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May 3, 2018

B.C. Sustainable Energy Association
c/o William J. Andrews, Barrister & Solicitor
1958 Parkside Lane
North Vancouver, B.C.
V7G 1X5

Attention: Mr. William J. Andrews

Dear Mr. Andrews:

Re: FortisBC Energy Inc. (FEI)

Project No. 1598946

2017 Long Term Gas Resource Plan (LTGRP) (the Application)

Response to the B.C. Sustainable Energy Association and Sierra Club of British Columbia (BCSEA) Information Request (IR) No. 1

On December 14, 2017, FEI filed the Application referenced above. In accordance with British Columbia Utilities Commission Order G-33-18 setting out the Regulatory Timetable for the review of the Application, FEI respectfully submits the attached response to BCSEA IR No. 1.

If further information is required, please contact Ken Ross at (604) 576-7343.

Sincerely,

FORTISBC ENERGY INC.

Original signed:

Diane Roy

Attachments

cc (email only): Commission Secretary
Registered Parties

1.0 Topic: FEI efforts to reduce carbon emissions from the natural gas stream

Reference: Exhibit B-1, p. ES-3; pdf p.15

FEI states that it "is also working with other entities to examine the potential for new technologies to reduce carbon emissions from the natural gas stream in order to help meet provincial emissions targets while maintaining throughput on the natural gas system and allowing customers to continue taking advantage of lower cost natural gas."

1.1 Please describe the specific efforts that FEI is referring to.

Response:

FEI is exploring the following projects that support innovative gas technologies that will help FEI meet its customers' preferences for gas while also addressing provincial plans for reducing GHG emissions. To date, these include:

1. A project that seeks to prove the commercial scalability of RNG from wood waste. If such cellulosic biogas does become available at reasonable prices, it could dramatically increase RNG supply enabling FEI to substantially increase its ability to serve demand via its RNG program;

2. Work with the Canadian Gas Association (CGA) and its member companies to explore injection of hydrogen into the natural gas pipeline system. Hydrogen combusts without generating GHG emissions and can be derived via electrolysis or methane reformation. As such it may be employed to decarbonize the natural gas stream by storing in the form of hydrogen in the gas pipeline system, energy generated from renewable sources or using carbon capture technologies;

3. A pilot project to capture carbon emissions from commercial natural gas end-use appliances such as commercial furnaces or boilers, and make the captured by-product available in a commercially usable format;

4. Investigating the commercialization of gas-driven heat pumps which could help natural gas appliances exceed 100 percent end-use efficiency;

5. Investigating a commercial deep energy retrofit pilot with the City of Vancouver;

6. Investigating using AMI for load aggregation, efficiency and detection of fugitive emissions; and

7. Conducting analysis to determine carbon intensity of RNG in the BC Renewable and Low Carbon Fuel Requirement Regulation and developing programs to promote RNG use in transport.

As discussed in Section 9, Action Item 8, FEI believes it is important that the Utility become a more active participant in the development of innovations that will help its customers reduce emissions and keep energy costs low, while maintaining the benefits of diverse energy systems and customer choice in their energy consumption decisions. As such, FEI may seek approvals to increase its ability to financially support these types of investigations on behalf of its customers.

1.2 Please describe any efforts by entities FEI is working with that would reduce upstream GHG emissions.

Response:

FEI is an active participant in the Natural Gas Innovation Fund (NGIF), created by the Canadian Gas Association, which works collaboratively with various stakeholders including utilities, industry and government to drive natural gas technology innovations both upstream and downstream.

2.0 Topic: Increasing demand for natural gas

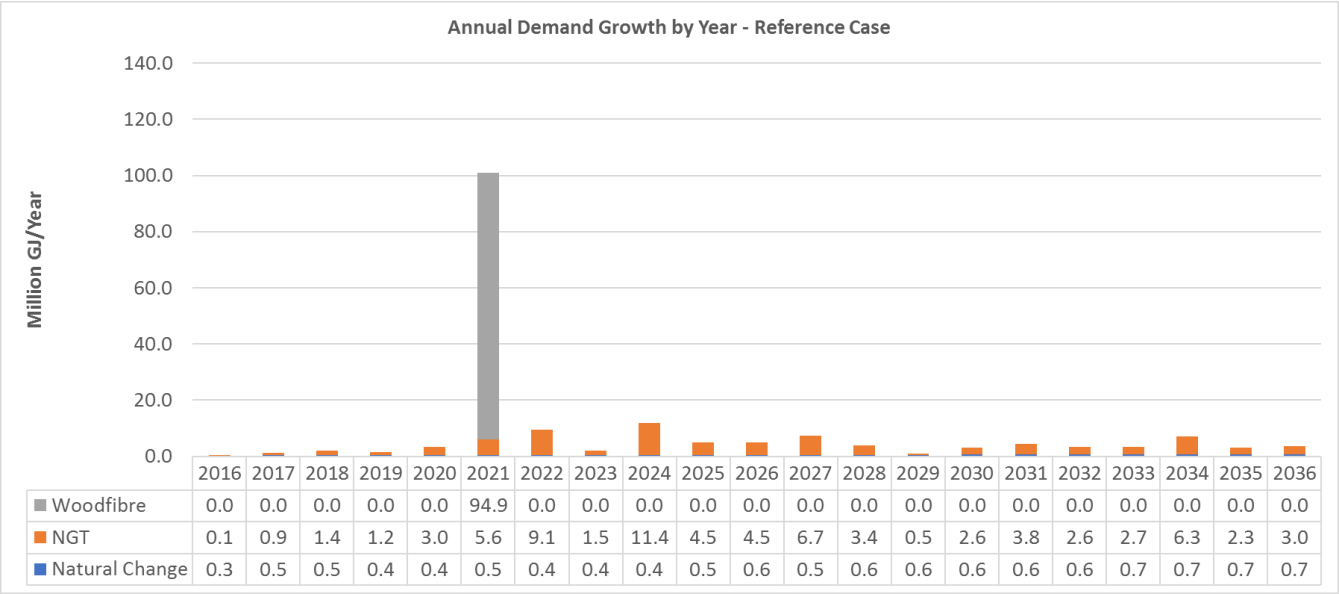
Reference: Exhibit B-1, End-Use Total Annual Demand Forecast, p. ES-2, pdf p.16.

Figure ES-1: End-Use Total Annual Demand Forecast shows the Reference Case demand growing from just under 200 GJ/Year in 2015 to roughly 280 GJ/Year in 2035.

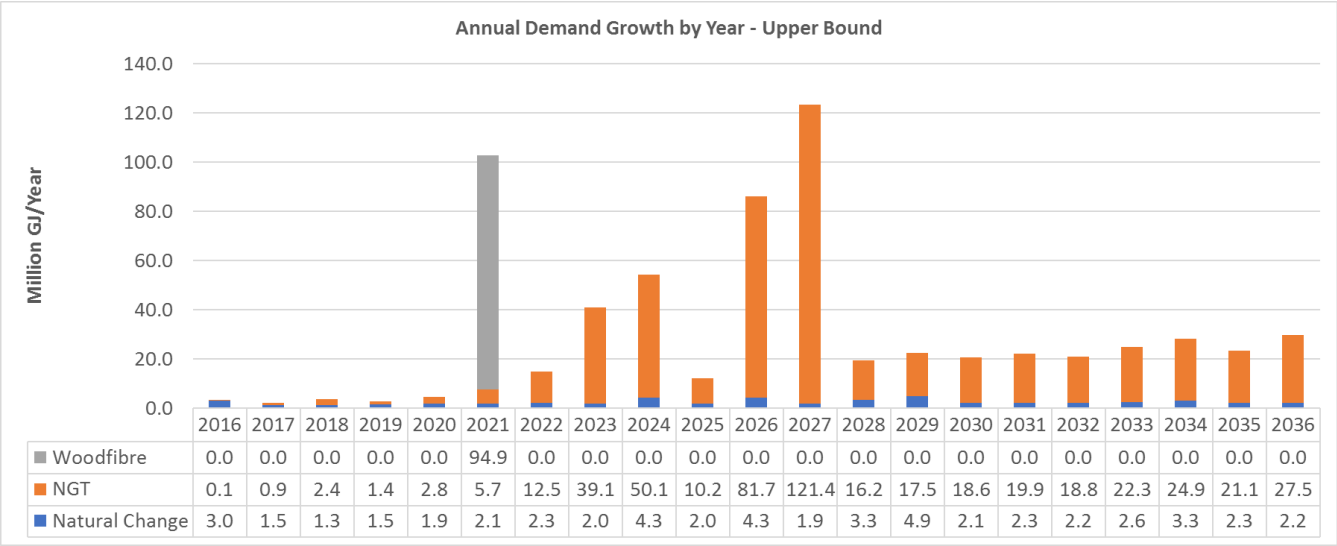
2.1 Please provide graphs and tables showing demand growth by year divided between "natural growth" and the results of FEI's load building activities, for the Reference Case, Upper Bound, and Lower Bound.

Response:

The three tables below outline annual demand growth in GJ by year for the end-use method Reference Case, Upper Bound, and Lower Bound, respectively. The tables separately display the potential load building impacts as they are forecast in the 2017 LTGRP, i.e. NGT and Woodfibre LNG Project. The 2017 LTGRP does not forecast the potential impacts of the Connect to Gas program, which FEI newly launched in Q3 of 2017. These impacts are likely to be immaterial in relation to the impacts of NGT and the Woodfibre LNG Project. As explained in FEI's response to BCSEA IR 1.28.1, FEI conducts various direct and indirect load-building activities as part of its normal business operations in order to meet its customers' energy needs while maintaining rate competitiveness. The 2017 LTGRP does not forecast as separate individual categories the various direct and indirect impacts of these load-building activities.



	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
Woodfibre	0.0	0.0	0.0	0.0	0.0	94.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NGT	0.1	0.9	1.4	1.2	3.0	5.6	9.1	1.5	11.4	4.5	4.5	6.7	3.4	0.5	2.6	3.8	2.6	2.7	6.3	2.3	3.0
Natural Change	0.3	0.5	0.5	0.4	0.4	0.5	0.4	0.4	0.4	0.5	0.6	0.5	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.7



	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
Woodfibre	0.0	0.0	0.0	0.0	0.0	94.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NGT	0.1	0.9	2.4	1.4	2.8	5.7	12.5	39.1	50.1	10.2	81.7	121.4	16.2	17.5	18.6	19.9	18.8	22.3	24.9	21.1	27.5
Natural Change	3.0	1.5	1.3	1.5	1.9	2.1	2.3	2.0	4.3	2.0	4.3	1.9	3.3	4.9	2.1	2.3	2.2	2.6	3.3	2.3	2.2

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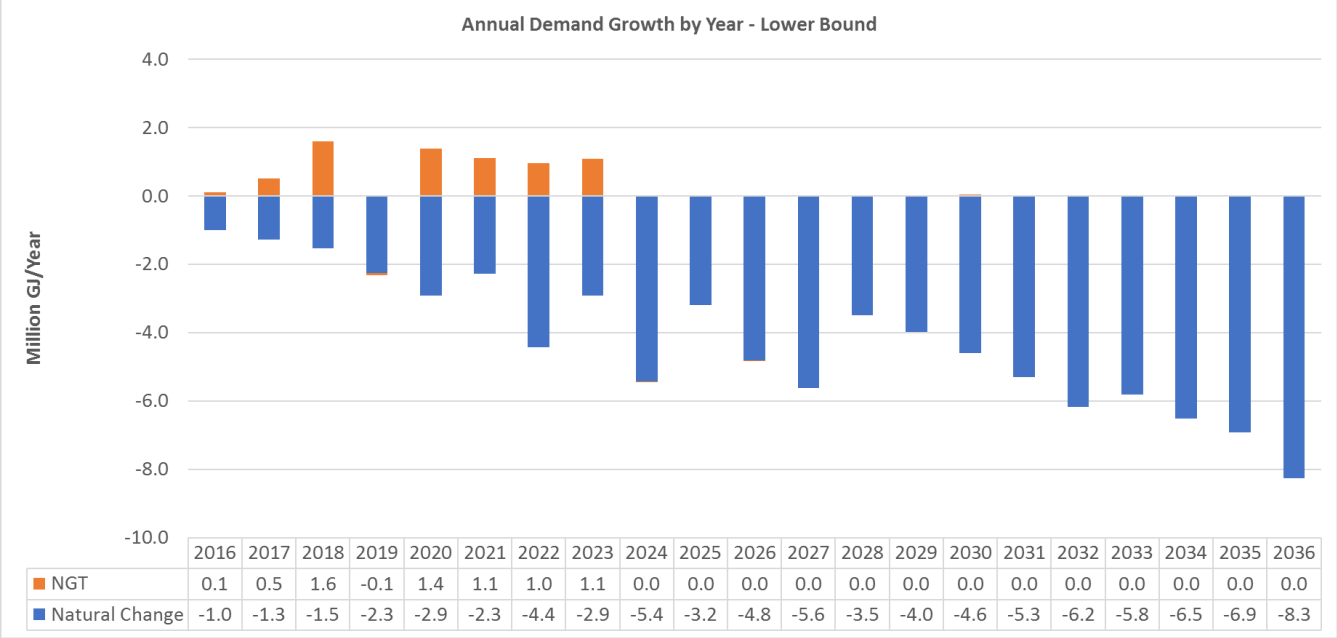

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
NGT	0.1	0.5	1.6	-0.1	1.4	1.1	1.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Natural Change	-1.0	-1.3	-1.5	-2.3	-2.9	-2.3	-4.4	-2.9	-5.4	-3.2	-4.8	-5.6	-3.5	-4.0	-4.6	-5.3	-6.2	-5.8	-6.5	-6.9	-8.3

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3.0 Topic: Rate impacts of load building

Reference: Exhibit B-1, p. ES-5-6, pdf p.14-15

FEI says that its proposed load-building activities, including "fuel switching to natural gas for space heating and hot water, NGT to shift fleets, heavy duty vehicles, marine and other vessels from higher carbon, petroleum based fuels to natural gas, and seeking to add new, large industrial customers,... are important for customers by adding throughput to the natural gas system and thereby reducing rates while also helping to achieve government energy and emissions policy objectives." [Pdf pp.17-18, ES-5- 6, underline added]

Further, FEI states:

> "Growth in peak demand is among the most significant challenges for FEI's long term planning. When forecast peak demand exceeds available capacity, a gas system expansion is required. ... Infrastructure projects on transmission systems to address system capacity constraints are often large and take many years to plan and execute." [p.ES-7, pdf p.19, underline added]

3.1 Please confirm, or otherwise explain, that FEI's load-building activities reduce delivery rates on a 'moment in time' basis but can increase delivery rates by accelerating costly system capacity expansions.

Response:

Confirmed. However, FEI notes the delivery rate impacts (benefits) of increasing throughput to the FEI system generally outweigh the delivery rate impacts (costs) of accelerating/increasing infrastructure investments needed to meet the increased demand due to load-building activities. Table 8-2 in Section 8.6 of the Application shows that the Upper Bound Scenario has an overall lower cumulative and compounded annual delivery rate impact than the Reference Case between 2015 and 2036. To further demonstrate the difference in delivery rate impacts between increasing throughput and accelerating system capacity expansions, the table below provides a breakdown of the two impacts under the Base Scenario (without C&EM and NGT).

