it drains into an underground dispersion pipe. The third is in the Fleet Services building, and drains into a rock pit behind the building. The 4th is in the Fleet Wash Bay, and it drains into the same rock pit as the Fleet building.	55 55 55 55	31 5 31 7	24 50 24 48

Deficiency Analysis: Drainage behind Fleet Services not controlled at this time, and the Company is at risk to a spill. Recommend continuing drainage control project to minimize risk to the environment. Paving and flow control will add to the safety of spill control in this area.

Component	Electrical			
	3 phase 1200amp main electrical service with multiple subpanels.	30	7	23
	Dropped down high pressure sodium fixtures in the shop and warehouse area.	30	7	23
	Ceiling hung and recessed flourescent lighting in offices	20	7	13
	Exterior pole-mount and building mount yard lights are controlled by light sensors	35	31	4

Deficiency Analysis: No problems at this time.

Component	**Safety/Security**			
	There are fire safety plans mounted by all exits.			
	There are no sprinkler systems in place			
	There is an Edwards Fire alarm panel There are smoke/heat detectors located in the janitor room and in the mezzanine areas above Line Services office, Warehouse office, and the changerooms.	20	7	13
	There is a DSC access control security system for the gate only	20	7	13
	The property is fenced with 8' high chain link fence with barbed wire top rows. There is a 20' motorized gate controlled through the security system.	30	7	23
	There is video surveylance equipment for the front of the Operations building only.	25	15	10
Deficiency Analysis:	Access control needs to be brought up the the Company standard: card access and electric strikes on exterior doors. The fences are in fair/poor condition and need work. The fence shaker warning system has failed.	Estimated Life	Effective Life	Remaining Life
Component	**Parking**			
	There is substantial parking for personal vehicles in lots to the west and north of the building. There are marked stalls for company vehicles on the south and east sides There is covered parking for large trucks attached to the Fleet Services building	30	7	23
Deficiency Analysis:	No problems at this time.			
Component	**Yard**			
	There is substantial lawns and gardens on the west side of the property in good condition.			
	The materials storage and yard in general is very tidy			
Deficiency Analysis:	Paving the pole bunk area will reduce dust and allow control of drainage			

Inspection Sheet

Building Name: Warfield System Control Centre **Audit Date:** 18-Aug-10

Address: 100 Bingay Road, Trail BC

Date Built: 1975 Renovated in 2003, trailer added 2009

Building Gross S.F.: 5382
Office Area S.F.: 3942
Temp Trailer S.F.: 1440

Building Description: The building is a single storey office with attached trailer, and detached battery room

Component	Structural, Foundation and Substructures	Estimated Life	Effective Life	Remaining Life
	The basic foundation consists of slab on grade.	50	35	15
	The basic structure itself is concrete block.			
Deficiency Analysis:	There is no deterioration indicated in the overall structure, foundation and substructures.			

Component	Exterior Systems			
	The exterior wall construction is concrete block in good condition.	50	35	15
	There is metal facia on the upper part of the building			
	The office has two sets of double glass with steel frame door at the main entrance and two 3'x7' metal doors with metal frames at the east and north entrances, both in good condition.			
	There are multiple 3'x7' factory sealed aluminum windows all in good condition.	30	21	9
Deficiency Analysis:	No problems at this time			

Component	Roof Systems			
	Built-up torch on roof on both the main building and the trailer The overall condition of the roof is good.	25	19	6
Deficiency Analysis:	No problems at this time.			

		Estimated Life	Effective Life	Remaining Life
Component	**Ceiling Systems**			
	The majority of the office ceilings consist of Tbar acoustic tile with the exception of the electrical and computer rooms, which are painted drywall. The washrooms consist of painted drywall ceilings	25	13	12
Deficiency Analysis:	All ceilings are in good condition. No problems at this time.			

Component	Floor Coverings			
	Office: Flooring covering in the offices consists of carpet tile The trailer floor is covered in linloeum washrooms are linoleum. All flooring is in good condition.	20	14	6
Deficiency Analysis:	No problems at this time.			

Component	Interior Walls and Partitions			
	The interior office walls are painted drywall in good condition. The interior doors are wood with wood frame measuring 3'x6'8" and all are in good condition	20	14	6
Deficiency Analysis:	No problems at this time.			

Component	Specialties and Accessories
	There is one Men's Room (10'x6') with one toilet and one urinals, one three foot counter with one sink. The overall appearance is good.
	There is one Ladies' Room (10'x6') with one toilet, one three foot counter with one sink. The overall appearance is good.
	There is a kitchen area with a counter, one sink, upper cabinets and lower cabinets, dishwasher, stove, fridge and freezer. The overall appearance is good.

Vertical blinds are used as window coverings and are in good condition.

Metal containers are used in the handling of waste.

		Estimated Life	Effective Life	Remaining Life
Deficiency Analysis:	No problems at this time.			
Component	**HVAC**			
	There are two (heat pump) roof top units in good condition.	30	25	5
	There are exhaust fans in the washrooms.	30	25	5
	There is an air conditioner in the electrical room	30	25	5
	There are two Fuji split ductless air conditioners in the computer room	30	25	5
	There is a Cromalox unit heater in the battery room			
	There are four window air conditioners in the trailer, with baseboard for heat			
Deficiency Analysis:	All HVAC equipment is in good working order. No problems at this time.	30	25	5
Component	**Plumbing**			
	Both water and sanitary sewers are on the town system. No problems.	40	35	5
Component	**Electrical**			
	There is 3-phase 120/208 electrical service to the building All electrical panels are well labelled.	50	35	15
	There is a 125kW generator and transfer switch for the facility			
	Control Room: There are direct/reflective dimmable 12' florescent pendant lights over each Operator console			
	Office: pendant direct/reflective pendant lights over the desks and in the west office The trailer uses 2-tube wrap fixtures, surface mount			
	Drop in fixtures are used in the central office and pot lights everywhere else			
Deficiency Analysis:	The dimmable fixtures are unreliable and flicker, causing Operator fatigue			

		Estimated Life	Effective Life	Remaining Life
Component	**Safety Standards**			
	There is an Notifier fire alarm system in place.			
	There is an FM200 gas fire suppression system in place for the computer room	50	35	15
	There is a fire plan and emergency plans are in place			
	The security system used is DSC with card access. There are eight (8) motion sensors.	20	9	11
Deficiency Analysis:	No problems at this time.			
Component	**Site Work (Yard)**			
	There is pavement around to the back of the building to access the generator and battery room	40	25	15
Deficiency Analysis:	No problems at this time.			

Achievable Savings

A Retrospective Look at the Northwest Power and Conservation Council's Conservation Planning Assumptions

August 2007 Council document 2007-13

Executive summary

The Northwest Power Act of 1980, the federal law that authorized the states of Idaho, Montana, Oregon, and Washington to form the Northwest Power and Conservation Council, directs the Council and the Bonneville Power Administration to treat energy conservation --improved efficiency of electricity use -- as a resource equal to electricity generation when planning to meet future demand for power. The Act requires Bonneville to acquire all cost-effective conservation first before acquiring new power from generating resources.

The Act also directs the Council to prepare, and to periodically review, a regional electric power plan to assure an adequate, efficient, economical, and reliable electricity supply in the Pacific Northwest. The administrator of Bonneville is required by the Act to make resource acquisition decisions that are consistent with the Council's power plan. Consistent with the Power Act, energy conservation is the highest-priority resource in the Council's power plan.

To assist the Council in determining the cost-effectiveness of generating and conservation resources that are included in the power plan, the Act establishes three criteria. A cost-effective resource or measure is one that is forecast by the Council to be 1) reliable, 2) available when it is needed, and 3) no more expensive than the least-cost alternative resource.

From this instruction, the Council developed a methodology to identify all of the technically feasible potential conservation measures in the region and any timing constraints to their implementation. With this methodology, the Council forecasts the rate of annual deployment of conservation measures and the maximum achievable potential of the measures over the 20-year horizon of the power plan (the Act requires the Council to plan 20 years into the future and to review the plan every five years).

The Council divides conservation measures into two categories: those that can be acquired at any time, such installing low-flow shower heads (these are called non-lost opportunity measures), and those that can only be acquired under specific conditions or at a specific time, such as wall insulation in buildings that are under construction (these are called lost-opportunity measures -- if they aren't implemented, the opportunity is lost). For planning purposes, the Council sets penetration limits, with respect to time, for both types of conservation.

In its planning, the Council assumes that the upper limit of conservation (this is called "penetration") that can reasonably be acquired by all mechanisms available. These mechanisms include more than utility programs alone. The mechanisms include incentive payments from utility and system benefit charge programs, improved state and local building codes, federal and

state appliance standards, market transformation programs, marketing efforts, voluntary programs, electricity pricing mechanisms and other tools. The Council's assumptions estimate achievable penetration rates without respect to what fraction will be acquired by utility programs versus other mechanisms such as market transformation, codes, standards, or electricity price effects.

Over the twenty-year planning horizon the long-term cumulative upper limit of market penetration in the region is 85 percent of the economically (i.e., cost-effective) and technically achievable potential for non-lost opportunity measures and about 65 percent for lost-opportunity measures over a 20 year period. In addition to long-term penetration limits, the Council sets annual near-term limits on how much conservation can reasonably be developed. These annual limits are a more critical assumption for regional planning and implementation than the long-term penetration limits.

The annual limit for non-lost-opportunity measures is 120 average megawatts per year. The annual limit for lost-opportunity measures gradually increase from 15 percent to 85 percent of annually available and cost-effective lost-opportunity measures over the first twelve years of plan implementation. These annual limits have the effect of reducing the near-term achievable potential significantly. For example, in the first ten years of plan implementation, the resultant cumulative limit of achievable potential is 62 percent of the 20-year economically and technically available potential for non-lost opportunities and 21 percent for lost-opportunity resources. In aggregate, across both non-lost opportunity and lost-opportunity resources, the Council's 5th Plan limits achievable potential to about 44 percent of the 20-year technical and economic potential over the first ten years.

There is ample historic evidence to support retaining these near-term and long-term planning assumptions, as both are supported by actual experience during the last 20 years. There are many examples of better than 85 percent penetration for lost-opportunity measures. For example, before the end of 1992 -- not quite 10 years after the Council issued its first power plan -- Washington and Oregon, the two most populous states in the region, already had met the energy-savings goals in the plan set forth for new residential and commercial construction. By 2002 all four Northwest states had met the goals of the plan for conservation in new residential construction and also exceeded the goals for conservation in new commercial buildings by at least 10 percent.

Examples of historic penetration rates for non-lost-opportunity measures are more difficult to analyze on a retrospective basis by measure because of data limitations and a lack of sustained efforts for many measures. The Hood River Weatherization Project demonstrated over 85 percent penetration in just two years with a 100 percent incentive and a large marketing effort. Recent data shows over 32 percent penetration in just six years for residential compact fluorescent lighting. Furthermore, there are two episodes of high region-wide acquisition rates in the early 1990s and 2000s that demonstrate the capability to acquire over 100 average megawatts per year through utility programs alone.

It is more relevant today to reliably predict the pace at which conservation programs can be "ramped up" and maintained over the near-term than it is to plan 20 years into the future. The

20-year timeframe stipulated in the Act for the Council's power and conservation planning is less important for conservation than the near-term acquisition rates for two reasons. In 1980, new generating plants took up to 15 years to site, license, and build. Today, new generating facilities and transmission system expansions can be brought on line in three to five years. Second, the Council develops a new power plan every five years or so. Conservation potential is reassessed in each plan which allows a fresh look at accomplishments as well as what exists for future potential.

Background

In 2007 there is a resurgent interest in the Council's approach to integrated resource planning in general, and its methodology for incorporating conservation in its Northwest power plans in particular. There are several reasons. For the region's public utilities, Bonneville's pending proposal to serve the load growth of its preference customers at "market-based" rates rather than embedded costs encourages them to consider their resource choices more systematically. In Washington State, the enactment of HB1010 and the passage of Initiative 937 (I-937) created additional impetus for the state's larger utilities, public and investor-owned. HB1010 requires utilities to prepare resource plans to demonstrate that they have adequate resources to meet their load-serving obligations.[1] I-937 requires utilities to develop all conservation that is cost-effective, reliable, and feasible using methodologies consistent with those used by the Council.[2] Because I-937 specifically references the Council's methodology there is heightened interest in understanding how the Council assesses achievable conservation potential. The purpose of this paper is to provide an overview of the Council's methodology and an assessment of whether its current planning assumptions regarding "achievable" savings are supported by evidence.

The Council's Conservation Planning Methodology

The Northwest Power Act establishes three criteria for resources included in the Council's power plans: resources must be 1) reliable; 2) available within the time they are needed, and 3) available at an estimated incremental system cost no greater than that of the least-cost similarly reliable and available alternative.[3] Beginning with its first power plan in 1983, the Council interpreted these requirements to mean that conservation resources included in the plans must be:

- technically feasible (reliable)
- economically feasible (lower cost)
- achievable (available)

The first step in the Council's methodology is to identify all of the technically feasible potential conservation savings in the region. This involves the review of a wide array of commercially available technologies and practices for which there is documented evidence of electricity

[1] http://www.cted.wa.gov/DesktopModules/CTEDPublications/CTEDPublicationsView.aspx?tabID=0&ItemID=4039&MId=863&wversion=Staging

[2] Energy Independence Act. RCW 19.285.040(1)(a) (http://apps.leg.wa.gov/RCW/default.aspx?cite=19.285.040)

[3] See Section 839a(4)(A)(i) and (ii) of the Northwest Power Planning and Conservation Act. (http://www.nwcouncil.org/library/poweract/3_definitions.htm or http://www.nwcouncil.org/LIBRARY/poweract/poweract.pdf)

savings. This step also involves determining the number of potential applications in the region for each of these technologies or practices. For example, electricity savings from higher efficiency water heaters are only "technically feasible" in homes that have, or are forecast to have, electric water heaters. Similarly, increasing attic insulation in homes can only produce electricity savings in electrically heated homes that do not already have fully insulated attics.

The second step in the Council's process is to determine the total resource cost of the energy savings from all of those measures that are technically feasible. This process requires the comparison of the all of the costs of a measure with all of its benefits, regardless of who pays those costs or receives the benefits. In the case of a more efficient clothes washer, cost includes the difference (if any) in retail price between the Energy Star model and the "standard efficiency" model, plus any utility program administrative and marketing cost. On the other side of the equation, benefits include the energy (kilowatt-hour) and capacity (kilowatt) savings, water and wastewater treatment savings, and savings on detergent costs.[4] While not all of these costs and benefits are either paid by or accrue to the region's power system, they are included in the evaluation because ultimately they are paid by or benefit the region's consumers.

Once the *net cost* (present value of all cost minus the present value of all benefits) of each of the conservation technologies or practices is determined, the technologies are ranked by cost in two "supply curves" that depict the amount of conservation resource potential available in the region. One "supply curve" represents all of the retrofit or "non-lost opportunity" resources. The other represents all of the "lost-opportunity" conservation resources.[5] The Council divides conservation resources into these two categories because their patterns of potential deployment are different. Non-lost opportunity conservation resources can be captured at any time. Lost-opportunity resources are only available during specific periods. For example, savings from improved wall insulation in new buildings are only available when the building is constructed. Savings from most appliances are available only as appliance stock turns over. If the savings from these lost-opportunity resources are not acquired within this limited window of opportunity, they are treated as lost and no longer available to be deployed.

The third step in the Council's process is to establish any timing constraints on the availability of the conservation contained in these supply curves. These constraints are needed in the Council's portfolio modeling process. The portfolio model selects the quantity and timing of all resource development. Because significant quantities of conservation are available at costs below most forecasts of future market prices, the portfolio model will "dispatch" all of the low-cost conservation immediately unless the pace of conservation deployment is constrained.

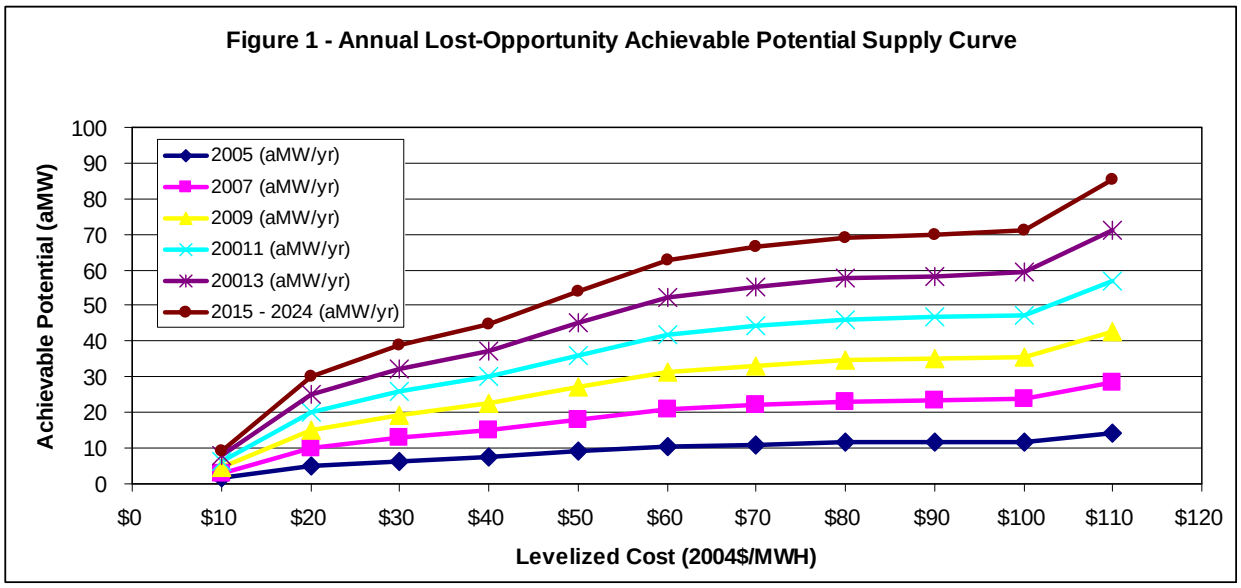
Thus the Council establishes two types of constraints on the amount of available conservation. The first is on the rate of annual deployment. This constraint represents the upper limit of annual conservation resource development. In the Council's Fifth Northwest Power Plan, non-lost opportunity resource development was limited to 120 average megawatts per year. On the other hand, lost-opportunity resources are more difficult to capture because of the limited window of

[4] More energy efficiency clothes washers use less water and hence require less detergent.
[5] Lost-opportunity resources are those that can only be technically or economically captured during a limited window of opportunity, such as when a building is built or industrial process is upgraded.

opportunity. So lost-opportunity deployment was based on penetration rates of 15 percent achievable in 2005 and increasing to 85 percent achievable over 12 years.