	Base (w/o C&EM & NGT)		
	Cumulative Delivery Rate Change (2015-36, %)	Compound Annual Delivery Rate Change (2015-36, %)	Reference
Reference Case	60%	2.2%	Table 8-2 of Application
Upper Bound annual demand w/ Reference Case system capacity expansion	**-28%**	**-0.8%**	
Reference Case annual demand w/ Upper Bound (accelerated) System Capacity Expansion	**+4%**	**+0.1%**	
Upper Bound	36%	1.5%	*Sum of above* (also see Table 8-2 of Application)

For reference, the Upper Bound scenario is a scenario with increases in annual throughput to the FEI system as discussed in Section 3 of the Application and accelerated as well as increased system capacity expansions as discussed in Section 6 of the Application in comparison to the Reference Case. The cumulative and compound annual delivery rate change for the Reference Case from 2015 to 2036 is 60 percent and 2.2 percent, respectively (first row of the table above). If the demand throughput to the FEI system is increased (e.g. annual demand increases from the Reference Case to the Upper Bound level as discussed in Section 3 of the Application) but the infrastructure investments maintain at the same level as the Reference Case, then the cumulative and compound annual delivery rate from 2015 to 2036 is estimated to *decrease* by 28 percent and 0.8 percent, respectively, from the Reference Case level. On the other hand, if the infrastructure investments are accelerated/increased from the Reference Case to the Upper Bound Case but the annual demand remains at the same level as the Reference Case, then the cumulative and compound annual delivery rate from 2015 to 2036 is estimated to *increase* by 4 percent and 0.1 percent, respectively, from the Reference Case level. When combining the impacts of both increasing annual demand throughput to FEI system (Row 2 of table above) as well as accelerating/increasing infrastructure investments to meet the increases in demand throughput (Row 3 of table above), then the cumulative and compound annual delivery rate from 2015 to 2036 is estimated to be a net decrease of 24 percent and 0.7 percent, respectively, from the Reference Case level of 60 percent and 2.2 percent, respectively. This results in the Upper Bound Case having a cumulative and compound annual delivery rate impact of 36 percent and 1.5 percent, respectively, which is lower than the increase in the Reference Case. This example clearly illustrates the overall benefits in rates to all customers if the throughput to FEI's system is increased with load-building activities.

3.2 Please provide a quantitative comparison of the delivery rate impacts (costs) of expected infrastructure investments needed to meet increased demand due to load-building activities to the rate impacts (benefits) of increasing throughput to the FEI system due to load-building activities.

Response:

Please refer to the response to BCSEA IR 1.3.1.

4.0 Topic: DSM and system capacity constraints

Reference: Exhibit B-1, p. ES-7, pdf p.19; Decision and Order G-189-14

FEI states that "Infrastructure projects on transmission systems to address system capacity constraints are often large and take many years to plan and execute."

FEI states further that "There are three resource options to evaluate when planning system expansions: pipelines, compression and storage."

In its decision regarding FEU's 2014 LTRP, the Commission directs FEU as follows:

> "Accordingly, in the next LTRP the FEU are directed to provide a more fulsome analysis of opportunities for DSM to be cost-effectively used to replace or defer infrastructure investments." [p.28]

The definition of "demand-side measure" in section 1(1) of the CEA is:

> "A rate, measure, action or program undertaken (a) to conserve energy or promote energy efficiency, (b) to reduce the energy demand a public utility must serve, or (c) to shift the use of energy to periods of lower demand . . . but does not include (d) a rate, measure, action or program the main purpose of which is to encourage a switch from the use of one kind of energy to another such that the switch would increase greenhouse gas emissions in British Columbia, or (e) any rate, measure, action or program prescribed." [underline added]

4.1 Does FEI agree that when the Commission uses the term "DSM" in the 2014 FEI LTRP Decision it is referring to DSM as defined in the UCA, CEA and DSM Regulation?

Response:

When the Commission uses the term "DSM" in the 2014 FEI LTRP Decision, FEI's interpretation is that the term is referring to DSM as defined in the UCA, CEA and DSM Regulation.

4.2 Does FEI acknowledge that "demand-side measure" as defined in the CEA includes programs to reduce peak demand and programs to shift demand from peak to non-peak periods?

Response:

"Demand-side measure" as defined in the CEA includes a rate, measure, action or program undertaken to shift the use of energy to periods of lower demand. "Peak demand" or "peak load" is not mentioned in the CEA in the context of natural gas supply.

4.3 Please confirm, or otherwise explain, that FEI's C&EM portfolio could include programs to reduce peak demand or to shift demand from peak to non-peak periods.

Response:

Confirmed. Please refer to the responses to BCUC IRs 1.29.1, 1.29.2.1 and 1.29.2.1.1, which discuss C&EM as it relates to peak demand.

4.4 Does FEI agree that DSM (i.e., under the UCA) is a resource option that could be used to address system constraints? Why or why not?

Response:

FEI agrees that DSM can be used as a resource option to address system constraints. Practically, however, FEI cannot confirm that DSM programs are reducing peak demand to the extent that they can address system constraints. Please refer to the responses to BCUC IRs 1.29.1, 1.29.2, 1.29.4 and 1.40.1.1 for more discussion regarding the difficulty of attributing peak demand reductions, and thus a value for avoided capacity costs, to natural gas DSM programs.

4.5 Does FEI agree that load shifting DSM is a resource option that could be used to address system constraints? Why or why not?

Response:

FEI agrees in principle that, with sufficient verification to support its effectiveness, a load-shifting DSM program could be used to address system constraints. FEI currently has interruptible rate schedules offered to industrial customers that are effective, have procedures in place to execute curtailment and have been used for many years to manage peak demand when required. Please refer to the responses to BCUC IRs 1.29.2, 1.29.2.1 and 1.29.4 for additional discussion on addressing peak demand.

5.0 Topic: DSM and system capacity constraints

Reference: Exhibit B-1, Vancouver Island (VI) Peak Demand Forecast with End-Use Peak Demand Scenarios with DSM, pp.161-162, pdf pp.186-187, Figure 6-5

"The capacity constraint in the Reference Case forecast is deferred to 2035, compared to 2031 when using the Reference Case forecast without DSM."

5.1 Please confirm, or otherwise explain, that the "DSM" here means C&EM.

Response:

Confirmed. As noted in footnote 145 on page 154 of the Application, the term DSM in Section 6 refers to FEI's forecast C&EM activity from Section 4.2 only.

5.2 Please confirm, or otherwise explain, that "DSM" here means DSM at planned levels, as distinct from additional DSM designed to reduce peak or shift load to defer T&D investments.

Response:

Confirmed. Posterity applied the same C&EM programs that were applied to the Reference Case annual demand to determine UPC_{peak} values that were used by FEI to create the Reference Case Peak Demand with DSM forecast. The 2017 LTGRP does not contain any C&EM programs/measures whose primary purpose is to target peak demand (as opposed to targeting annual energy reductions). Please refer to the response to BCUC IR 1.29.1 for additional explanation.

5.3 Has FEI conducted any analyses of the potential to use additional (above Plan) DSM to address VITS constraints?

Response:

FEI interprets "additional (above Plan) DSM" to mean C&EM activity in excess of the activity forecast in the 2017 LTGRP C&EM analysis. FEI has not conducted analysis addressing above

Plan DSM to address any of VITS, CTS or ITS constraints for reasons described in the response to BCUC IR 1.29.1. FEI is developing the means to conduct such an analysis. To complete an analysis that FEI could use to address transmission system constraints requires a method that can reliably predict the impact of either general C&EM programs or targeted DSM on peak demand and then reliably measure the impact. The exploratory peak demand method developed by Posterity represents FEI's current investigation into whether impacts on peak can be predicted. At present, the results remain theoretical in nature, with limitations as described in the responses to BCUC IRs 1.29.1 and 1.29.3. FEI intends to continue to explore means to verify the model results and refine the inputs to the method with the objective of creating a reliable tool for analysis.

5.3.1 If yes, please provide the analyses.

Response:

Please refer to the response to BCSEA IR 1.5.3.

5.3.2 If no, why has it not conducted such analyses?

Response:

Please refer to the response to BCSEA IR 1.5.3.

5.4 Has FEI conducted any analyses of the potential to use additional (above Plan) DSM to address CTS constraints?

Response:

FEI interprets "additional (above Plan) DSM" to mean C&EM activity beyond the C&EM activity forecast in the 2017 LTGRP analysis.

In Section 6.3.2 of the Application (pp. 166-167) and illustrated in Figure 6-7, FEI indicated that with the recently installed CTS project in place there are no capacity constraints to meet forecast demand over the planning horizon. Also, please refer to the response to BCSEA IR 1.5.3.

5.4.1 If yes, please provide the analyses.

Response:

Please refer to the response to BCSEA IR 1.5.3.

5.4.2 If no, why has it not conducted such analyses?

Response:

Please refer to the response to BCSEA IR 1.5.3.

5.5 Has FEI conducted any analyses of the potential to use additional (above Plan) DSM to address ITS constraints?

Response:

Please refer to the response to BCSEA IR 1.5.3.

5.5.1 If yes, please provide the analyses.

Response:

Please refer to the response to BCSEA IR 1.5.3.

5.5.2 If no, why has it not conducted such analyses?

Response:

Please refer to the response to BCSEA IR 1.5.3.

6.0 Topic: DSM long term impact on annual demand

Reference: Exhibit B-1-1, section 4.2.3.1; Figures 4-1, 4-2, 4-3 and 4-4, p.103 et seq., pdf p.128, et seq.

In Figures 4-1, 4-2, 4-3 and 4-4 for All Sectors, Residential, Commercial and Industrial, respectively, FEI shows "Natural Gas Demand Before and After Estimated C&EM Savings (Excluding NGT)." The accompanying text compares (in percentage terms) the cumulative Upper Bound energy savings across the planning horizon to the Reference Case, and the cumulative Lower Bound energy savings to the Reference Case.

6.1 Please provide graphs and tables showing the cumulative energy savings for Upper Bound, Reference Case and Lower Bound over the planning horizon, for each of All Sectors, Residential, Commercial and Industrial.

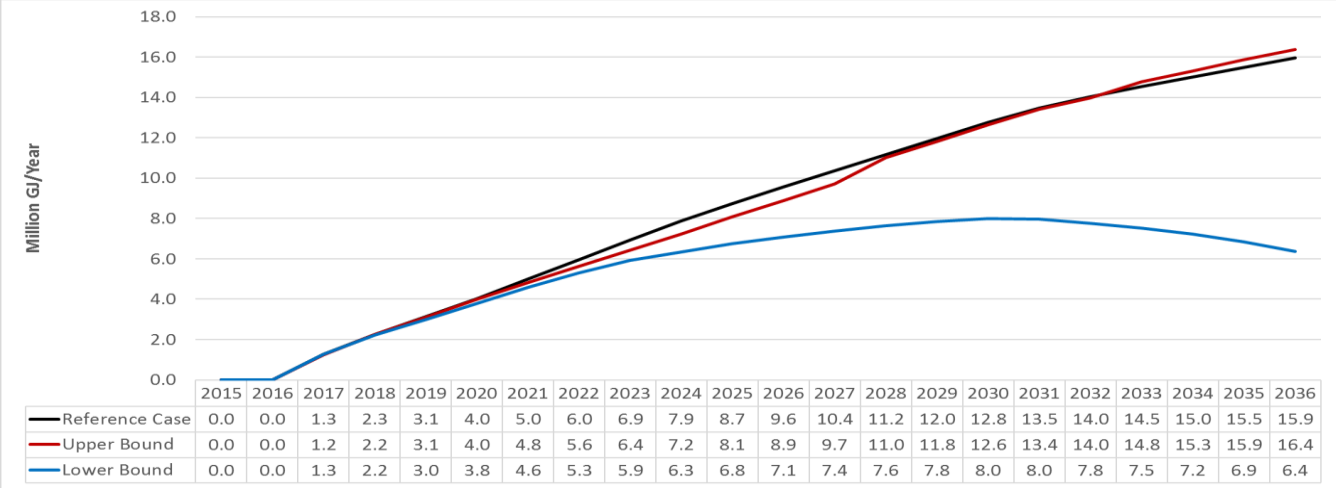
Response:

FEI interprets cumulative energy savings to mean cumulative annual energy savings. The four charts with included data tables below provide the requested information for the Reference Case, Upper Bound, and Lower Bound scenarios across the planning horizon for All Sectors, as well as the Residential, Commercial, and Industrial sector, respectively.

As noted in Section 4.2.3.1 of the Application, Commercial Sector Reference Case cumulative annual energy savings exceed the Upper Bound results because low natural gas and carbon price costs in the Upper Bound depress the avoided cost of gas in this scenario and thus render some commercial energy efficiency measures uneconomic. This effect appears to outweigh the Upper Bound having more technical energy savings opportunities than the Reference Case (by virtue of having more natural gas consumption than the Reference Case).

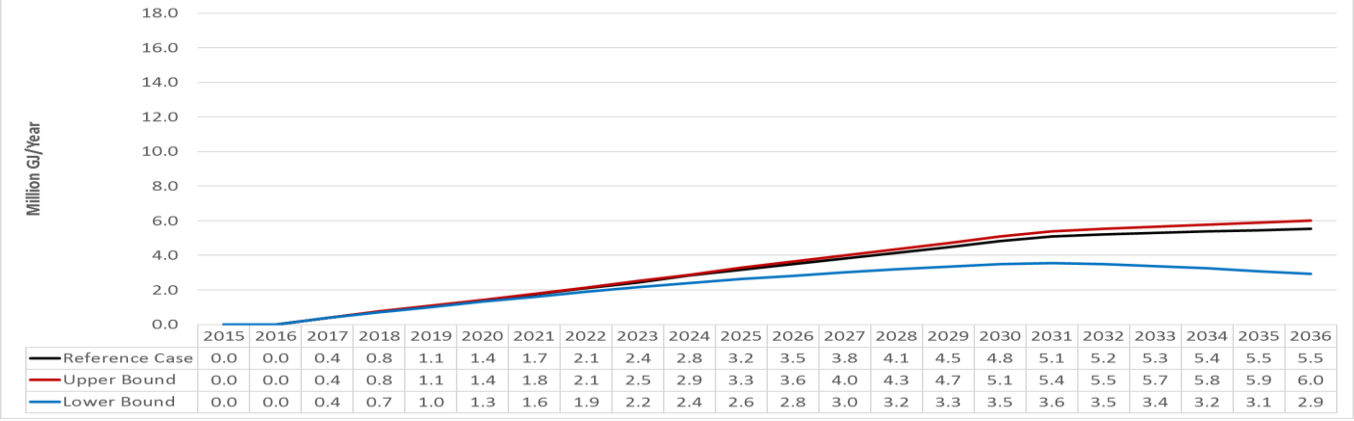
As explained in FEI's response to BCUC IR 1.46.1, Lower Bound cumulative annual C&EM energy savings decline at the end of the planning horizon because this scenario experiences a decline in natural gas consumption, which can erode energy savings for already-installed C&EM measures. As a practical example, if building envelope improvements are incentivized in a gas-heated home early in the forecast horizon, under the Lower Bound scenario that home may later switch to an electric heat pump when the furnace reaches its end of life. The initial gas savings from the early C&EM activity in that house would then disappear from the C&EM savings for the years after the conversion from gas to electricity.