The second constraint is the maximum achievable potential over the 20-year period covered by the Council's power plans. In the case of non-lost opportunity resources, the Council set an upper limit of 85 percent of the technically feasible and cost-effective savings. Because lost-opportunity resources are phased in to an upper limit of 85 percent market penetration over 12 years, the cumulative 20-year penetration of lost-opportunity conservation equates to 65 percent of the technically feasible and cost-effective savings.

Figures 1 and 2 show the conservation supply curves for lost-opportunity and non-lost-opportunity resources used in the Council's Fifth Power Plan.



As shown in Figure 1, the Council's planning methodology anticipates that the share of lost-opportunity resources that is achievable at a given cost increases over time. For example, at up to a levelized cost of $60 per megawatt-hour, only 10 average megawatts of the lost-opportunity resources are considered achievable in 2005. However, for the years 2015 and beyond, just over 60 average megawatts of savings are available each year at this same levelized cost.

Figure 2 shows the total achievable potential of non-lost opportunity resources.

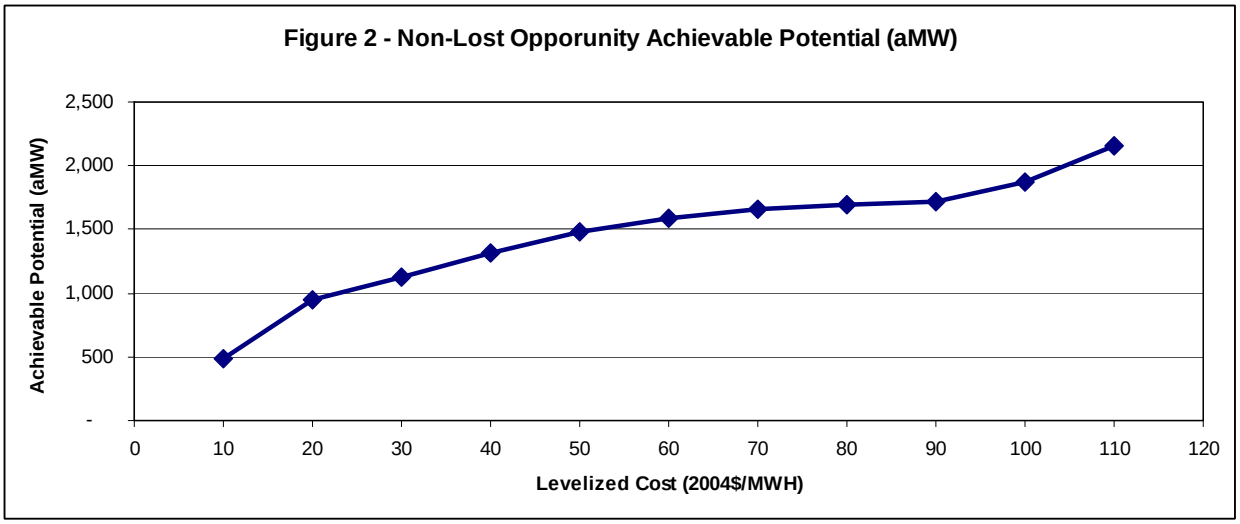


Figure 3 shows the expected value and annual deployment rate of those resources from 2005 through 2024 as well as the annual deployment rate of lost-opportunity resources over this same time period. As can be seen from Figure 3, the maximum amount of non-lost opportunity resource development remains constant at 120 average megawatts per year until 2015 and then declines significantly. This is a result of the fact that by 2015 all of the lower cost (<$50 /MWH) non-lost opportunity resources have been acquired and only in futures where prices are higher are the more costly conservation resources developed. A total of about 1,600 average megawatts of non-lost opportunity conservation resources are deployed over 20 years. But most of it, about 1,400 average megawatts, is deployed in the first 12 years. Figure 3 also shows that the amount of lost-opportunity resources developed annually increases over time until it reaches a "steady state" of around 70 average megawatts per year. That level represents 85 percent of the annual technical and cost-effective lost-opportunity potential. However, in the first 10 years, the Council assumes a gradual ramp up of achievable lost-opportunity conservation resources.

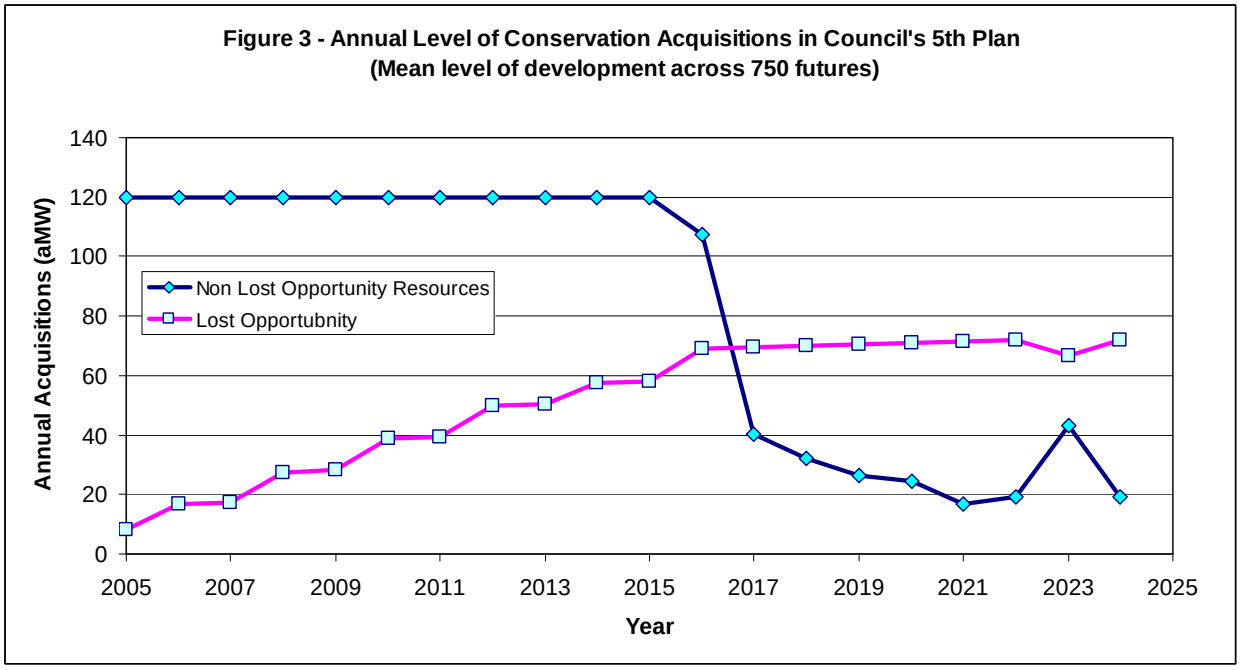
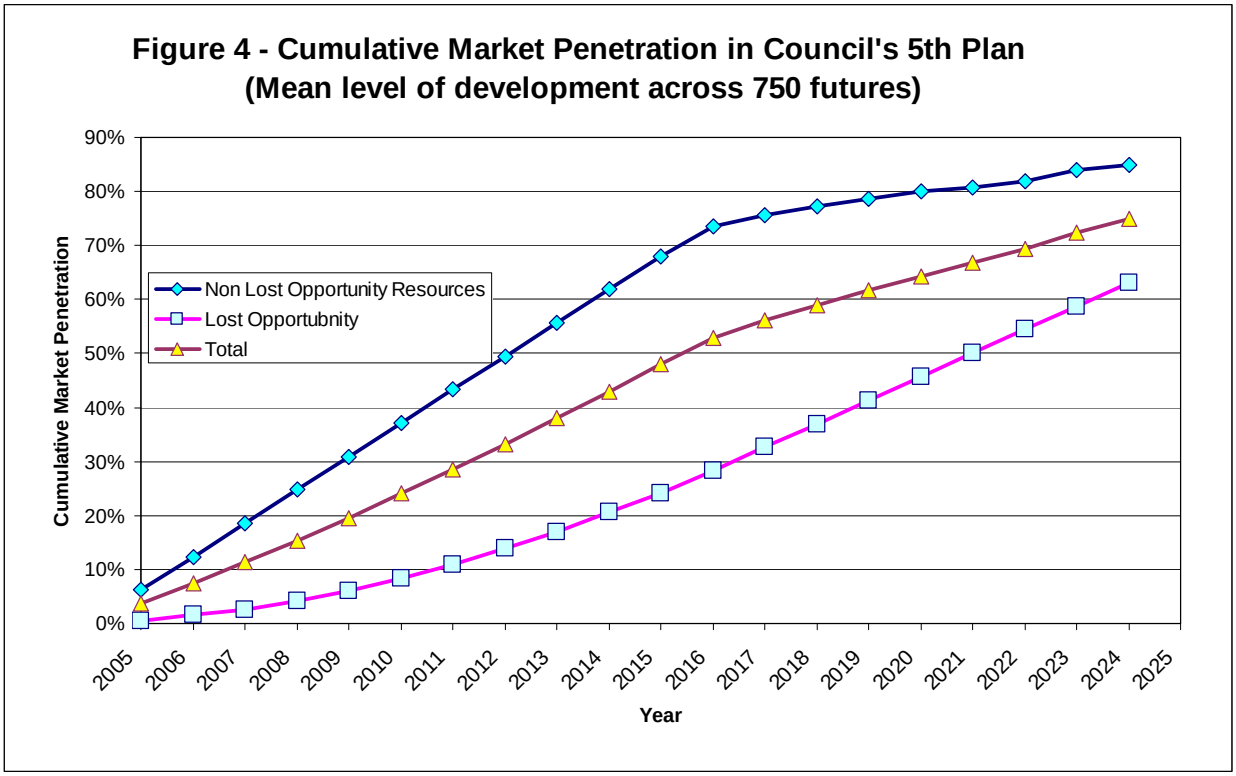


Figure 4 shows the cumulative maximum market penetration rate for lost-opportunity, non-lost opportunity and the total for conservation resources used in the Council's 5th Plan for each year covered by that plan. As can be seen from this figure, ten years into the plan (2014) the cumulative maximum market share of lost opportunity resources is 21 percent of their 20-year technical and economic potential. Also by this year, the cumulative maximum market penetration rate for non-lost opportunity resources is 62% of their of their 20-year technical and economic potential. In aggregate, across both non-lost opportunity and lost-opportunity resources the Council's 5th Plan limits cumulative achievable potential to about 43 percent of their 20-year technical and economic potential.