Estimated Cumulative Annual C&EM Energy Savings – All Sectors



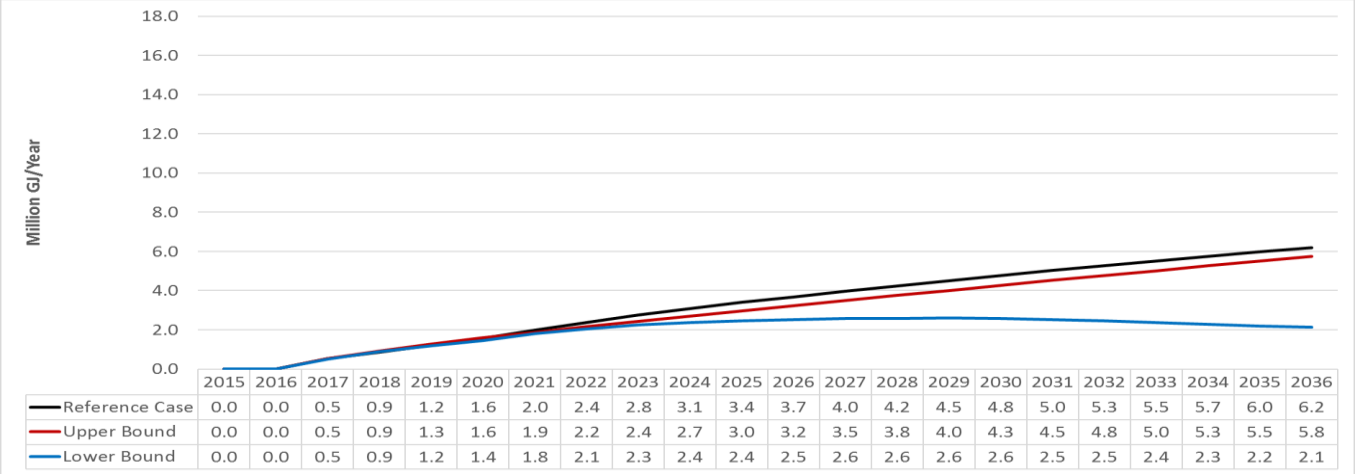
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
Reference Case	0.0	0.0	1.3	2.3	3.1	4.0	5.0	6.0	6.9	7.9	8.7	9.6	10.4	11.2	12.0	12.8	13.5	14.0	14.5	15.0	15.5	15.9
Upper Bound	0.0	0.0	1.2	2.2	3.1	4.0	4.8	5.6	6.4	7.2	8.1	8.9	9.7	11.0	11.8	12.6	13.4	14.0	14.8	15.3	15.9	16.4
Lower Bound	0.0	0.0	1.3	2.2	3.0	3.8	4.6	5.3	5.9	6.3	6.8	7.1	7.4	7.6	7.8	8.0	8.0	7.8	7.5	7.2	6.9	6.4

Estimated Cumulative Annual C&EM Energy Savings – Residential Sector



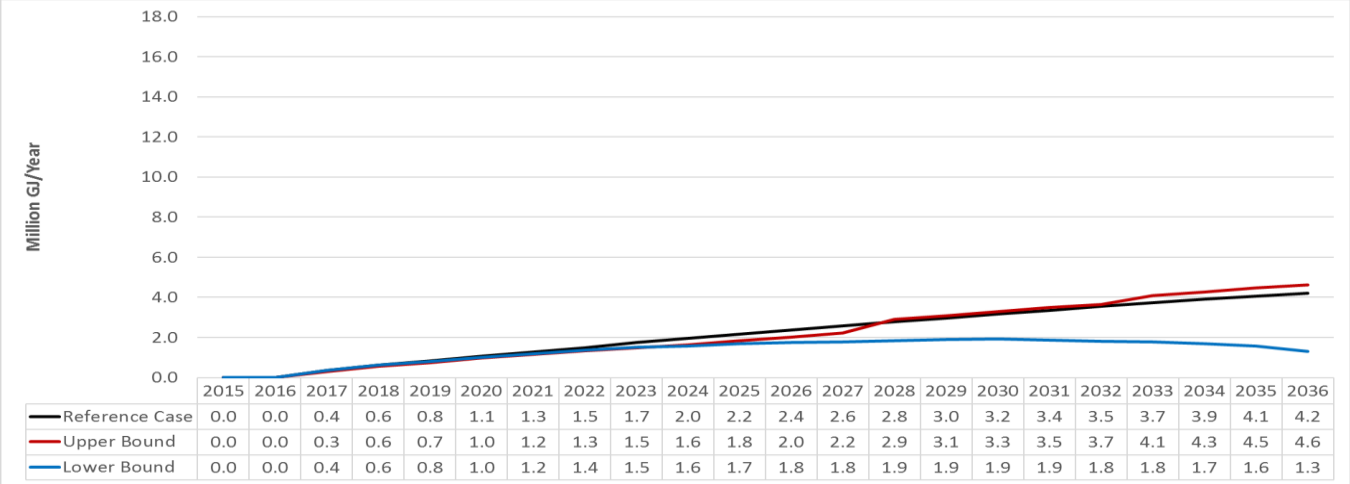
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
Reference Case	0.0	0.0	0.4	0.8	1.1	1.4	1.7	2.1	2.4	2.8	3.2	3.5	3.8	4.1	4.5	4.8	5.1	5.2	5.3	5.4	5.5	5.5
Upper Bound	0.0	0.0	0.4	0.8	1.1	1.4	1.8	2.1	2.5	2.9	3.3	3.6	4.0	4.3	4.7	5.1	5.4	5.5	5.7	5.8	5.9	6.0
Lower Bound	0.0	0.0	0.4	0.7	1.0	1.3	1.6	1.9	2.2	2.4	2.6	2.8	3.0	3.2	3.3	3.5	3.6	3.5	3.4	3.2	3.1	2.9

Estimated Cumulative Annual C&EM Energy Savings – Commercial Sector



	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
Reference Case	0.0	0.0	0.5	0.9	1.2	1.6	2.0	2.4	2.8	3.1	3.4	3.7	4.0	4.2	4.5	4.8	5.0	5.3	5.5	5.7	6.0	6.2
Upper Bound	0.0	0.0	0.5	0.9	1.3	1.6	1.9	2.2	2.4	2.7	3.0	3.2	3.5	3.8	4.0	4.3	4.5	4.8	5.0	5.3	5.5	5.8
Lower Bound	0.0	0.0	0.5	0.9	1.2	1.4	1.8	2.1	2.3	2.4	2.4	2.5	2.6	2.6	2.6	2.6	2.5	2.5	2.4	2.3	2.2	2.1

Estimated Cumulative Annual C&EM Energy Savings – Industrial Sector



	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
Reference Case	0.0	0.0	0.4	0.6	0.8	1.1	1.3	1.5	1.7	2.0	2.2	2.4	2.6	2.8	3.0	3.2	3.4	3.5	3.7	3.9	4.1	4.2
Upper Bound	0.0	0.0	0.3	0.6	0.7	1.0	1.2	1.3	1.5	1.6	1.8	2.0	2.2	2.9	3.1	3.3	3.5	3.7	4.1	4.3	4.5	4.6
Lower Bound	0.0	0.0	0.4	0.6	0.8	1.0	1.2	1.4	1.5	1.6	1.7	1.8	1.8	1.9	1.9	1.9	1.9	1.8	1.8	1.7	1.6	1.3

7.0 Topic: DSM terminology

Reference: Exhibit B-1

Chapter 4 of the Application is titled "4. Demand Side Resources." The introductory sentence states:

> "Once an estimate of the demand for natural gas in FEI's territory is developed (as has been presented in Section 3) the next step in long term resource planning is to determine what the impact of DSM activities will be on the demand forecast." [p.92, underline added]

FEI uses the term "Conservation and Energy Management," or "C&EM" to refer to the "portfolio of efficiency and conservation programs and activities that meets the province's DSM definition in the CEA and helps customers reduce their natural gas consumption." [p.94, underline added]

FEI refers to its "existing C&EM portfolio" approved in the Commission's decision on FEI's 2014-2019 Performance Based Ratemaking Plan, based on FEU's "2014-2018 DSM Plan." [p.96, underline added]

At the time the 2014-2018 DSM Plan was before the Commission, FEI referred to its DSM plan and expenditure schedule as "Energy Efficiency and Conservation" or EEC.

Under the heading "4.3 Other DSM Activities," FEI states:

> "While the legislative framework for DSM in BC focuses on energy conservation as the primary means to achieve demand side energy reductions, in the broader context, demand side management encompasses a range of activities in addition to energy conservation. The California Standard Practice Manual, which serves as the general standard of cost effectiveness analysis in the US, identifies the following categories of DSM strategies to distinguish between different types of DSM activity." [p.124]

7.1 Would FEI agree that its current terminology regarding DSM, EEC, C&EM and Other DSM is confusing?

Response:

No, FEI would not agree with this statement. FEI has characterized the various aspects of DSM accurately and appropriately within the 2017 LTGRP. When these statements are removed from their original context and rearranged in the manner presented in this preamble, however, they may appear to the reader of this information request to be confusing. The terms EEC previously, and C&EM currently are FEI's own designations of the DSM activities that FEI undertakes specifically within the BC Government's definition of DSM as set out in the CEA.

DSM has a much broader context, however, that must be considered in utility long-term planning.

7.2 Please provide a table showing, for each of the terms DSM, EEC, C&EM and Other DSM, what is included and excluded and whether the meaning is different in different contexts.

Response:

In the 2017 LTGRP, FEI applies the following general meanings to these terms, which have been clearly defined and consistently used in the 2017 LTGRP:

Term	Intended Meaning and Application	Additional Description
DSM	The acronym stands for Demand Side Management. It is a general industry term for any activity intended to impact the demand for energy. This use and general meaning of the term DSM is consistently applied in the LTGRP.	The converse term would be supply side management which is any activity intended to impact the supply of energy.
EEC	The acronym stands for Energy Efficiency and Conservation. This is an FEI term that until November 2015 represented the DSM activities and expenditures that FEI undertakes that specifically fall under the definition of "Demand-side Measure" contained in the BC Clean Energy Act and applied through the BC Demand-side Measures Regulation. This definition applies to a specific sub-set of DSM activities as set out in the regulation. This term also applied to the organizational group within FEI that developed and managed this specific subset of DSM activities for the Utility. This meaning of the term EEC is consistently applied in the 2017 LTGRP.	In November 2015, for internal reasons, FEI shifted away from using the term EEC in these instances, to using the term Conservation and Energy Management or C&EM, with the exception that FEI did not change the name of the external advisory group (the Energy Efficiency and Conservation Advisory Group or EECAG). The EECAG provides feedback on FEI's portfolio of [formerly EEC] now C&EM activities. The term EEC is no longer used by FEI except when referring to formal decisions or reports that used that term in the past and for communicating with or reporting on the EECAG. The change from using EEC to using C&EM was formally announced to EECAG members, including BCSEA, on February 24, 2016.
C&EM	The acronym stands for Conservation and Energy Management. This is an FEI term that has the same general meaning as EEC. This meaning of the term C&EM is consistently applied in the 2017 LTGRP.	The term C&EM has replaced the use of the term EEC except where referring to formal documentation that used the term EEC in the past and in reference to the external advisory group as noted above.

Term	Intended Meaning and Application	Additional Description
Other DSM	This term is intended by FEI to refer to any DSM activity that does not fall under the sub-set of Demand-side Measures as defined by the BC Demand-side Measures Regulation. This meaning of the term other DSM has been consistently applied in the 2017 LTGRP	A more detailed explanation can be found in the 2017 LTGRP, Section 4.3, page 124.

7.3 Given that "demand side measure" and "demand side management" (DSM) are legally defined terms applicable to certain of FEI's programs and activities that are the subject of the current regulatory proceeding, please confirm, or otherwise explain, that it would be helpful for FEI to use that meaning of DSM in the current proceeding rather than the broader definition of DSM used in the California Standard Practice Manual.

Response:

Not confirmed. FEI's use of each of these terms is accurate and appropriate. FEI does not see how it would be helpful to limit the meaning of the term demand side measure for overall, long term utility planning as suggested in this request - please refer to the response to BCSEA IR 1.7.2.

7.4 Where does the term Conservation and Energy Management (C&EM) come from? Is it used in the California Standard Practice Manual or elsewhere?

Response:

In 2015, to further integration of the FEI and FBC demand side management groups, FEI and FBC decided to move away from the department names of "Energy Efficiency and Conservation" and "PowerSense" respectively and move to one new and combined department name. The name "Conservation and Energy Management" was implemented for the department in November 2015.

Please refer to the response to BCSEA IR 1.7.2 for additional information regarding this change at FEI.

The term "Conservation and Energy Management" was meant to and continues to cover a similar set of activities as "Energy Efficiency and Conservation" and "PowerSense" once did. FEI considers C&EM to be synonymous with DSM in terms of activities as defined under the UCA, CEA and DSM Regulation.

Similar to its past use of the term "Energy Efficiency and Conservation", FEI does not actively externally promote the term "Conservation and Energy Management". The term is only used internally within FEI and FBC and with stakeholders to describe the department and activities within FEI and FBC that work on demand side management. The term is not prominently promoted to FEI customers.

While the term "Conservation and Energy Management" is not used in the California Standard Practice Manual, FEI understands that BC Hydro also uses it as an internal department name.

7.5 How exactly does FEI's new term Conservation and Energy Management (C&EM) compare to FEI's old term Energy Efficiency and Conservation (EEC)? Do they include and exclude the same types of activities? Are C&EM and EEC both synonymous with DSM as defined under the UCA, CEA and DSM Regulation?

Response:

Please refer to the response to BCSEA IR 1.7.4.

7.6 What is the purpose of replacing "Energy Efficiency and Conservation" with "Conservation and Energy Management"?

Response:

Please refer to the response to BCSEA IR 1.7.4.

7.6.1 When did FEI adopt the term "Conservation and Energy Management"?

Response:

Please refer to the response to BCSEA IR 1.7.2.

7.7 Given that the UCA, CEA and DSM Regulation meaning of DSM excludes load building, and that FEI uses the term "energy management" to include load building, why has FEI specifically chosen to add the words "energy management" to the term (C&EM) used to describe the BC DSM activities that exclude load building?

Response:

Please refer to the response to BCSEA IR 1.7.4 for an explanation of why and how the term 'Conservation and Energy Management' was chosen and used. Load building is not included in the FEI C&EM portfolio of activities. However, the term "energy management" when used independent of the FEI use of the term "Conservation and Energy Management" can encompass many other activities related to the management of energy. FEI does not see a need to limit the term "energy management" solely to use by the C&EM group and with respect to the C&EM portfolio of activities.

7.7.1 Is it FEI's intention to imply that load building is part of its C&EM portfolio?

Response:

No. Please refer to the response to BCSEA IR 1.7.7.

7.8 Please confirm, or otherwise explain, that on its website, FEI uses the term "Rebates and Savings" and does not use either "Energy Efficiency and Conservation" or "Conservation and Energy Management."

Response:

FEI promotes the terms "Rebates & offers", "Rebates & savings" and "Saving energy" to customers on its web site when referring to C&EM related programs and information. The term "Energy Efficiency and Conservation" can be found in past regulatory filings posted on fortisbc.com. The term "Conservation and Energy Management" can also be found in more recent regulatory filings posted on fortisbc.com as well as on web pages that contain references to the Conservation and Energy Management department.

7.9 For greater certainty, please confirm, or otherwise explain, that when FEI refers to its "C&EM portfolio" this is synonymous with 'DSM portfolio' as defined in the UCA, UCA and DSM Regulation.

Response:

Please refer to the response to BCSEA IR 1.7.4.

7.10 Would it cause any harm for FEI to retain the term "Energy Efficiency and Conservation" and not use "Conservation and Energy Management"?

Response:

Since the term "Conservation and Energy Management" is an internal FEI organizational term, FEI does not see any purpose or value to returning to the term "Energy Efficiency and Conservation" to describe its DSM activities. Before this proceeding, no stakeholders have indicated concern or issue with the change to the name "Conservation and Energy Management". As explained in FEI's response to BCSEA IR 1.7.4, the name change was made with the intent to further the integration of DSM activities across FEI and FBC.

7.10.1 If not, would FEI agree to do so? If not, why not?

Response:

Please refer to the response to BCSEA IR 1.7.10.

8.0 Topic: Low-carbon electrification

Reference: Exhibit B-1, p.47, pdf p.72

"On March 1, 2017, the BC Government issued OICs 100/2017 and 101/2017. These orders enable BC public utilities to conduct efficient electrification programs and BC Hydro to charge the costs of these programs to its DSM deferral account." [p.47, pdf p.72]

8.1 Is FEI aware of any steps by FBC (electric) to develop and implement a low-carbon electrification program under the GGRR?

Response:

FBC is currently waiting for the results of a fuel switching study that followed the BC CPR study to examine the potential for fuel switching to electricity.

8.2 Over the planning period, will FEI coordinate with FBC and BC Hydro regarding low-carbon electrification measures in their respective service areas?

Response:

Per FEI's response to BCSEA IR 1.8.1, applicable measures and opportunities for programs have yet to be confirmed. FEI will assess what its role should be in this area once those measures and opportunities for programs are confirmed.

9.0 Topic: All cost-effective energy savings potential

Reference: Exhibit B-1, p.102, pdf p.127; 2014 FEU Long Term Resource Plan proceeding, Exhibit B-2, BCUC IR 42.1

FBC states:

> "The C&EM analysis results indicate the outcome of pursuing all cost effective energy savings potential. Crucially, the BC CPR and the 2017 LTGRP C&EM analysis display a theoretical estimate of energy savings measure uptake in relation to the ratio between incentive levels and measure incremental costs. This estimate takes into account program experience and technology diffusion but does not take into account operational program delivery factors, such as staffing levels or specific program eligibility rules..." [underline added]

In the 2014 FEU Long Term Resource Plan proceeding, FEU responded to Commission IR 42.1 as follows:

> "42.1 Does FEU consider that, to meet the requirements of the Resource Planning Guidelines, it should identify all cost effective EEC? If not, please explain why not.
>
> **Response:**
>
> Yes, although neither the BCUC's Resource Planning Guidelines nor the *Utilities Commission Act* stipulate that all cost-effective demand-side measures be implemented, the FEU do believe that the identification of all cost-effective EEC measures is an important step in the planning process to ensure that the Companies are addressing the Guidelines and meeting the requirements of the Act to pursue adequate, cost-effective demand-side measures. The Companies identify (in Appendix C-1 of Exhibit B-1) and include all cost-effective EEC measures (as defined by the TRC or MTRC where applicable) in the LTRP analysis and energy savings estimates. Analysis in the LTRP involves applying the CPR methodology to find all cost-effective measures under different future scenarios." [underline added]

9.1 Does FEI endorse FEU's response to BCUC IR 42.1 in the 2014 LTRP proceeding?

Response:

Yes. FEI continues to believe that the identification of all cost-effective DSM measures is an important initial step in the DSM planning process. This is accomplished through the economic potential portion of the CPR.

10.0 Topic: DSM expenditure levels

Reference: Exhibit B-1, p.107, pdf p.132

FBC says that "Estimated [C&EM] expenditures are expected to almost double from 2016 levels by 2023 and gradually decline after this year towards the end of the planning horizon as available energy savings opportunities are depleted." [underline added]

10.1 Would FEI agree that while the available energy savings opportunities identified in 2017 will become depleted towards the end of the twenty-year planning horizon it is reasonable to expect that new available energy savings opportunities will be identified during the planning period?

Response:

FEI agrees that, in DSM history, new energy savings opportunities have been discovered over time. For example, FEI highlighted in its August 9, 2017, Resource Planning Advisory Group workshop that the 2010 Conservation Potential Review did not include residential smart learning thermostats whereas these represent a significant energy savings opportunity in the more recent BC Conservation Potential Review. As noted in Section 4.2.4 of the Application, FEI plans to continue to perform its innovative technologies C&EM activities, which aim to identify and quantify new energy savings opportunities as they arise, throughout the planning horizon.

11.0 Topic: DSM savings estimates and costs estimates

Reference: Exhibit B-1, Figures 4-1 to 4-4; Figures 4-4 to 4-7

11.1 Please confirm, or otherwise explain, that Figures 4-1 to 4-4, showing Natural Gas Demand Before and After Estimated C&EM Savings (Excluding NGT), are based on the figures in Tables 4-4 to 4-7, showing Estimated Reference Case Annual Expenditures.

Response:

The Reference Case data in Figures 4-1 to 4-4 coincides with the values in Tables 4-4 to 4-7. The Upper Bound and Lower Bound data in Figures 4-1 to 4-4 coincides with the input data for Upper Bound and Lower Bound Estimated Annual Expenditures in Figures 4-5, 4-6, 4-7, and 4-8, respectively.

12.0 Topic: DSM cost per GJ

Reference: Exhibit B-1, Table 4-8: Estimated Reference Case Cost Effectiveness Test Results – All Program Areas

In Table 4-8, FEI shows Estimated Reference Case Cost Effectiveness Test Results – All Program Areas

FEI explains that Table 4-8 excludes data from behavioural and energy management measures:

> "All cost effectiveness test results reported below exclude data from behavioural and energy management measures (e.g. residential home energy reports or industrial strategic energy management). In alignment with the BC CPR, the 2017 LTGRP C&EM analysis assumes that these measures have negligible incremental costs which cause them to have uncharacteristically high cost effectiveness test results. Excluding data for these measures prevents their results from skewing the aggregate data reported below."

12.1 Please provide a version of Table 4-8 that includes data from behavioural and energy management measures.

Response:

Please see below for a version of Table 4-8 that includes data from behavioural and energy management measures. Resulting aggregate results are more cost effective than in the original version of Table 4-8. In reality and during program delivery, behavioural and energy management actions may have costs to program participants even though these costs may be intangible (e.g. deviating from a preferred behaviour to save energy) and thus unsuitable for economic modelling as performed in the 2017 LTGRP C&EM analysis. Please also refer to the response to the BCUC IR 1.29 series for further discussion on behavioural and energy management measures.

Year	TRC	MTRC	UCT	CCE ($/GJ)
Aggregate	**2.9**	**17.4**	**2.7**	**4.2**
2017	5.4	31.6	4.7	2.5
2018	4.8	28.3	4.1	2.9
2019	4.2	25.0	3.7	3.2
2020	3.9	22.9	3.4	3.4
2021	3.6	21.1	3.2	3.7
2022	3.4	19.9	3.0	3.9
2023	3.2	18.9	2.9	4.1
2024	3.1	18.2	2.8	4.2

Year	TRC	MTRC	UCT	CCE ($/GJ)
2025	3.0	17.8	2.7	4.3
2026	3.0	17.4	2.7	4.3
2027	2.9	17.1	2.6	4.3
2028	2.9	16.8	2.6	4.3
2029	2.8	16.6	2.6	4.4
2030	2.8	16.3	2.5	4.4
2031	2.7	16.2	2.5	4.4
2032	2.7	16.1	2.5	4.3
2033	2.7	16.1	2.5	4.3
2034	2.7	16.1	2.5	4.3
2035	2.7	16.1	2.5	4.3
2036	2.7	16.1	2.5	4.2

1
2

13.0 Topic: DSM future cost-effectiveness

Reference: Exhibit B-1, p.116, pdf p.141

FEI states that "In general, cost effectiveness test ratios fall over time as the more easily realized energy savings opportunities (i.e. the low-hanging fruit) are depleted."

13.1 Would FEI agree that while the more easily realized of the energy savings opportunities identified in 2017 may become depleted towards the end of the twenty-year planning horizon it is reasonable to expect that new energy savings opportunities, including more easily realized energy savings opportunities, will be identified during the planning period?

Response:

FEI understands the term "more easily realized" in the above quoted passage to mean energy savings opportunities with a relatively greater ratio between energy savings and incremental costs. FEI is unable to comment on whether this ratio will be higher or lower for new energy savings opportunities than for the C&EM measures included in the 2017 LTGRP C&EM analysis. As noted in the response to BCSEA IR 1.10.1, FEI confirms that, in DSM history, new energy savings opportunities have been discovered over time and that FEI plans to continue its innovative technologies C&EM activities throughout the planning horizon in order to identify and quantify new energy savings opportunities.

14.0 Topic: DSM, FEI response to 2014 FEI LTRP Decision

Reference: Exhibit B-1, p.121, pdf p.146; Decision and Order G-189-14

In its decision regarding FEU's 2014 LTRP, the Commission states:

> "8. The Panel therefore directs the FEU to include, in its next LTRP, the following information:
>
> • The development of DSM funding scenarios, reflecting the results of the most recent CPR. At a minimum, this should include a 'reference' DSM funding scenario with 'high DSM' and 'low DSM' scenarios that are relative to the reference scenario;
>
> • Analysis of each DSM scenario, at a portfolio level and for each DSM category (residential, low-income, commercial etc.), including:
>
> - Total Resource Cost/modified Total Resource Cost test results;
> - Utility Cost Test result, expressed as a ratio and $/GJ;
> - Delivery rate impact;
> - Estimated total bill impact (including delivery and commodity), $ and %, with residential split between high and low use gas customers; and
> - Estimated gas (GJ) and GHG emission reductions." [p.27]

FEI implies that Figures 4-6 to 4-8 showing Estimated Annual Expenditures by [Natural Gas Demand] Scenario reflect reference, high, and low DSM funding scenarios:

> "In its decision on the 2014 LTRP, the Commission directed FEI to provide in the 2017 LTGRP DSM funding scenarios that reflect the results of the most recent CPR and, at a minimum, should include a reference, a high, and a low DSM funding scenario. FEI provided these scenarios in Section 4.2.3.2 above."

14.1 Is it FEI's view that the analysis shown in Figures 4-6 to 4-8 is responsive to the Commission's direction number 8 in the 2014 LTRP decision? Please explain.

Response:

Section 4.2 of the Application is responsive to the Commission's directive number 8 in the 2014 LTRP decision because it examines different levels of forecast C&EM energy savings, cost effectiveness, and estimated expenditures (i.e. DSM funding) across a Reference Case, Upper Bound, and Lower Bound scenario. Based on stakeholder input, FEI bolstered these results by

1 directionally examining in Section 4.2.3.5 of the Application how sensitive estimated C&EM
2 expenditures and forecast C&EM energy savings might be to changes in incentive levels.

3

15.0 Topic: Natural Gas DSM – 2015 and 2016 Annual Reports

Reference: Exhibit B-1, Appendix D, pdf 3137-3290, 2015 and 2016 DSM Annual Reports

15.1 Please provide Table 2-2 from both the 2015 and 2016 Natural Gas Demand-Side Management (DSM) Annual Reports in electronic, Excel format.

Response:

Please refer to Attachment 15.1 for the requested Tables 2-2: Overall DSM Portfolio Level Results by Program Area for 2015 and 2016.

16.0 Topic: Natural Gas DSM – 2017 Annual Report

Reference: Exhibit B-1, Appendix D, pdf 3137-3290, 2015 and 2016 DSM Annual Reports

16.1 Please provide FEI's Natural Gas Demand-Side Management (DSM) – 2017 Annual Report.

Response:

Please refer to Attachment 16.1 for a copy of FEI's Natural Gas Demand-Side Management (DSM) – 2017 Annual Report.

16.2 Please provide Table 2-2 in electronic, Excel format.

Response:

Please refer to the fully functional spreadsheet provided in Attachment 16.2 for Table 2-2 of FEI's Natural Gas Demand-Side Management Annual Reports. Overall DSM Portfolio Level Results for 2017, 2016 and 2015 are included.

17.0 Topic: BC Conservation Potential Review

Reference: Exhibit B-1-1, Section 4.1, Table 4-1, p. 92, pdf p. 117

FEI states in row "f" of Table 4.1, "Section 4.2.3 outlines FEI's analysis and Section 4.2.2.1 explains that this incorporates all cost-effective demand-side measure activity." [underline added]

Reference: Exhibit B-1-1, Section 4.2.2.1 p. 101, pdf p. 126

FEI describes its method for applying the C&EM potential to its multi-scenario end-use forecast as follows:

> "1. In the 2017 LTGRP forecast model, construct a separate Reference Case which matches as closely as possible the BC CPR's Reference Case;
>
> 2. Import the CPR measure assumptions into this 2017 LTGRP CPR Reference Case;
>
> 3. Produce the technical energy savings potential in the 2017 LTGRP CPR Reference Case and calibrate the measure applicability rates in light of the BC CPR technical energy savings potential results;
>
> 4. Produce the economic energy savings potential results in the 2017 LTGRP CPR Reference Case;
>
> 5. In the 2017 LTGRP CPR Reference Case, run the market potential energy savings analysis and calibrate individual measure participation rates in light of the BC CPR energy savings market potential results;
>
> 6. Import into the 2017 LTGRP CPR Reference Case, the expenditure parameters (i.e. ratio of incentive to non-incentive spending by program area and ratio of incentives to incremental costs by program area) from the BC CPR market potential analysis;
>
> 7. Apply the 2017 LTGRP Reference Case and produce the market potential energy savings, benefit-cost, and expenditure results;
>
> 8. Calibrate expenditure parameters at the measure level in light of the BC CPR results and existing program experience and re-run step 7; and
>
> 9. Run the step 7 analysis for the Upper Bound and Lower Bound scenarios."

17.1 Please explain how Section 4.2.2.1 explains that the analysis incorporates all cost-effective demand-side measure activity.

Response:

Section 4.2.1.3 of the Application explains that the range of potential C&EM measures from the BC CPR results inform the 2017 LTGRP C&EM analysis and points to Appendix C-1 of the Application for the BC CPR Report. Table 5-1 of the BC CPR Market Potential scope report describes how the BC CPR results were developed. Steps 1 through 9 in Section 4.2.2.1 explain that the 2017 LTGRP C&EM analysis imports the BC CPR measure assumptions (Step 2), calibrates the analysis in light of the BC CPR technical potential results (Step 3), then applies the applicable cost-effectiveness tests to produce economic energy savings potential (Step 4) before applying further analysis steps. As such, the 2017 LTGRP incorporates all economic (i.e. cost-effective) demand-side measure activity.

17.1.1 In which step in s.4.2.2.1 is this explained?

Response:

Please refer to the response to BCSEA IR 1.17.1.

17.1.2 How did FEI determine the total of “all cost-effective” savings?

Response:

FEI consulted with Posterity Group Consulting Inc. (Posterity) to provide the following response.