Basis of "Achievable Potential" Constraints

The first two filters in the Council's screening process, technical feasibility and cost, involve less "subjective" assessments than does the application of the "achievability" filter. Therefore, it is important to understand the basis of the Council's constraint on achievable conservation. The Council established the 85-percent upper limit in its first power plan in 1983 and has used this limit in all subsequent plans. The limit is based on the actual achievements in the Hood River Conservation Project sponsored by the Bonneville Power Administration and operated by PacifiCorp (then called Pacific Power and Light Company). The Hood River Conservation Project made weatherization measures available to all Hood River County residents with electric heat at no cost over a period of two years. In this project 83 percent of technically feasible (i.e. audit recommended) weatherization measures, representing 93% of the potential savings in the electrically heated residences were installed within a period of two years.[6]

[6] Hirst, E. 1987. Cooperation and Community Conservation: The Hood River Conservation Project, ORNL/CON-235, pp. 36-37.



While the Hood River project set one mark for how much conservation is achievable, the Council also adopted the 85-percent value because, in its judgment, the region had access to multiple "tools" that could be used to achieve this goal. First, the region had *20 years* to achieve the 85 percent goal, even though it was accomplished in just two years in Hood River.[7] Second, Bonneville and utilities can offer significant financial incentives to encourage consumers to adopt energy-efficient technologies and practices called for in the Council's power plans. Indeed, by definition, Bonneville and utilities can offer to pay up to the full incremental cost of all cost-effective energy-efficient technologies or practices to encourage consumers to install them. In the Council's judgment, it seems realistic to assume that the combined ability to offer the more energy-efficient technologies and practices at no additional cost to consumers over a 20-year period would result in an 85-percent market penetration of those measures. Finally, in addition to offering financial incentives, that Bonneville and utilities had the ability to work at both the state and federal level to enact standards and improve codes that would require the use of more energy-efficient technologies and practices by law.

In addition to the Hood River project, the Council is aware of only one other empirical test of comparable scale that addresses the question of how much of the technically and economically feasible conservation potential in the region is actually "achievable."

[7] The Council also viewed its 85-percent goal as having limited risk because its power plans are updated every five years. If progress toward the goal is slow, then adjustments to the timing of the development of other resources can be made.

1983 Power Plan Achievable Conservation Potential: Goals and Actual Achievements

The 1983 Plan included a range of future load growth forecasts and resource scenarios to meet them. In the "high forecast" case, the 1983 Plan targeted over 4,900 average-megawatts of conservation savings by 2002. In the "low forecast" case, the plan's target was less than 700 average-megawatts. According the Council's recent analysis, by the end of 2002 the region had acquired just over 2,300 average-megawatts of savings. It is not possible to directly compare this value with the "achievable potential" in the 1983 Plan, for two reasons. First, the "actual" load growth experienced between 1983 and 2002 does not correspond with any of the 1983 Plan's four forecasts. Thus, the amount of potentially achievable "lost-opportunity" resources that could have been developed does not match the 1983 Plan's resource assessment. Second, Bonneville and utility conservation acquisition programs did not operate in a sustained manner over this period. In fact, during the mid 1980s and late 1990s Bonneville and utility conservation programs were significantly curtailed. Therefore, any comparison between the 1983 Plan's conservation goals, which were forecast to be achievable through stable and aggressive programs over 20 years, and the actual results would be misleading.

However, it is possible to compare many of the 1983 Plan's specific estimates of achievable potential with what actually occurred. In particular, the 1983 Plan contained a detailed forecast of achievable conservation potential for residential and commercial buildings, appliances, and equipment.[8]

Residential Sector

The 1983 Plan estimated achievable conservation potential for space heating in new and existing residences, appliances, lighting, and water heating. With respect to space heating new residences, the Plan called upon the region to adopt energy codes that were equivalent to the Council's Model Conservation Standards (MCS). The MCS represented a 40-percent savings over the construction practices and codes of 1983. Table 1 below compares the "prescriptive requirements" of 1983 Model Conservation Standards with the 1992 energy code requirements in Oregon and Washington. The table shows that by 1992 energy code requirements in Oregon and Washington were nearly identical to the Council's 1983 MCS. These energy code requirements were adopted in Oregon in 1992 and in Washington in 1991, less than 10 years after the Council established the MCS.

The Council's 1983 Plan anticipated that it would take until 2002 for the region to achieve 85 percent of MCS savings potential. Table 2 shows the estimated regional (all four states) average electric space heating requirements, normalized to kilowatt-hours per square foot, for new homes built under various "vintages" of energy codes. This table shows that by 1992 the entire region had already achieved that goal (85 percent of 40 percent is 34 percent) and that by 2006 the region had slightly exceeded the Council's original MCS efficiency levels.

[8] 1983 Northwest Power and Conservation and Electric Power Plan, Volume II, Appendix K. Northwest Power Planning Council. Portland, OR.

Table 1 1983 Plan Model Conservation Standards versus 1992 Oregon and Washington Energy Code Requirements						
Component	MCS - Zone 1	MCS - Zone 2	MCS - Zone 3	WA Code - Zone 1	WA Code - Zone 2	OR Code All Zones
Ceiling/Attic	R-38	R-38	R-38	R-38	R-38	R-38
Wall	R-19	R-25	R-25	R-19	R-19	R-21
Floor	R-30	R-30	R-30	R-30	R-30	R-25
Window	U-0.37	U-0.37	U-0.37	U-0.40	U-0.35	U-0.40
Door	R-5	R-5	R-5	R-5	R-5	R-5
Slab	R-10	R-12	R-15	R-10	R-10	R-15

Table 2 Regional Average Annual Space Heating Use of New Single Family Homes Constructed Between 1983 and 2006			
Vintage	Annual Use (kWh/SF/yr.)	Percent of 1983 Use	Improvement over 1983
1983	6.3	100%	0%
1986	5.5	88%	12%
1989	5.4	86%	14%
1992	4.0	64%	36%
Current Practice - 2006	3.7	59%	41%

Further evidence of the pace of efficiency improvement in new homes is shown in Table 3. This table shows the average heat loss rate derived from field audits of a random sample of homes across the region collected as part of a regional heat pump performance evaluation. As can be seen from Table 3, the average heat loss rate of the homes in the 2001 vintage is 35 percent lower than for the homes built in 1983, clearly reflecting the improvements in energy codes and construction practices across the region. For site-built homes, regulation via state energy codes was critical to achieving high rates of market penetration. Furthermore, improvements in the state's energy codes and federal standards remain an excellent tool for capturing further energy efficiency savings.

Manufactured housing provides an example of similar achievable penetration rates, but without reliance on the regulatory approach used to achieve the savings from site built housing. The 1983 Plan assumed that the MCS did not apply to new manufactured homes because federal law pre-empted the state regulation of energy efficiency aspects of these homes. Consequently, no savings from this market segment was included in that Plan's forecast of achievable potential. However, beginning in the mid-1980s the region's manufactured housing industry began working with Bonneville and the state energy offices to develop options for improving the efficiency of these homes -- over 80 percent of which use electric space heating. Early in 1992, just as the new "MCS equivalent" energy codes for site-built homes were adopted, all of the region's manufactured home builders agreed

Table 3 - Average Heat Loss Rate for New Single Family Homes Built Between 1980 - 2003		
Vintage	Heat Loss Rate (BTU/hr/sq.ft. floor area	Improvement over 1983 Code/Practice
1980-1984	0.260	0%
1985-1988	0.247	5%
1989-1991	0.194	25%
1992-1999	0.182	30%
2000-2003	0.170	35%

to build all of their new electrically heated homes to MCS levels. Since 1988 over half (54%) of new electrically heated manufactured homes generated savings that were not envisioned as "achievable" in the 1983 Plan.

Table 4 shows the annual penetration rate achieved for "MCS-level" efficiency manufactured homes between 1988 and 2005. Two periods shown in this table are noteworthy. The first period of interest is the period between 1988 and 1994, which indicates the rapid increase in market penetration of these more efficient homes. This period demonstrates that with a concerted effort and program design, the region achieved almost 90 percent of the technically feasible and cost-effective potential of this lost-opportunity resource without regulation. It is also worthy of note that this far exceeds the pace of market share increase assumed over 12 years as the upper limit of achievability for lost-opportunity resources used in the Council's Fifth Power Plan.

Table 4 - Model Conservation Standard Equivalent Manufactured Home Shipments and Market Share 1988 - 2006			
Year	SGC/NC Shipments	Total Shipments	SGC/NC Market Share
1988	29	9,049	0%
1989	135	9,967	1%
1990	684	11,875	6%
1991	2,081	11,815	18%
1992	11,000	13,784	80%
1993	15,094	17,535	86%
1994	18,356	20,512	89%
1995	15,710	19,641	80%
1996	11,503	17,125	67%
1997	9,231	17,301	53%
1998	7,677	17,996	43%
1999	5,366	14,620	37%
2000	3,475	9,564	36%
2001	3,828	7,437	51%
2002	4,887	8,029	61%
2003	4,669	7,384	63%
2004	4,654	7,601	61%
2005	4,754	7,834	61%
1988 - 2005	123,133	229,069	54%

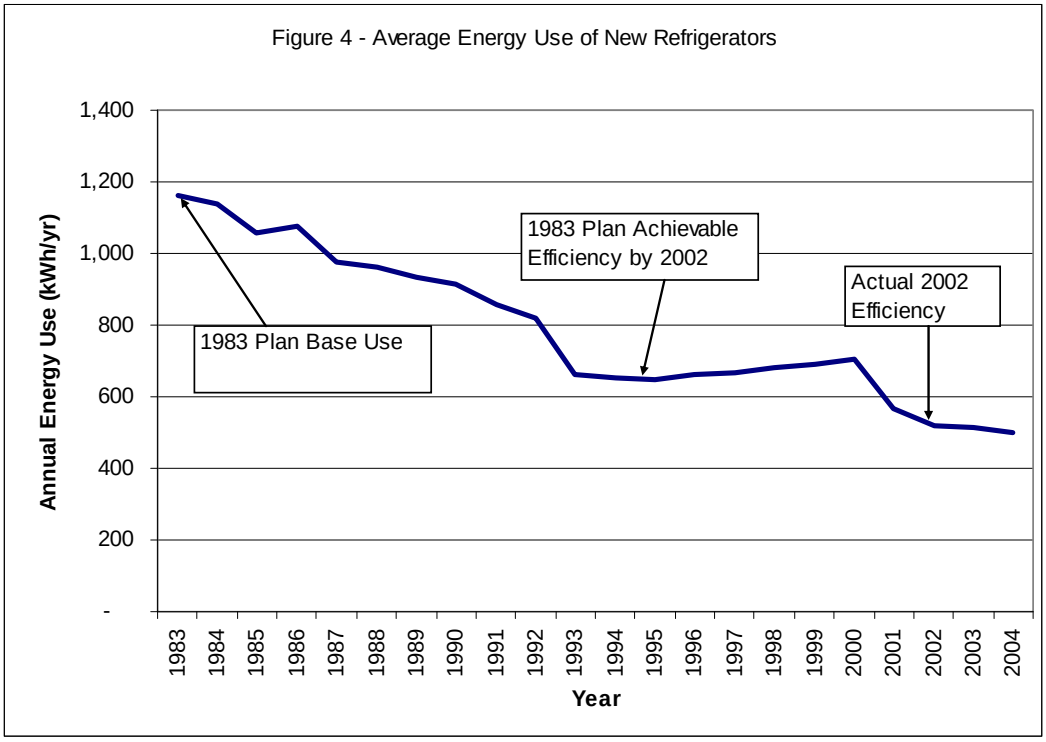
The second period of note is between 1996 and 2002 when the region's manufacturers first abandoned the production of energy-efficient homes and then returned to building these homes after discovering that the market did not want the less-efficient products they were trying to sell. While not specifically germane to the issue of "achievable potential," this market trend clearly demonstrates that even without regulation, higher levels of efficiency for manufactured housing sold in this region has become the market norm.

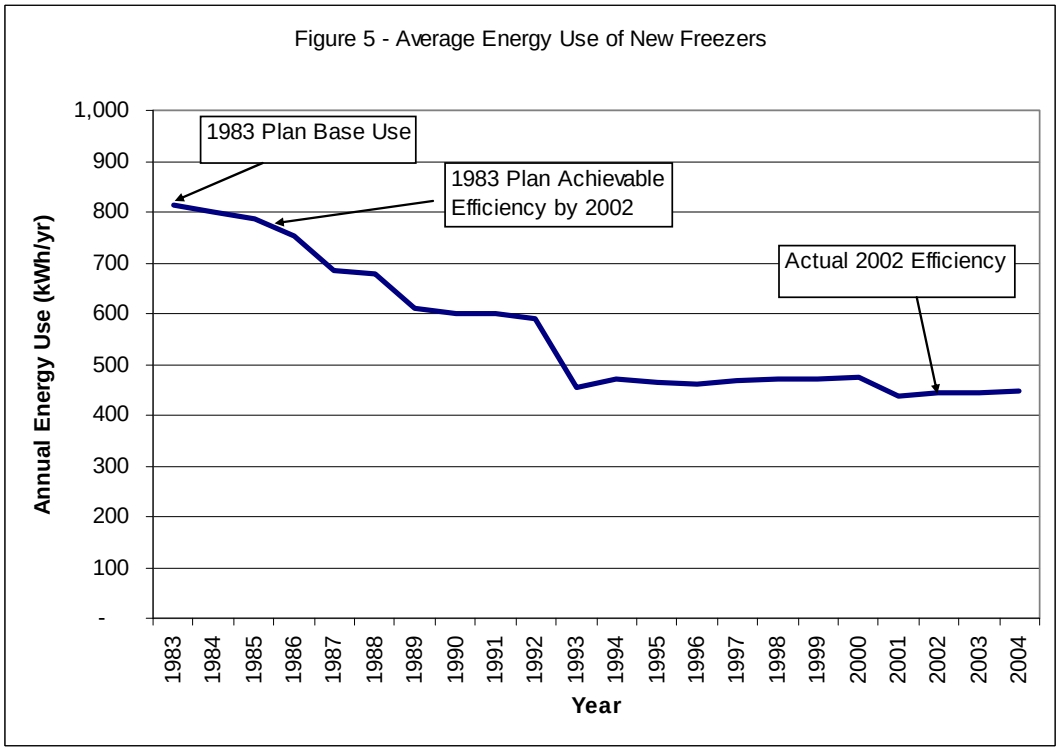
The 1983 Plan anticipated that by 2002 the region would have weatherized approximately 1.27 million existing electrically heated homes. Unfortunately, data collection processes that permit a direct comparison with this forecast were not in place during the period prior to 1991. However, current utility residential weatherization programs continue to produce savings, so it is clear that not all homes in the region have been fully weatherized. It is also clear that the pace of residential weatherization has slowed considerably since the early 1980's. For example, less than 7 average megawatts of residential weatherization savings were reported by the utilities participating in Bonneville's Conservation and Renewable Resources Rate Discount Program for the fiscal years 2001 through 2006. In comparison, Bonneville reported over 50 average megawatts of residential savings from 1991 through 1996, primarily from residential weatherization measures. While this may or may not be an indication of whether the 85 percent market saturation rate of technically and economically feasible measures has been reached, it does appear that this market is reaching saturation.

Residential appliances offer another window into the viability of achievable conservation assumptions. Data on the energy savings from major residential appliances, water heating and lighting are available. The 1983 Plan assumed that by 2003 average residential water heating use could be reduced by about 12 percent from roughly 5,150 kilowatt-hours per home per year to 4,530 kilowatt-hours per home per year. Three measures were identified to achieve this: 1) increased tank insulation; 2) lower-flow showerheads, and 3) lower the water tank temperature (from 140 degrees Fahrenheit to 130). As of 1991 the minimum federal standard for electric water heaters required that the average 50 gallon tank use less than 4,220 kilowatt-hours per year. This surpasses the Council's forecast of achievable potential with just one of these three measures (tank insulation) in less than ten years. In 1994 federal standards mandated that showerheads not exceed flow rates of 2.5 gallons per minute and that temperature on all water heaters be set at the factory at 120 degrees Fahrenheit for safety reasons. The 1994 federal standard was below the 2.75 gallons per minute showerhead flow rate assumed to be achievable in the 1983 Plan. In combination with the mandated lower water temperature, the achievable energy savings from residential water heating were nearly 50 percent higher than anticipated in the 1983 Plan.[9] Furthermore, the Council's 20-year target for improving water heating efficiency by 12 percent was exceeded in just ten years.

In 1983 the Council forecast that the achievable potential savings between the average electricity consumption of a new refrigerator and the most efficient model on the market would result in a savings of 515 kilowatt-hours per year. For freezers, the savings potential was just 35 kilowatt-hours per year. The Council did not break out its specific assumptions for clothes washers and dishwashers, but it did indicate that between these two appliances it anticipated that an annual savings of 340 kilowatt-hours should be achievable by 2002. Figures 4 and 5 show the "sales-weighted average" energy use of each of these appliances by year of purchase. As can be seen from these figures, the actual efficiency improvements for both refrigerators and freezers not only exceeded the forecast of achievable potential in the 1983 Plan, but they were achieved far early than forecast. Figures 4 and 5 are based on data reported by the Association of Home Appliance Manufacturers (AHAM), the appliance manufacturing industry trade association.

[9] In 2004, the federal minimum standard for a typical 50 gallon electric water heater resulted in electricity use of 4,060 kilowatt-hours per year.