The C&EM measures were evaluated using the TRC and MTRC cost effectiveness tests. MTRC was used consistently for residential measures in all scenarios. In the Lower Bound scenario, the MTRC was used for all measures for all three sectors. Critical uncertainty outcomes, such as gas commodity costs and carbon pricing, were changed in the TRC cost effectiveness tests according to the 2017 LTGRP scenario analysis framework, so that all measures that passed the cost effectiveness test for each specific scenario would be included in the analysis.

Uptake of cost-effective measures is influenced by factors that fall outside pure economics. Customer behaviour, either naturally or as influenced by program activity, is more complex than

a financial calculation. Accordingly, 2017 LTGRP C&EM analysis forecast market potential energy savings were informed by BC CPR results and FEI's C&EM program experience.

18.0 Topic: BC Conservation Potential Review

Reference: Exhibit B-1-1, Appendix C, British Columbia Conservation Potential, Section 5. Market Potential, Section 5.1: Approach to Estimating Market Potential, pdf p. 493; 4-1 UCA Requirements and Areas Addressed in Section 4

In Table 4-1 UCA Requirements and Areas Addressed in Section 4, FEI says that its DSM analysis "incorporates all cost effective demand-side measure activity." [p.92, pdf p.117, underline added]

The CPR uses the terminology: economic, market potential, program potential, and cost-effectiveness results. It states:

> "Market potential is a subset of economic potential that considers the likely rate of DSM acquisition, given factors like the rate of equipment turnover (a function of a measure's lifetime), simulated incentive levels, consumer willingness to adopt efficient technologies, and the likely rate at which marketing activities can facilitate technology adoption." [pdf p.493, underline added]

The CPR states that "Market potential differs from program potential in that market potential does not specifically take into account the various delivery mechanisms that can be used by program managers to tailor their approach depending on the specific measure or market."

The CPR states that "This report presents market potential results from three distinct approaches to screening measures for cost effectiveness."

18.1 For greater certainty, please explain the terminology used by FEI and the CPR related to FEI's statement that the analysis "incorporates all cost effective demand-side measure activity." Please explain how these terms relate to terms such as "economic potential" and "achievable potential."

Response:

FEI consulted with Posterity to provide the following response.

As noted in Table 4-1 and Section 4.2.3 of the Application, the 2017 LTGRP C&EM analysis incorporates all cost effective C&EM measure activity and its results indicate the outcome of pursuing all cost effective energy savings potential. As informed by the BC CPR results and FEI's program experience, the 2017 LTGRP C&EM analysis results display a theoretical estimate of energy savings measure uptake in relation to the ratio between incentive levels and measure incremental cost. This estimate takes into account program experience and technology diffusion but does not take into account operational program delivery factors. This

represents a critical difference to FEI's C&EM expenditure schedules which request BCUC approval of expenditures for FEI's short to medium-term C&EM activities.

For greater certainty, please see the following explanation of how the BC CPR applies cost effectiveness tests and participation models to distinguish between potential types.

> While developing the list of C&EM measures included in the BC CPR, a Technical Advisory Committee of various industry professionals, including a representative from BCSEA, were asked to review the proposed study measures and recommend additional measures with potential material savings opportunities and available data to characterize the measures with a reasonable level of confidence. All proposed measures that met these criteria, including those that were unlikely to be economic, were included in the BC CPR.
>
> The modelling activities considered this comprehensive collection of DSM measures for technical, economic, and market potential. Measures with a technical cost effectiveness test ratio larger than 1.0 were considered for economic and market potential. Depending on the cost effectiveness screening approach evaluated, the cost test ratio corresponded to either the Total Resource Cost (TRC) or the Modified Total Resource Cost (MTRC).
>
> Economic potential represented the upper bound on cost-effective potential, assuming an absence of market barriers. In cases where two or more cost-effective measures were competing for the same application (e.g., a non-condensing or condensing boiler replacing a low-efficiency boiler), the analysis selected the competing efficient measure with the largest savings potential to include in economic potential. As a result, competing efficient measures that did not have the largest savings potential did not appear in the reported results for economic potential, though they were considered in the analysis and were cost-effective.
>
> Market potential represented the cost-effective addressable potential that C&EM programs could pursue, while recognizing constraints imposed by likely market conditions (e.g., equipment turnover rates, incentive levels, consumer willingness to adopt, etc.). Since this analysis does not consider specific program design or delivery mechanisms, one cannot conclude that actual C&EM programs will, in practice, necessarily capture this addressable potential. For this reason, FEI uses the term market potential rather than the term achievable potential used by previous CPRs. The analysis relied on customer willingness to adopt to determine the percentage of installations implementing an efficient measure versus a non-efficient measure. Customer willingness to adopt was a function of modelled customer awareness and economic attractiveness of each measure. As a result, efficient measures that had low customer willingness to adopt,

despite being economic from a TRC/MTRC perspective, did not appear in the reported results for market potential, though they were considered in the analysis.

18.2 Please identify where in the CPR report it provides results showing all cost-effective DSM activity.

Response:

FEI consulted with Navigant Consulting Ltd. (Navigant) to provide the following response.

Results for all economic DSM activity are called "Economic Potential" throughout the CPR report. Three cost effectiveness screening approaches were analyzed in the study: TRC, MTRC, and Hybrid MTRC/TRC. The CPR provides the greatest level of detail for the TRC approach and a more aggregate level of detail for the MTRC and Hybrid MTRC/TRC approaches. For each approach, references within the exhibit are available below.

TRC Cost Screening Approach

Exhibit B-1, Appendix C-1, British Columbia Conservation Potential Review Report for FEI, Section 4.2: Economic Potential Results, PDF p. 437 ff.

Exhibit B-1, Appendix C-1, British Columbia Conservation Potential Review Report for FEI, Section 5. Market Potential, Section 5.2.1: Comparison of Savings by Potential Type, PDF p. 504 ff.

MTRC Cost Screening Approach

Exhibit B-1, Appendix C-1, British Columbia Conservation Potential Review Report for FEI, Section 5. Market Potential, Section 5.4.2: MTRC Economic Potential Results, PDF p. 522 ff.

Hybrid MTRC/TRC Cost Screening Approach

Exhibit B-1, Appendix C-1, British Columbia Conservation Potential Review Report for FEI, Section 5. Market Potential, Section 5.5.2: Hybrid MTRC/TRC Economic and Market Potential Results, PDF p. 532 ff.

18.3 Is FEI's estimate of "market potential" energy savings premised on historical DSM achievements and program designs?

Response:

FEI consulted with Navigant to provide the following response.

The 2017 LTGRP C&EM analysis is informed by the BC CPR results and by FEI's program experience. As such, the C&EM analysis is informed by FEI's historical C&EM program achievements, participation economics, as well as the BC CPR consultant's North American DSM benchmark data. Interaction between these sources permitted forecast C&EM adoption rates to change throughout the planning horizon and thus to deviate from historic conditions.

While the C&EM analysis starting point is directly connected to FEI's historical program achievements, the C&EM analysis framework enables future C&EM activity to diverge from historical program designs.

The market potential represents a high-level assessment of savings that could be achieved over time, factoring in broader assumptions about customer acceptance and adoption rates that are not dependent on a particular program design. As such, the BC CPR did not seek to optimize program design.

Sector-level historical DSM achievements, but not program design, informed the initial market potential estimates for CPR measures that were offered historically by FEI. Beyond the first year of the CPR, the market dynamics (e.g., equipment turnover, new construction and customer willingness to adopt) forecast by the CPR model drove the levels of annual market potential. The initial market potential estimates for CPR measures that had not been offered historically relied on the CPR consultant's benchmarking of similar offerings in other jurisdictions. Since the CPR's market potential was not intended to represent "program" potential, the study excludes considerations of measure-by-measure incentive levels and program delivery mechanisms.

Since the BC CPR evaluated a comprehensive, peer-reviewed collection of C&EM measures, the economic potential provides a reasonable assessment of cost-effective savings, given the exclusion of market barriers. To account for market barriers, the BC CPR relied on widely accepted Bass Diffusion models and assessments of customer willingness to adopt. The BC CPR consultant calibrated these models using relevant literature and benchmarking with similar C&EM programs. Given that all cost effective measures were eligible for market potential and the forecasts of customer willingness to adopt were grounded in observed market behaviour, the market potential provides a reasonable assessment of cost effective savings potential.

When calibrating the savings and utility spending levels in the first year of the study to historical DSM achievements, the goal was to begin the market potential forecast under similar conditions experienced in recent FEI program activity and from other jurisdictions. Beyond the first year of the study, the model's forecast market dynamics were allowed to deviate from historic achievements. The CPR did not attempt to analyze market potential for scenarios where initial program spending, marketing, staffing and implementation design would differ drastically and immediately from historic conditions.

18.3.1 If yes, is it FEI's position that its program designs are optimal, equaling or outperforming any best-in-class experience of other program administrators?

Response:

Please refer to the response to BCSEA IR 1.18.3.

18.3.2 If no, how is it possible to determine whether or not FEI's estimate of "all cost-effective" savings is reasonable?

Response:

Please refer to the response to BCSEA IR 1.18.3.

18.4 How were the market potential energy savings estimates varied between the Reference Case, Upper Bound, and Lower Bound scenarios?

Response:

FEI consulted with Posterity to provide the following response.

The market potential energy savings for each scenario begin with the measures that are economic (pass the TRC or MTRC cost effectiveness tests) for that scenario. The participation factors, for measure uptake, were informed by BC CPR results and FEI's C&EM program experience. At its simplest level, market potential for a measure applied to a group of buildings in a given year and scenario is the economic potential multiplied by the participation factor. The 2017 LTGRP C&EM analysis uses the same participation factors for all three scenarios. As noted in Section 4.2.3.5 of the Application, FEI also performed a directional analysis of how sensitive Reference Case C&EM analysis results might be to changes in incentive levels. This analysis does include an examination of how participation factors change across changes in incentive levels.

18.4.1 Which assumptions, if any, were adjusted to develop the market potential estimates for each of the scenarios?

Response:

FEI consulted with Posterity to provide the following response.

The 2017 LTGRP C&EM analysis adjusted the following assumptions to develop the market potential estimates for the different scenarios according to the 2017 LTGRP scenario analysis parameters explained in Appendix B-1 of the Application:

- The underlying natural gas demand against which the C&EM measures were applied was different in each scenario, changing the baseline demand available to be saved.
- The TRC cost effectiveness test was used for commercial and industrial measures in the Reference Case and Upper Bound scenarios, but MTRC was used for those measures in the Lower Bound scenario.
- Avoided commodity cost and carbon pricing were different in each scenario, affecting the TRC cost effectiveness test results.
- Uptake was eliminated for measures that would be superseded by changes in codes or standards assumed in the scenario. The Lower Bound scenario included assumptions about accelerated code adoption. This eliminated the potential for the Energy Star Home measure for homes constructed after 2022, because performance in new homes after that year were assumed to equal or exceed the requirements of this measure. Savings from adoption of the measure before that year were assumed to continue.

Table 5-1 Market Potential Methodology Overview [pdf p. 495] describes the CPR market potential incentive strategy as "Set incentives as a percent of the incremental cost for all measures pertaining to each sector, such that the simulated percentages of total spending from incentives versus non-incentive costs aligns with historic values across the sector." [underline added]

18.5 Is it FEI's view that "historic values" for the ratio of incentive to non-incentive spending were based on capturing all cost-effective energy savings?

Response:

FEI consulted with Navigant to provide the following response.

The simulated percentages of total spending from incentives versus non-incentive costs were aligned with historic values for only the first year of the study horizon. Beyond the first year, equipment turnover, new construction and customers' propensity to adopt various measures determined the incentive spending as a percentage of total spending. The model made no attempt to constrain the incentive spending to a particular percentage of total spending beyond the first year of the study horizon. Over the study horizon, the percentage of incentive spending as a percentage of total spending increased in response to the model's forecasted mix of cost-effective measures that customers were likely to adopt.

Please also refer to the response to BCSEA IR 1.18.6 for FEI's interpretation of "all cost-effective energy savings" in this historical context.

18.6 Is it FEI's view that its historic program performance captured all cost-effective energy savings?

Response:

FEI assumes that "all cost-effective energy savings" cited in this question refers to the applicable economic potential listed in past CPRs that applied to FEI's now historic DSM program performance. FEI submits that its historic program performance has not captured all economic potential and that it is not a reasonable expectation that it could.

The economic potential is a subset of technical potential. The technical potential is the total energy savings available assuming that all installed measures can immediately be replaced with the "efficient" measure/technology—wherever technically feasible—regardless of the cost, market acceptance, or whether a measure has failed and must be replaced. The economic potential uses the same assumptions regarding immediate replacement as in technical potential, but including only those measures that have passed the benefit/cost test chosen for measure screening (historically for FEI the Total Resource Cost (TRC) test). Note that it does not take into account the likely rate of DSM acquisition, given factors like the rate of equipment turnover, simulated incentive levels, consumer willingness to adopt efficient technologies, and the likely rate at which marketing activities can facilitate technology adoption. It also does not take into account market barriers to measure adoption that are further researched and then attempted to be addressed through program development.

19.0 Topic: DSM annual savings

Reference: Exhibit B-1-1, Section 4.2.3.1, Estimated Long Term Impact on Annual Demand, p. 103, pdf p. 128

The 20-year planning horizon is 2017-2036. [p.1, pdf p.26]

Figures 4-1 to 4-4 start with a data point for 2015, whereas Tables 4-4 to 4-7 start with a data point for 2017.

19.1 For greater certainty, please confirm that the C&EM Plan (Reference Case, Upper Bound and Lower Bound) is from 2017 to 2036.

Response:

Confirmed: as noted in footnote 121 on page 107 of the Application, the 2017 LTGRP C&EM analysis starts providing forecast results in 2017. When FEI prepared the 2017 LTGRP C&EM analysis, it had already filed with the BCUC annual reports on its 2015 and 2016 C&EM activities. The 2017 LTGRP C&EM analysis includes zero values only for 2015 and 2016; C&EM analysis values from 2017 until 2036 are forecasts (denoted by the terms forecast, projected, or estimated). For greater certainty, Figures 4-1 to 4-4 provide forecast C&EM energy savings and Tables 4-4 to 4-7 outline estimated Reference Case annual C&EM expenditures within the 2017 LTGRP C&EM analysis. As noted on page 93 of the Application, FEI is not seeking approval for these estimated expenditures and is developing a separate C&EM expenditure schedule for submission to and approval by the Commission.

19.2 Where figures are presented for 2015 and 2016, are these actuals? Where figures are presented for 2017, are these actual/projected, or plan?

Response:

Please refer to the response to BCSEA IR 1.19.1.

19.3 Is it the case that the pre-plan figures not weather normalized but the plan figures are normalized?

Response:

FEI consulted with Posterity to provide the following response.

FEI interprets "plan figures" to mean the energy demand data presented in the 2017 LTGRP C&EM analysis. Consistent with past practice:

1. Residential and commercial historic actual (pre-plan) data used for forecasting is weather normalized.
2. Industrial historic actual (pre-plan) data used for forecasting is weather normalized.

The residential and commercial components of all forecasts (plan) assume normal weather because they were all developed with weather-normalized data.

19.4 For 2015, 2016 and 2017, please explain which year's figures are actual, projected or estimated (plan).

Response:

Please refer to the response to BCSEA IR 1.19.1.