Figures 6 and 7 show AHAM's sales-weighted average energy use for dishwashers and clothes washers for each year between 1983 and 2004. Also shown are the 1983 Plan's implied achievable potential savings for new dishwashers and clothes washers. As was the case with refrigerators and freezers, it appears that the 1983 Plan's forecast of achievable savings for dishwashers proved to be overly conservative. On the other hand, the Council's assessment of

achievable efficiency improvements in clothes washer efficiency roughly correspond to the actual improvement in this appliance's energy use in 2002. However, it should be noted that by 2004, just two years later, the sales weighted average energy use of new clothes washers was *almost half* that anticipated in 1983 for machines sold in 2002.

Figure 6 - Average Energy Use of New Dishwashers

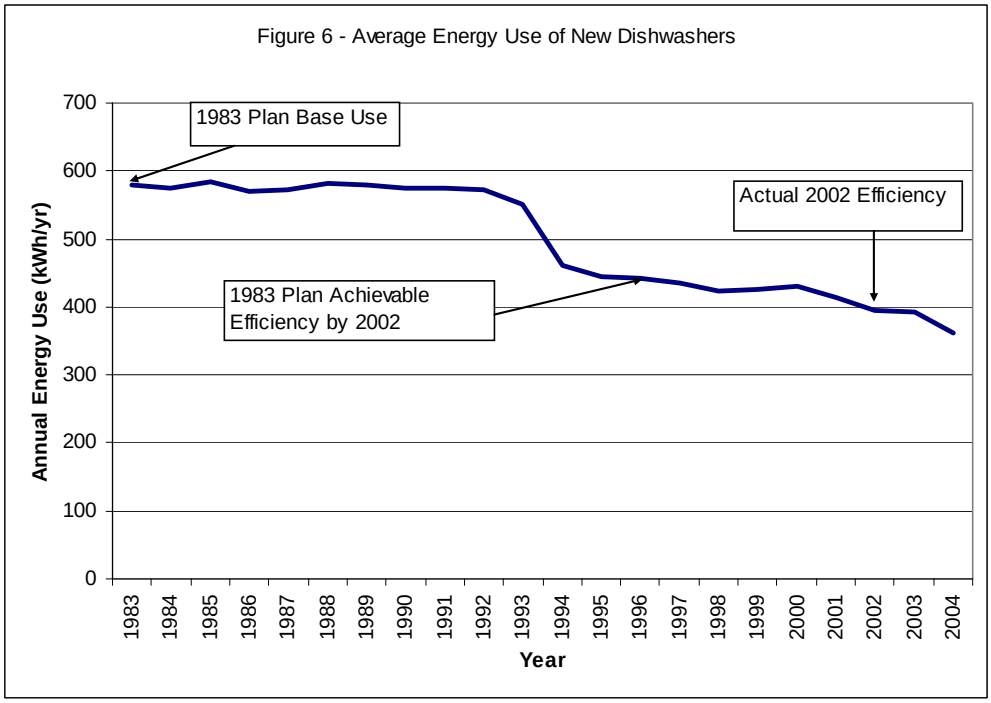
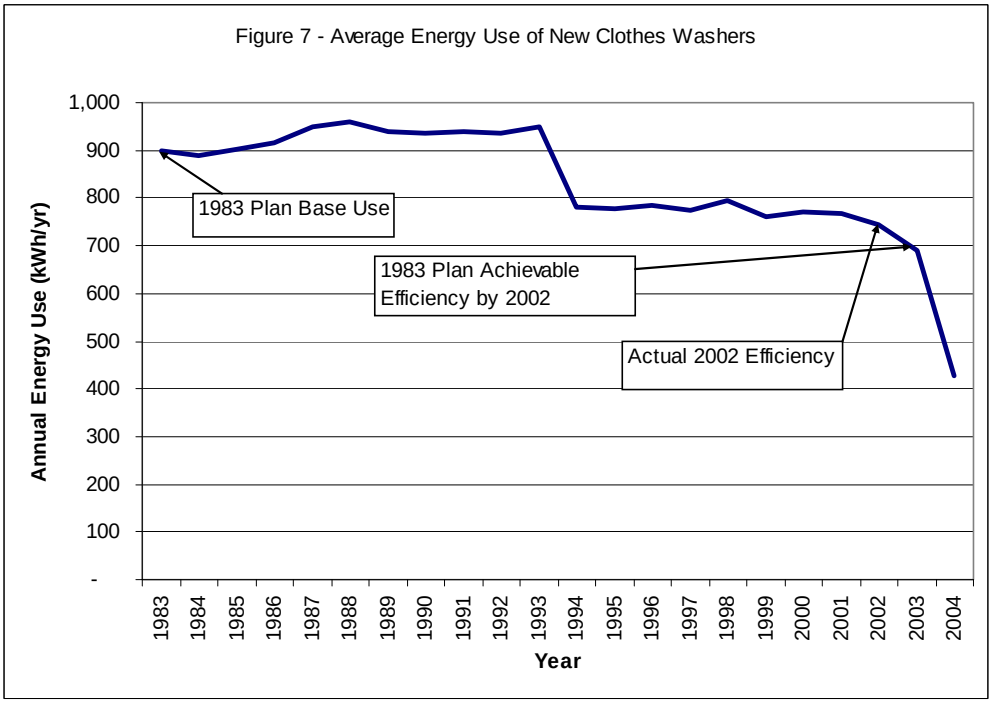


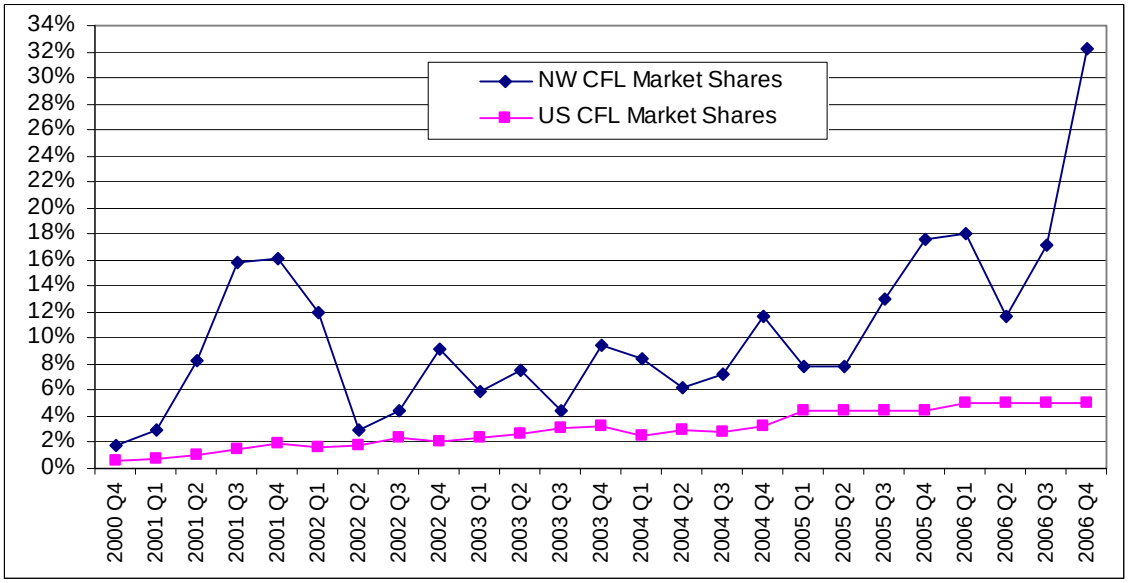
Figure 7 - Average Energy Use of New Clothes Washers



The 1983 Plan also anticipated efficiency improvements in residential lighting. That plan assumed that by 2002 the average home would use approximately 170 kilowatt-hours per year less for lighting than it did in 1983. While the 1983 Plan assumed that linear fluorescent lighting technologies could be employed to achieve these savings, it appears that compact fluorescent lamps (CFLs) are actually being used to achieve most of these savings. Based on surveys done for the Northwest Energy Efficiency Alliance, it appears that on average homes in the region had two to three CFLs installed by the end of 2002[10]. Based on the Council's current savings assumptions, this would translate into between 70 and 105 kilowatt-hours per home per year of savings. These savings are approximately half those anticipated as being achievable in 1983.

Since 2002, the penetration of CFLs in the residential sector has increased dramatically. Figure 8 shows that the regional market share of CFLs increased from 9 percent in the fourth quarter of 2002 to 32 percent in the fourth quarter of 2006. Such evidence does not prove the region can reach an 85 percent penetration rate in 20 years. But it is a strong indicator that high penetration rates for some non-lost opportunity measures are possible in a short time frame. The high market share for CFLs is due to a combination of mechanisms which rely heavily on federal and regional market transformation strategies, as well as utility incentives which have been a fraction of measure cost.

Figure 8 -Estimated ENERGY STAR CFL Market Share for the Northwest and U.S., 2000-2006



Sources: NW CFL sales 2000-2006: PECI and Fluid Market Strategies sales data reports; and NEEA estimate of an additional 1.5 million WAL-MART CFLs sold region-wide in 2006 (See Appendix A [Section 9.1.1] of MPER3 for more detail); U.S. and NW population estimates 2000-2006: U.S. Census 2004; U.S. market shares and non-CFL sales 2000-2005: Itron California Lamp Report (2006); U.S. market share 2006: D&R International (personal communication).

[10] ECONorthwest, Market Progress Evaluation Report, No. 1 (E02-101), prepared for NEEA June 20, 2002.