FEI states that "Forecast 2036 Reference Case energy savings account for 7.89 percent of projected sales. This ratio changes to 6.79 percent and 5.92 percent for the Upper and Lower Bound scenarios, respectively."

19.5 Please provide annual energy savings as a percentage of annual sales for (a) pre-plan years (as many as are reasonably available) and (b) the plan period. For the plan period, please provide Reference Case, Upper Bound and Lower Bound.

Response:

a. The table below outlines C&EM energy savings (as reported by FEI to the BCUC in its annual C&EM reports) as a percentage of annual sales.

Year	(A) Annual C&EM Energy Savings (GJ)	(B) Annual Sales (GJ)	A/B
2012	452,563	191,414,133	0.23%
2013	497,833	188,337,946	0.25%
2014	393,607	187,745,416	0.20%
2015	434,550	191,738,754	0.21%
2016	438,827	200,161,369	0.20%

b. The table below outlines forecast annual 2017 LTGRP C&EM energy savings as a percentage of forecast 2017 LTGRP annual demand for the Reference Case, Upper Bound, and Lower Bound, respectively. As explained in FEI's response to BCSEA IR 1.19.1, the 2015 and 2016 values are zero. For the Lower Bound, the percentage is negative from 2031 until 2036 for two reasons: (1) the table outlines annual energy savings rather than cumulative annual energy savings, and (2) the Lower Bound scenario experiences an erosion of C&EM energy savings towards the end of the forecast horizon as a result of a significant shift away from natural gas consumption in this scenario prior to the application of C&EM activity (please refer to FEI's response to BCUC IR 1.46.1 for further details about this phenomenon).

Year	Reference Case	Upper Bound	Lower Bound
2015	0.00%	0.00%	0.00%
2016	0.00%	0.00%	0.00%
2017	0.66%	0.64%	0.67%
2018	0.52%	0.51%	0.51%
2019	0.46%	0.44%	0.42%
2020	0.45%	0.45%	0.43%
2021	0.51%	0.41%	0.46%
2022	0.49%	0.40%	0.40%
2023	0.51%	0.39%	0.36%
2024	0.48%	0.38%	0.24%
2025	0.44%	0.41%	0.26%
2026	0.42%	0.38%	0.21%
2027	0.41%	0.38%	0.18%
2028	0.41%	0.59%	0.17%
2029	0.40%	0.35%	0.14%
2030	0.41%	0.37%	0.10%
2031	0.36%	0.33%	-0.02%
2032	0.28%	0.25%	-0.15%
2033	0.25%	0.34%	-0.18%
2034	0.24%	0.23%	-0.26%
2035	0.24%	0.22%	-0.31%
2036	0.23%	0.22%	-0.45%

19.6 Please provide incremental GHG emissions reductions due to C&EM over the plan period for each scenario.

Response:

FEI interprets the reference to "incremental GHG emissions reductions due to C&EM" in this question to mean GHG emissions reductions that would not be forecast without the results of the 2017 LTGRP C&EM analysis. Table 8-1 of the Application (reproduced below for convenience) provides this information in absolute terms. Page 203 of the Application also notes that, in "the Reference Case, FEI's 2036 C&EM forecast result accounts for an emissions reduction of 8.3 percent over the 2036 emissions presented in Figure 8-2 [Annual GHG Emissions of Residential, Commercial, Industrial Customers (metric tonnes) – Excluding NGT, RNG, and C&EM]. This value changes to 8.5 percent and 3.3 percent for the Upper and Lower Bound scenarios, respectively."

Table 8-1: Comparison of FEI's Emissions Reduction Activities with the Calculated Emissions Reduction Target

GHG Reductions Required to Meet the Calculated 2036 Target ($MtCO_2e$, 2014 Base)	Forecast Emissions Reductions in 2036 ($MtCO_2e$, 2015 Base)		
29.3	Reference Case	Upper Bound	Lower Bound
RNG	0.04	0.14	0.01
C&EM	0.8	0.8	0.3
NGT	2.3	14.9	0.2

Notes:
Some forecast NGT emissions reductions are realized outside the current boundaries of the BC emissions inventory.

20.0 Topic: C&EM expenditures

Reference: Exhibit B-1, Section 4.2.3.2, Estimated C&EM Expenditures, Table 4-4: Estimated Reference Case Annual Expenditures 1 – All Program Areas; Figure 4-5: Estimated Annual Expenditures by Scenario 1 – All Program Areas

20.1 Are the lines for Estimated Annual Expenditures in Figure 4-5 for Total C&EM annual expenditures (Incentive Estimate plus Non-Incentive Estimate) or for Incentives only?

Response:

The data in Figure 4-5 of the Application includes both incentive and non-incentive expenditure estimates associated with incentive based programs, but does not include all costs for C&EM activities that would be included in an expenditure application or would be reported in an annual report of actual expenditures. Section 4.2.3.2 on page 106 of the application, an excerpt of which is reproduced below, explains what is not included in the values shown in Figure 4-5.

> These results do not take into account the following factors which flow into C&EM expenditure schedules and C&EM annual reports to the Commission:[1]
>
> - Non-incentive expenditures that support or enable C&EM programs at the portfolio level, such as Enabling Activities and Conservation Education Outreach expenditures;[2]
> - Operational program delivery considerations, such as changes in required C&EM staffing levels or program eligibility requirements; and
> - Emergence of new technologies more than five years into the future or technologies which are currently unknown which may increase aggregate energy savings opportunities and thus enable greater actual C&EM program expenditures across the planning period.[3]

[1] For this reason, individual C&EM expenditure schedules may contain higher or lower energy savings and expenditures in the short and medium term than indicated in the long term C&EM analysis in the LTGRP.

[2] FEI expects these expenditures to continue but FEI's future C&EM expenditure schedules will determine their specific extent.

[3] FEI does not project the actual expenditure impact of unforeseen future technologies as these depend on both their per-measure C&EM expenditure and also their total DSM participation rate.

20.1.1 Please explain why $52 million is the figure for the highest Total Annual Estimate for the Reference Case in Table 4-4, whereas Figure 4-5 appears to show the highest Annual Estimate for the Reference Case at something between $45 and $50 million.

Response:

FEI consulted with Posterity to provide the following response.

Table 4-4 presents estimated annual Reference Case C&EM expenditures for all years from 2017 until 2036, whereas Figure 4-5 is based on data points for five years only (2017, 2022, 2027, 2032, 2036).

20.2 Please provide a table and figure to illustrate how the estimated annual C&EM spending over the planning period compares to historical C&EM spending, for All-Program, Residential, Commercial and Industrial.

Response:

The following three figures summarize the requested information across the Reference Case, Upper Bound, and Lower Bound scenarios, respectively. Historical annual C&EM expenditures are identical across all three figures. 2017 LTGRP estimated C&EM expenditures behave as described in Section 4.2.3.2 of the Application. As noted in Section 4.2.3.2 of the Application, 2017 LTGRP estimated C&EM expenditures do not take into account the following factors which flow into C&EM expenditures schedules and C&EM annual reports:[4]

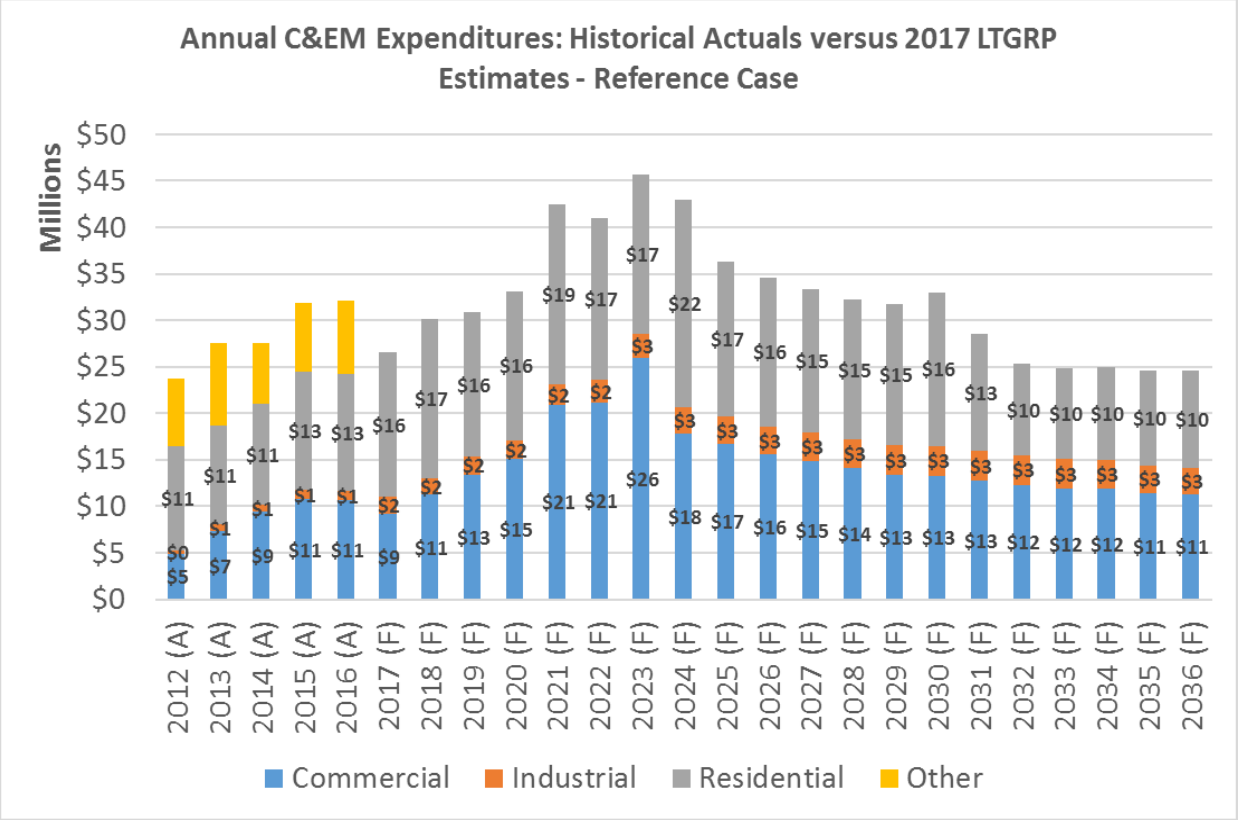
- Non-incentive expenditures that support or enable C&EM programs at the portfolio level, such as Enabling Activities and Conservation Education Outreach expenditures;5
- Operational program delivery considerations, such as changes in required C&EM staffing levels or program eligibility requirements; and
- Emergence of new technologies more than five years into the future or technologies which are currently unknown which may increase aggregate energy savings

[4] For this reason, individual C&EM expenditure schedules may contain higher or lower energy savings and expenditures in the short and medium term than indicated in the long term C&EM analysis in the LTGRP.

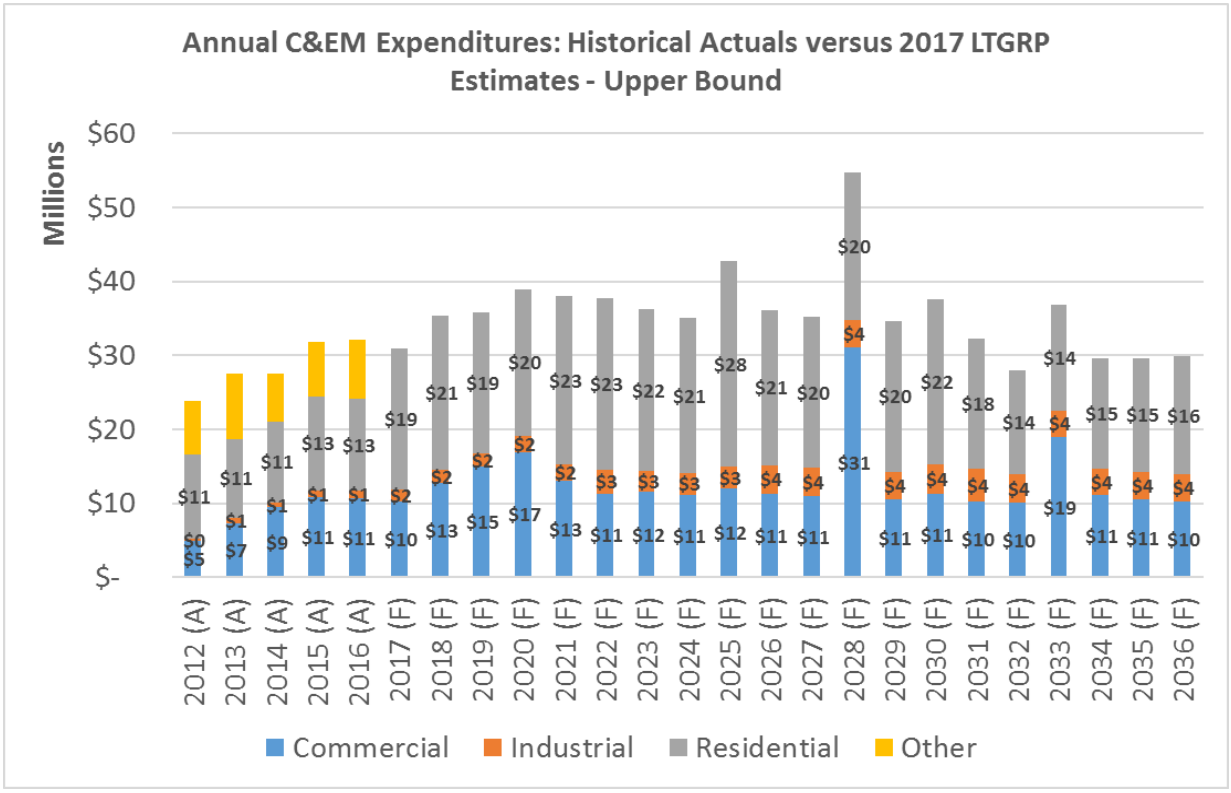
[5] FEI expects these expenditures to continue but FEI's future C&EM expenditure schedules will determine their specific extent.

opportunities and thus enable greater actual C&EM program expenditures across the planning period.6