Commercial Sector

The available data for commercial buildings tell a similar story; today's energy codes far exceed the achievable penetration rates identified by the Council twenty years ago. In the 1983 Plan (as is the case in the Fifth Power Plan) the largest portion of the commercial sector's achievable conservation potential was forecast to come from improvements in lighting. Lighting was estimated to make up about 45 percent of commercial sector electric use in 1983. Lighting power density, as measured by watts per square foot, is one metric that can be used to gauge the progress in lighting efficiency over time. Table 5 compares the lighting power densities for four major building types forecast to be achievable in the Council's 1983 Plan through adoption of its Model Conservation Standards for New Commercial Buildings with the current requirements of the commercial energy codes in the region. Table 5 shows that for office buildings and schools, current code requirements far exceed the levels of efficiency forecast to be achievable in 1983. For retail stores and warehouses, the 1983 Plan's assessment of achievable efficiency levels appears to be very near current code requirements. Offices, schools, retail stores, and warehouses make up about 60 percent of total commercial sector building floor space.

In addition to lower lighting power densities, the 1983 MCS also made recommendations on several lighting-control measures that have largely been adopted -- or exceeded in local codes throughout the region. The 1983 MCS included switchable lighting circuits that would allow manual or automatic control to turn off half the lighting circuits in spaces over 400 square feet. Current energy codes in all four states have adopted similar or superior provisions. The 1983 MCS called for automatic controls on outdoor lighting to turn lights off during daylight hours. That measure has been adopted in all local codes in the region. The 1983 MCS also required lighting circuits be designed to accept manual or automatic day lighting controls for areas within 12 feet of windows in office and school spaces. That measure is in code in Washington. In addition, current energy codes go much farther in lighting controls than was anticipated in the 1983 MCS. For example, occupancy sensors are required in Oregon and Washington on certain classroom, office and conference spaces. Automatic night-time control of interior lighting is required in all four states for all but the smallest buildings.

Table 5
Commercial Building Maximum Lighting Power Densities in 1983 Commercial Model Conservation Standards and Current Regional Energy Code Requirements

	Lighting Power Density (watts/sq.ft.)				
Building Type	1983 Commercial MCS	OR 2004	WA 2004	ID & MT	Seattle 2004
Office buildings	1.5	1.0	1.0	1.0	1.0
Retail Stores	1.5	Varies 1.5+	Varies 1.5+	Varies 1.5+	Varies 1.5+
Schools	2.0	1.1	1.35	1.2	1.2
Warehouses	0.7	0.5	0.8	0.8	0.5

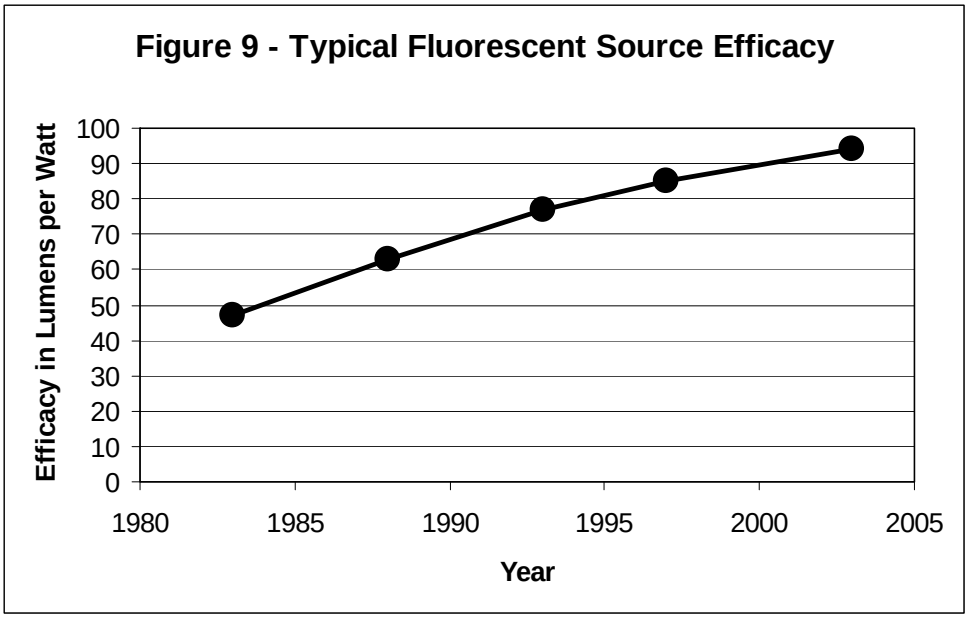
Lighting improvements for existing commercial buildings show similar trends of exceeding 1983 estimates of conservation potential. Two extensive surveys have been conducted to assess the energy-related characteristics of existing commercial buildings in the region. The first was carried out in 1987, about five years after the 1983 Plan was adopted. The second was completed in 2002. Table 6 shows the average lighting power density of the sample of existing buildings in 1987 and these same buildings in 2001. During this time period lighting power density was reduced by 20 percent across all buildings and from 13 to 21 percent in office and retail buildings. The 1983 Plan did not estimate lighting conservation potential specifically for existing commercial buildings. But overall electric conservation potential was identified as about 28 percent of electric use in 1982. By 1987, utility programs had already started to take a bite out of the conservation potential identified in 1983. Lighting represented about 45 percent of electricity use in commercial buildings in 1983. So a 20-percent reduction in existing lighting power density in the 14 years between 1987 and 2001 represents at least a 10-percent reduction in overall electric use for older buildings. Because lighting represents 45 percent of all commercial uses of electricity, the 25-percent reduction in lighting power density shown in Table 6 for existing buildings translates into 11 - 12 percent overall building efficiency improvement.

Table 6 - Change in Lighting Power Density for Existing (Pre-1987) Buildings Between 1987 and 2001

	Lighting Power Density (watts/sq.ft.)			Reduction in Lighting Power Density (%)		
Audit/Survey Date	All Buildings	Offices	Retail	All Buildings	Offices	Retail
As found in 1987	1.5	1.6	1.9			
As found in 2001	1.2	1.4	1.5	20%	13%	21%

Another gauge of lighting improvement is to look at the huge technological improvement in lighting efficacy, particularly fluorescent lighting, which accounts for about two thirds of commercial lighting. At the time of the 1983 Plan, improvements in lighting were available through improved fixture design, reduced lighting levels, and conversion from incandescent lighting to fluorescent or other high-efficiency lighting. Only modest improvements, on the order of 10 percent, were available in the efficacy of fluorescent light sources themselves -- the lamps and ballasts. But since 1983, improvement in the efficacy of fluorescent light sources has doubled. Figure 8 shows fluorescent source efficacy, as measured by lumens of light output per watt of electric input. Source efficacy for fluorescent lighting, the ability to turn electricity into light, increased from 47 to 94 lumens per watt over the twenty years from 1982 to 2002. In 1987, typical office lighting power density was about 2.0 watts per square foot[11]. By combining the 50-percent improvement in fluorescent source efficacy with additional improvements in fixture design, reduced lighting levels, and conversion from incandescent lighting to fluorescent lighting and other high-efficacy sources, it is clear why new office lighting designs can get to 0.7 watts per square foot, about one-third of what they were in 1983 and well below what was thought possible at the time.

[11] PNNonRes Phase II Results, Table 10c



In addition to improvements in lighting efficiency, the 1983 Plan forecast achievable savings from increases in the efficiency of heating, ventilating and air conditioning (HVAC) equipment. Table 7 compares the 1983 Plan's expected minimum efficiency requirements for cooling equipment efficiency levels with the minimums have been required by code in all states in the region since 2001. What is clear is that current minimum efficiency requirements far exceed those envisioned as achievable in 1983. The minimum efficiency requirements (SEER) for cooling equipment under 65,000 Btu/hr in all Northwest states is 66 percent above that expected in the 1983. Similarly, for larger equipment the minimum efficiency requirement is 22 percent above that anticipated for 2002 in the 1983 commercial MCS.

Table 7 - Commercial HVAC Equipment Efficiency Specifications				
System Type	Capacity Under 65,000 Btu/hr		Capacity 65,000 Btu/hr and Larger	
	1983 Achievable SEER[12]	Current Code Minimum SEER	1983 Achievable EER[13]	Current Code Minimum EER
Air Cooled	7.8	13.0	8.2	11.0

Irrigation Sector

In 1982 total irrigated acreage in the region was roughly 8.9 million acres and irrigation electricity use that year was 695 average megawatts or 655 kilowatt-hours per acre per year. In 2002 the irrigated acreage in the region was virtually unchanged from 1982 while electricity used for irrigation had dropped to 595 average megawatts or 579 kilowatt-hours per acre per year.

[12] SEER = Seasonal Energy Efficiency Ratio. This is the annual ratio of electricity used per unit of cooling energy provided. A SEER of 6.826 equals an annual coefficient of performance of 2.0 (6,826 Btu of cooling for each kilowatt-hour -- 3413 Btu -- of electricity use)

[13] EER = Energy Efficiency Ratio. This is the instantaneous ratio of electricity used per unit of cooling energy provided.

The 1983 Plan assumed that if all achievable efficiency measures (e.g., reduced pressure, center pivot sprinkler systems) and practices (e.g., irrigation water scheduling) were implemented by 2002, electricity use for irrigation would drop to 596 kilowatt-hours per acre per year. Actual irrigation efficiency gains, therefore, slightly exceeded those forecast in the 1983 Plan.