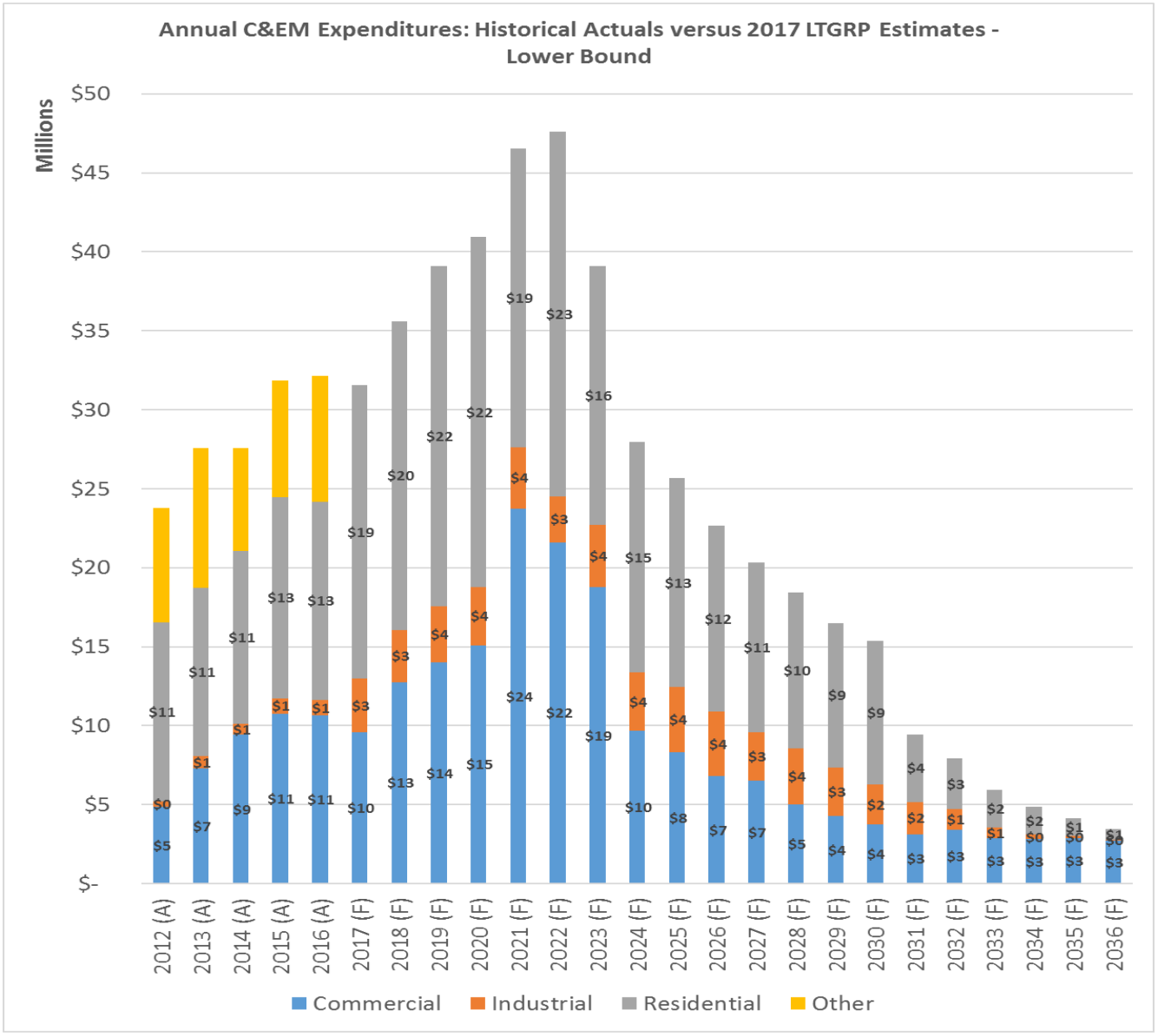
For reference, historical annual C&EM expenditures across the three figures include the Other category which contains such expenditures (Conservation Education Outreach, Portfolio Level Activities, Innovative Technologies, and Enabling Activities) that are excluded from the 2017 LTGRP estimated C&EM expenditures. Across the historical years presented in the figures, these Other expenditures average about $7.6 million per year. Since the historical annual Low Income Program Area expenditures are attributable to multiple customer sectors, these are also included in the Other category. Across the historical years presented in the figures, Low Income expenditures average about $1.3 million per year.



6 FEI does not project the actual expenditure impact of unforeseen future technologies as these depend on both their per-measure C&EM expenditure and also their total DSM participation rate.


Annual C&EM Expenditures: Historical Actuals versus 2017 LTGRP Estimates - Upper Bound
Millions
$60
$50
$40
$30
$20
$10
$-
2012 (A)
2013 (A)
2014 (A)
2015 (A)
2016 (A)
2017 (F)
2018 (F)
2019 (F)
2020 (F)
2021 (F)
2022 (F)
2023 (F)
2024 (F)
2025 (F)
2026 (F)
2027 (F)
2028 (F)
2029 (F)
2030 (F)
2031 (F)
2032 (F)
2033 (F)
2034 (F)
2035 (F)
2036 (F)
Commercial
Industrial
Residential
Other

1


Annual C&EM Expenditures: Historical Actuals versus 2017 LTGRP Estimates - Lower Bound
Millions
$50
$45
$40
$35
$30
$25
$20
$15
$10
$5
$-
2012 (A)
2013 (A)
2014 (A)
2015 (A)
2016 (A)
2017 (F)
2018 (F)
2019 (F)
2020 (F)
2021 (F)
2022 (F)
2023 (F)
2024 (F)
2025 (F)
2026 (F)
2027 (F)
2028 (F)
2029 (F)
2030 (F)
2031 (F)
2032 (F)
2033 (F)
2034 (F)
2035 (F)
2036 (F)
Commercial
Industrial
Residential
Other

1

2

21.0 Topic: DSM

Reference: Exhibit B-1-1, Section 4.2.3.3, Table 4-8, p. 116, pdf p. 141

Table 4-8 is labeled "Estimated Reference Case Cost Effectiveness Test Results — All Program Areas."

21.1 Confirm that the aggregate TRC result for each year from 2017 to 2035 is no less than 2.0.

Response:

Confirmed.

21.2 Confirm that the aggregate MTRC result for each year from 2017 to 2035 is no less than 10.3.

Response:

Confirmed.

21.3 Confirm that the aggregate UCT result for each year from 2017 to 2035 is no less than 2.0.

Response:

Confirmed.

21.4 With such robust cost-effectiveness results, why does FEI conclude that the Reference Case captures "all cost-effective" energy savings?

Response:

FEI consulted with Posterity to provide the following response.

In Table 4-1 of the Application, FEI states that its C&EM analysis incorporates all cost effective demand-side measure activity. Section 4.2.3 of the Application, states that the C&EM analysis results indicate the outcome of pursuing all cost effective energy savings potential.

The 2017 LTGRP C&EM Reference Case incorporates all C&EM measures that the BC CPR identified and which individually pass either the MTRC (for residential measures) or the TRC (for commercial and industrial measures). The C&EM analysis was informed by the BC CPR results and FEI's C&EM program experience about the level of measure uptake that should be applied to these economic measures in order to estimate addressable C&EM market potential that could result from pursuing this cost effective energy savings potential.

Aggregate results for TRC and MTRC are a weighted average, but the C&EM measures in the market potential include some measures that pass the TRC or MTRC cost effectiveness test by a small margin only. This aggregation effect may conceal that the 2017 LTGRP C&EM analysis, in fact, does apply the applicable cost effectiveness test to each individual C&EM measure.

21.5 Is it reasonable to assume that FEI could plan to capture additional cost-effective energy savings?

Response:

FEI could reasonably attempt to capture additional cost-effective energy savings but such planning would occur in its future C&EM expenditure schedules and program design, which consider incentive levels, program delivery methods, and marketing. The 2017 LTGRP C&EM analysis represents a long-term directional forecast of addressable C&EM initiatives. Section 4.2.3.5 of the Application provides a directional sensitivity analysis that suggests that this addressable potential may increase with increased C&EM incentive levels but that projected C&EM energy savings increase at a lower rate than forecast C&EM expenditures. FEI emphasizes that, in order to capture addressable potential, its C&EM program team sets actual incentive levels based on specific market research and program experience at the time of developing programs or preparing C&EM expenditure schedules. In contrast, the BC CPR Bass Diffusion model which yielded the sensitivity analysis results represents a theoretical construct that is calibrated to FEI's historical program performance and North American industry benchmark data.

21.5.1 If yes, how would FEI undertake to capture additional savings?

Response:

Please refer to the response to BCSEA IR 1.21.5.

21.5.2 If no, explain why FEI does not believe that the "gap" between the projected cost-effectiveness results and the minimum required cost-effectiveness ratio of 1.0 does not represent the potential for additional cost-effective measures.

Response:

Please refer to the responses to BCSEA IRs 1.21.4 and 1.21.5.

22.0 Topic: DSM

Reference: Exhibit B-1, Section 4.2.3.5, Figure 4-13, p. 122, pdf p. 147

Figure 4-13 is labeled "Sensitivity Results Trend-Lines – BC CPR 2035 Incentive Level versus Estimated Expenditures and Energy Savings, All Program Areas."

22.1 Confirm that Figure 4-13 indicates that "High Incentive" levels in the model result in 44% greater energy savings than do the baseline incentives.

Response:

FEI consulted with Navigant to provide the following response.

Not confirmed. As explained in lines 8 – 10 of page 122, Figure 4-13 indicates that the "Highest Incentive" scenario—having aggregate incentives that are 44% higher than the "Baseline Incentive" scenario—results in 2035 annual savings that are 34% higher than the "Baseline Incentive" scenario.

22.2 Given that the TRC test is indifferent to the portion of project costs that are paid by incentives, confirm that the savings achieved at the "high incentives" level would not be less cost-effective under the TRC than the savings achieved at the baseline incentives level.

Response:

FEI consulted with Navigant to provide the following response.

Though the TRC test does not include incentive costs, the TRC test can be less cost-effective as incentives increase. The TRC test is directly related to the lifetime gas savings potential and incremental costs of each measure included in the BC CPR market potential portfolio. When incentives levels are not elevated — as defined in the Baseline incentive case — customers are more likely to adopt measures whose lifetime gas savings and associated lifetime customer bill savings are high compared to the incremental costs. As incentives rise — as defined in the High incentive case — the effective cost (e.g., the incremental cost less incentive) incurred by the customers decreases, so customers require less gas savings and associated bill savings for the investment to provide a payback time equivalent to the Baseline incentive case. Thus, the mix of measures adopted by customers in the High incentive case can be less cost-effective from a TRC perspective than the mix adopted in the Baseline incentive case. Stated another

way, the mix of adopted measures in the High incentive case has a lower ratio of aggregate lifetime gas savings to aggregate incremental costs. This directly impacts the TRC test by reducing the ratio of aggregate avoided gas costs to aggregate incremental costs, which leads to a reduction in the TRC test for the High incentive case relative to the Baseline incentive case.

22.2.1 If not confirmed, explain why not.

Response:

Please refer to the response to BCSEA IR 1.22.2.

23.0 Topic: DSM

Reference: Exhibit B-1, Section 4.2.3.6, p. 123, pdf p. 148

"FEI commissioned Posterity to develop an exploratory process linking peak demand forecasts to the end-use scenarios used in the annual demand forecasts. Section 6.2.1.3 further discusses this process. Overall, Posterity's approach suggests that the 2017 LTGRP's C&EM forecast decreases peak demand. Section 6 discusses in detail how this may impact infrastructure expansion requirements across FEI's regional transmission systems. FEI emphasizes that Posterity's approach currently is theoretical in nature and unsupported by direct measurement. Thus FEI's infrastructure planning continues to rely on FEI's traditional peak demand forecast method (Traditional Peak Method)."

23.1 Please confirm, or otherwise explain, that if FEI were able to defer or reduce infrastructure investments due to the peak-demand reducing effect of cost-effective DSM, this would be beneficial to ratepayers by reducing rates.

Response:

It is correct to assume that, all else being equal, deferring or reducing infrastructure investments due to peak-demand reducing DSM activities can benefit ratepayers either by delaying future delivery rate increases (in the case of infrastructure investments being delayed) or reducing the level of delivery rate increases (in the case of infrastructure investments still occurring but at a reduced level). However, one must also consider the cost of delivering the DSM activities as well as the delivery rate impact as a result of DSM activities that decreases both the peak demand and the annual demand throughput in FEI's system (in general, reductions in peak demand due to DSM also reduces the annual demand throughput). This is illustrated in Table 8-2 in Section 8.6 of the Application, reproduced below, which shows that DSM activities (referred as C&EM in the table) will have an overall higher delivery rate impact (costs) in comparison to scenarios without DSM activities. FEI's response to BCSEA IR 1.3.1 further demonstrates that the beneficial delivery rate impact of demand throughput generally outweighs the delivery rate impact of the resulting changes in infrastructure investments[7]. However, it is important to note that the table below shows the impact to delivery rates only. Participants in DSM programs that implement measures to reduce their own consumption volumes will benefit from overall cost savings on the commodity, midstream, tax and delivery components of their total bill.

[7] The example shown in the response to BCSEA IR 1.3.1 is for a scenario of accelerating infrastructure investment, thus the effect will be opposite in the scenario contemplating in this question which the infrastructure investment is delayed or reduced.

	Rate Change (2015-36, %)					
	Base		Base + C&EM		Base + C&EM + NGT	
	Cumulative	Compound Annual	Cumulative	Compound Annual	Cumulative	Compound Annual
Reference Case	60	2.2	78	2.8	62	2.3
Upper Bound	36	1.5	48	1.9	23	1.0
Lower Bound	201	5.4	217	5.6	205	5.4

23.2 In assessing the need for infrastructure expansion, does FEI's "traditional peak demand forecast method" rely on any theoretical values, or are all values supported by direct measurement?

Response:

To determine the expected UPC_{peak} and subsequently peak demand in the base year, FEI's Traditional Peak Method relies on monthly consumption data derived from direct measurement at FEI customer premises. To create the forecast, the Traditional Peak Method relies on a basic assumption that the UPC_{peak} values derived in the base year remain constant through the forecast period and load growth is related to account growth, but not varying UPC_{peak} values. As presented in the response to BCUC IR 1.40.1.1, FEI's measured UPC_{peak} values between 2007 and 2016 do not show any consistent trend to indicate either increasing or decreasing UPC_{peak}. In this respect, the assumption of constant UPC_{peak} and FEI's Traditional Peak Method is supported by direct measurement.

At present, determination of UPC_{peak} using Posterity's end-use peak demand method is newly developed and is considered theoretical in that its predictions of UPC variations have not been verified by direct measurement.

23.3 In FEI's assessment, what would be required for it to assess demand side alternatives on an equal footing with infrastructure investments when planning to meet peak demand?

Response:

FEI does assess demand side alternatives on an equal footing to supply side alternatives. As FEI described in response to BCUC IRs 1.1.4, 1.2.1 and 1.10.1 (Attachment 23.3 to this response) in the FEI 2014 LTRP proceeding, FEI does not directly compare supply and demand side portfolio alternatives because it is not a vertically integrated utility that must make decisions on behalf of its rate payers on whether to build or buy new generation resources to meet demand. Instead, FEI purchases its resources on the open market at fair market prices and relies on market players (in this case producers and transporters of natural gas) to make appropriate resource development decisions. FEI thus includes the avoided costs of purchasing gas supplied by the open market in the assessment of the cost effectiveness of C&EM activities. If infrastructure costs on its own system can be avoided through its DSM programming (the generic use of the term DSM per the response to BCSEA IR 1.7.2 is intended), then a non-vertically integrated utility like FEI should include the infrastructure avoided costs in the benefits side of the cost effectiveness tests as well. By including all cost-effective C&EM measures in its estimate of the energy savings from C&EM activities, FEI is assessing demand side alternatives on an equal footing to supply side alternatives. Please refer to the responses to BCUC IRs 1.29.1, 1.29.2 and 1.40.1.1 in this proceeding for a discussion of why FEI does not currently include an avoided cost of capacity infrastructure on its own system in its cost effectiveness tests for C&EM activities.

Infrastructure investments designed to meet peak demand are engineered. The capacity benefit is quantifiable using established engineering methods and can be defined within fairly precise tolerances. Therefore FEI would consider infrastructure investment as a firm resource in the context of resource planning for addressing peak demand capacity constraints. To assess whether or not demand side measures are truly having a firm impact on peak demand and what economic value could be attributed to that impact would require direct measurement of end-use loads at a reading frequency (hourly for example) sufficient to identify the peak end-use consumption trends.