Industrial Sector

Energy efficiency progress is difficult to measure on a broad scale in the industrial sector. Confounding issues include the changing mix of industries, products, and feedstocks, the general lack of applicable codes and standards, and the ability to substitute fuel and electricity in some processes. In 1983 the Council's forecast of achievable conservation potential was equivalent to about 6 percent of non-DSI industrial electric loads. Incremental improvements in minimum efficiency levels for electric motors alone have yielded a good share of that potential over the last twenty years. Motors comprise something on the order of 60 percent of industrial energy use. Minimum efficiency standards now in place are a 3 to 10 percent improvement over 1983 efficiency levels for motor sizes covered by federal standards.

Further, motor efficiency is a small part of what has been accomplished in the industrial sector. There are many industrial plants and processes that have far exceeded a 6-percent efficiency improvement by improving their processes and facilities. These include documented improvements of 20 to 30 percent in cold-storage facilities, savings of 15 to 30 percent in compressed air systems for many plants across different industries, lighting improvements of about 50 percent in manufacturing spaces with high ceilings, and many industry-specific process changes in the range of 20-percent improvement. In addition, NEEA has operated several successful industrial market transformation projects. For example, the NEEA and Siemens project on silicon crystal-growing facilities reduced electric power consumption for producing silicon crystals by 50 percent[14]. Savings from this project occurred in an industry that barely existed in 1983.

Summary and Conclusions

There is ample empirical evidence to support retaining the Council's assumptions for the upper limit on achievable conservation potential. Both the 85-percent upper bound on the achievable potential for non-lost opportunity resources and the approximately 65-percent cumulative upper bound on the achievable potential for lost-opportunity resources over a 20-year period are supported by experience of the last 20 years. Further, the Council's assumed maximum near-term achievable acquisition rates, which are the critical limiting factor, are well-supported and may be conservative when compared to what has occurred in practice.

In its 1983 Plan the Council forecast that significant improvements in the energy efficiency of a wide array of residential and commercial appliances, equipment and buildings could achieve an 85-percent market share by 2002. With some exceptions, nearly all of the actual improvements in residential appliances and water heating have far exceeded the 1983 Plan's expectations. In its

[14] Market Progress Evaluation Report, Silicon Crystal Growing Facilities, No. 2, Report #E01-090, prepared by Research Into Action, Inc., for NEEA, November 2001.

1983 Plan the Council called upon the states in the region to improve residential energy codes by approximately 40 percent and commercial energy codes by 10 percent. Before the end of 1992 the two most populous states in the region, representing over 80 percent of new home construction and nearly 85 percent of new commercial floor space, had met the savings goals. By 2002 all of the states in the region had met the Council's original residential MCS and exceeded its original commercial MCS by at least 10 percent.

The 1983 Plan forecast that a 43-percent efficiency improvement in new residential refrigerators was achievable by 2002. This level of efficiency gain was not only achieved 10 years early (1992), but by 2002 new refrigerators used only 55 percent of the energy they did in 1983, even though they were both larger and more of them were frost-free. Freezer and dishwasher efficiency improvements also far exceed the 1983 Plan's assessment of achievable potential. Freezers met the first Plan's efficiency target in 1984, and by 2002 these appliances were using 45 percent less energy that was viewed as "achievable" in 1983. Dishwashers in 2002 used 32 percent less energy than they did in 1983, far exceeding the first Plan's goal of a 24-percent savings.

It is important to recognize that energy codes for buildings and appliance efficiency standards have contributed greatly to the acquisition of conservation over the last twenty years. Many of the conservation accomplishments outlined in this retrospective rely in part on codes and standards to achieve high penetration rates. Utility influence has been critical to the adoption of better codes and standards. Utility programs have demonstrated that new measures beyond codes are viable and that some can eventually be codified. Past performance does not guarantee future success. But with respect to codes and standards, the region is better positioned today to employ these mechanisms for future conservation acquisition than when the 1983 plan was adopted. When the first plan was adopted there were no federal appliance standards, state energy codes had only been in place for two years and there was no established process for code revision. All of these mechanisms are now in place.

A few conservation measures included in the 1983 Plan, such as residential heat pump water heaters, have not yet realized the anticipated penetration. However, savings from measures not envisioned in the 1983 Plan, such as those from low-flow showerheads and energy-efficient new manufactured housing, more than offset the unrealized savings. The fact that the first plan did not perfectly forecast these outcomes should not alter the overall finding with regard to "achievability." The Council updates its plan's every five years. Adjustments both upward and downward to its assessment of what is technically and economically achievable can be made on the basis of actual program experience and technological changes. Since each planning cycle offers the Council the opportunity to reassess the risk of relying on conservation to defer or reduce the scale of other resource additions near-term experience will always trump long-term forecast.

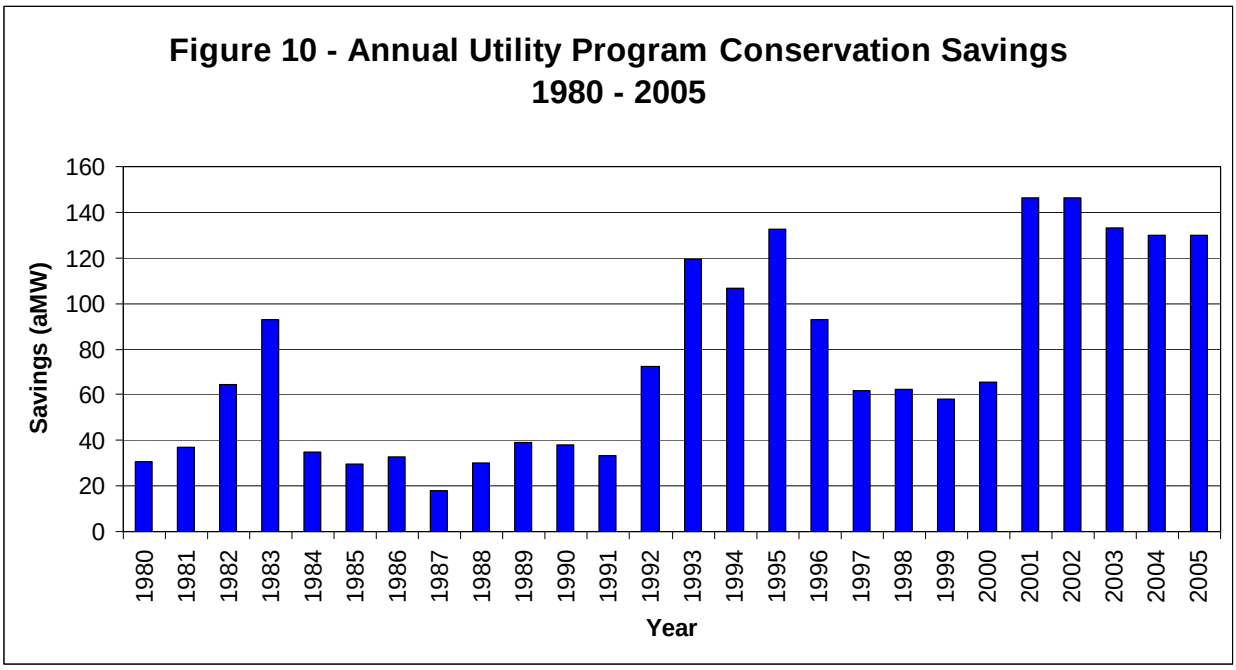
While the Council staff believes there is ample empirical evidence to support existing assumptions of 20-year achievable penetration rates, it is important to note that the 20-year forecast window for achievable conservation is less important today than it was in 1983 when

generating resource lead times were long[15]. New generating facilities and transmission system expansions now can be brought on line in three to five years. Therefore, the need to accurately predict the achievable market penetration rate of an energy efficiency measure 20 years into the future is greatly reduced. Much more relevant to present-day resource planning decisions is what is achievable in the near term. The pace at which conservation programs can be "ramped up" and maintained over the near-term period is critical and of more practical importance than 20-year forecasts. There is solid evidence, presented here, that near-term achievable conservation rates have been higher than the Council's planning assumptions for both lost-opportunity and non-lost opportunity measures.

The historic effect of codes and standards in comparison to the Council's 1983 Model Conservation Standards reveals that in most cases, Council forecasts of 20-year achievable potential for lost-opportunity measures were met or exceeded in 10 years or less. In fact, several exceed 100-percent penetration in ten years, far exceeding the Council's near-term assumption of approximately 20-percent penetration in 10 years for lost-opportunity measures.

There is also ample evidence from utility programs that indicate conservation acquisition programs for non-lost opportunity measures can be scaled up rapidly. Figure 9 shows annual regional utility program conservation savings from 1980 through 2005. There are three periods, in the early part of each decade, where program savings have more than doubled in just one or two years. These increases were driven almost entirely by acceleration of programs for non-lost opportunity measures. In the last five years the region has maintained acquisition levels of 130-150 average megawatts per year. Retrofit conservation comprises 110-120 average megawatts per year of that total. If that pace were maintained, it would take 12 to 14 years, not 20, to reach the 85-percent penetration rate for the 1,500 average megawatts of cost-effective non-lost opportunity conservation identified in the Fifth Power Plan.

[15] The rationale for selecting a 20-year perspective for realistically achievable conservation in the 1983 Plan stemmed from the fact that at that time it took as much as 15 years to construct major central-station generating facilities. Therefore, both load forecasts and resources plans had to predict when construction should start far in advance of actual need.



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