23.3.1 What steps is FEI undertaking to assess demand side alternatives on an equal footing with infrastructure investments when planning to meet peak demand?

Response:

Please refer to the response to BCSEA IR 1.23.3 which explains that FEI is assessing demand side alternatives on an equal footing with infrastructure investments. In order to examine potential impacts of DSM on peak demand, FEI has worked with Posterity to develop the end-use peak demand method. As described in the response to BCUC IR 1.29.3.2 FEI believes that in order to refine the end-use peak demand process, and to develop a level of confidence in the results with respect to peak day and peak hour demand, the collection of FEI customer consumption data at hourly intervals and analysis of that data for implications on peak demand is a key component. FEI is currently in the process of conducting a pilot study of AMI with hourly metering and pressure measurement. Examination of the preliminary information as it becomes available in 2018 will assist in defining how we apply this information to future study and process development efforts.

Additionally, since the forecast UPC_{peak} was produced for the 2017 LTGRP using the end-use process, FEI is nearing completion of its annual load gathering process for another year. The UPC values produced will be assessed against the predicted values from the end-use forecasts to determine if any predicted changes are apparent in the current UPC values. If the results are not comparable, FEI will be assessing how the end-use peak demand model may be refined to produce more comparable results. Refining the gas appliance load shape information based on FEI customer consumption data is another avenue of development that is being considered that will benefit from hourly metering to establish a more direct link to the end-use practices of FEI consumers. FEI believes that many years will be required to establish the measurement solutions and develop the end-use method to a point where a reliable determination of the impacts of DSM on peak demand projections and capacity related infrastructure investments can be made.

23.4 Is FEI aware of any jurisdictions in North America where regulators require that either natural gas or electricity infrastructure investment decisions must be weighed against demand side alternatives?

Response:

Many vertically integrated electric utilities across North America directly compare supply side resource portfolios to demand side resource portfolios in their integrated resource plans. BC Hydro and FortisBC Inc. (electric) are both examples.

23.4.1 If yes, what is different about the T&D systems in those jurisdictions compared with FEI's system such that demand side measures are considered to be viable alternatives to infrastructure investments?

Response:

Please refer to the response to BCSEA IR 1.23.3.

23.5 Is FEI aware of any jurisdictions in North America where, within a single utility, avoided cost values used in DSM cost-effectiveness analysis vary depending on geographic location, based on the perceived value of deferring infrastructure investments?

Response:

FEI is not currently aware of any gas utilities that use avoided cost values that vary on a geographical basis based on the attributed values of infrastructural deferral, but has not done an exhaustive search. Please also refer to the response to BCUC IR 1.29.2.1.

23.5.1 Do the avoided cost values used in assessing DSM cost-effectiveness in FEI's LTGRP reflect the value of deferred infrastructure investments?

Response:

FEI does include a distribution adder that represents avoided distribution system improvements in its assessment of DSM cost effectiveness; however, this value does not include deferral of transmission system capacity related infrastructure for reasons explained in BCUC IRs 1.29.1, 1.29.2 and 1.40.1.1. Please also refer to the response to BCSEA IR 1.23.3.

23.5.2 If yes, are the avoided cost values higher in areas that FEI has identified for future infrastructure investments?

Response:

Please refer to the response to BCSEA IR 1.23.3.

23.6 To what extent has FEI considered the potential ratepayer costs for infrastructure investments in its targeting of potential load-building strategies?

Response:

FEI has seen increasing demand for gas service, and an increasing number of gas appliances in the residential sector, from customers. One of FEI's central objectives is to provide customers with cost effective delivery service, thus any potential impact to the delivery rates (both positive and negative) as a result of potential load-building strategies will be considered and accounted for, including potential changes to infrastructure investment as well as changes in the demand throughput. As shown in FEI's response to BCSEA IR 3.1, the delivery rate benefits due to the increases in demand throughput as a result of load-building strategies generally outweigh the delivery rate impacts of accelerating/increasing infrastructure investments needed to meet the increased demand due to potential load-building strategies. In the interest of providing customers with cost effective delivery service, it is important to consider the overall benefits to all customers as a result of the potential load-building strategies.

24.0 Topic: DSM expenditure schedule

Reference: Exhibit B-1, p.123, pdf.148

FEI says it will submit a multi-year DSM expenditure schedule to the Commission "in 2018 after submission of the 2017 LTGRP."

24.1 Does FEI intend to await the Commission's decision regarding the 2017 LTRP before submitting a multi-year DSM expenditure schedule?

Response:

FEI expects to file its 2019 – 2022 DSM Expenditures application during Q2, 2018, in order to attain a timely Commission approval for its 2019 expenditures.

25.0 Topic: DSM peak reduction and load shifting

Reference: Exhibit B-1, p.124

In the context of discussing the California Standard Practice Manual, FEI says its C&EM programs all fall under a category ("conservation") that is different than the category ("load management") that includes "programs that may either reduce peak demand or shift demand from peak to non-peak periods." This could imply that FEI considers that the scope of its C&EM portfolio does not include peak reduction or load shifting programs.

Further, in describing "programs that may either reduce peak demand or shift demand from peak to non-peak periods" as falling within the California SPM category of "load management," FEI also appears to reject peak reduction and demand shifting programs in B.C. as being difficult and challenging and to praise load-building instead.

25.1 Please confirm, or otherwise explain, that FEI's C&EM portfolio could include measures aimed at peak reduction and load shifting.

Response:

Please refer to the responses to BCUC IR 1.29 series and the responses to BCSEA IRs 1.23.3 and 1.23.3.1.

25.2 Has FEI rejected peak reduction and load shifting DSM programs for the C&EM portfolio?

Response:

No, FEI has not rejected peak reduction and load-shifting DSM programs, but is not able to bring such programs forward at this time. Please refer to the response to BCUC IR 1.29 series of responses.

26.0 Topic: DSM and Forecast Total Annual Demand

Reference: Exhibit B-1, Figure 4-14: Total Annual Demand After DSM - Including NGT and Woodfibre LNG Project Example

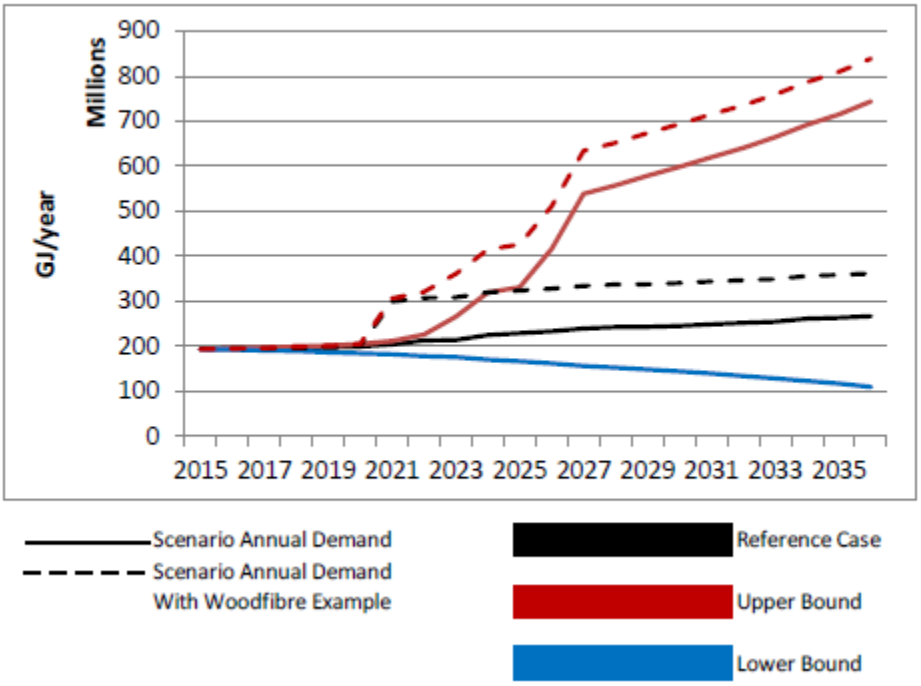
"Figure 4-14 below summarizes forecast total annual demand including FEI's base customers, FEI's projected NGT customers, and the effect of projected C&EM activity."

26.1 For greater certainty, please confirm that in Figure 4-14, the Reference Case and the Upper Bound include NGT but not "Woodfibre LNG Project Example."

Response:

Not confirmed. The solid lines in Figure 4-14 (reproduced below) denote Reference Case, Upper Bound, and Lower Bound annual demand including NGT and after forecast C&EM energy savings. For the Reference Case and the Upper Bound, the dashed lines indicate the impact of adding projected annual demand for the Woodfibre LNG Project Example.

Figure 4-14: Total Annual Demand After DSM - Including NGT and Woodfibre LNG Project Example



26.2 Please provide a version of Figure 4-14 that breaks out NGT demand.

Response:

The Application already contains the broken-out impact of NGT on annual demand. Figure 3-17 indicates NGT forecast demand, Figure 4-1 illustrates the impact of forecast C&EM energy savings on annual demand (excluding NGT), and Figure 3-20 illustrates the approximate impact of the Woodfibre LNG Project on annual demand (including NGT). For convenience, these figures are reproduced below.

Figure 3-17: Forecast Annual Demand from Long Term CNG and LNG Adoption Scenarios (2017-2036)

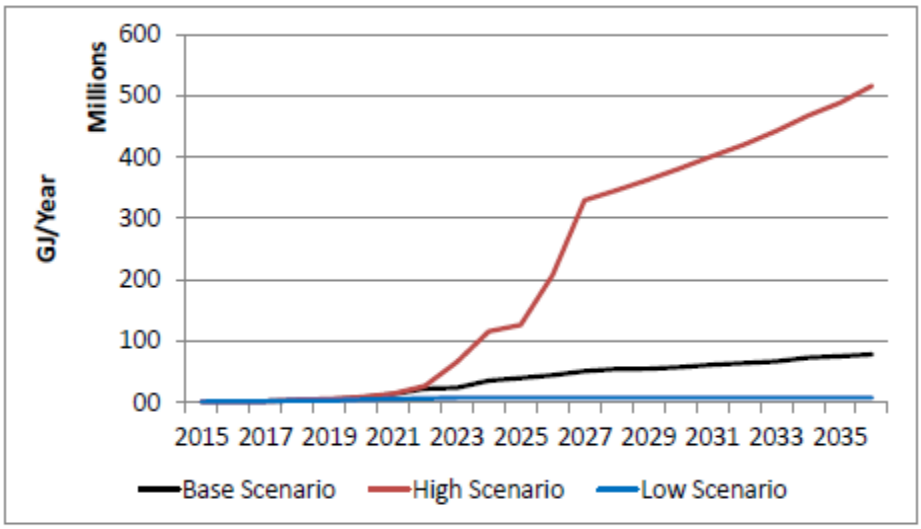


Figure 4-1: Natural Gas Demand Before and After Estimated C&EM Savings (Excluding NGT) – All Sectors

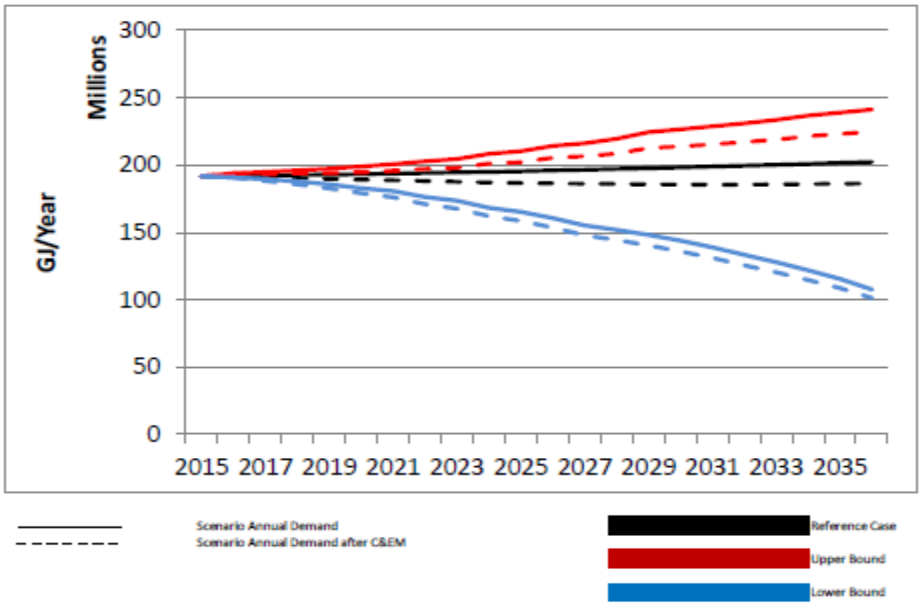
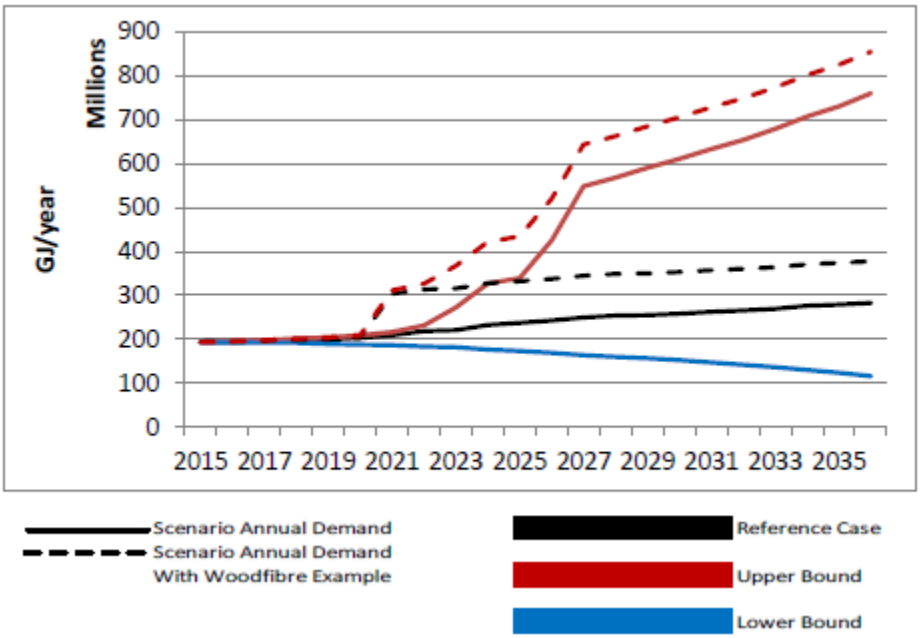


Figure 3-20: Total Annual Demand Including NGT and Woodfibre LNG Project Example



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27.0 Topic: DSM and Load Building, Recommended Actions

Reference: Exhibit B-1, pp.127-128, pdf pp.152-153

On pages 127-128, FEI discusses and provides list of recommended actions using the term "DSM activity" that includes both DSM activities as defined in the UCA, CEA and DSM Regulation and load-building activities.

27.1 Please restate the recommended actions, using the term DSM to mean only DSM measures as defined in the UCA, CEA and DSM Regulation.

Response:

The recommended actions from page 128 of the Application are repeated below. For greater certainty, the first two bullet items use the term C&EM to denote DSM measures as defined under the CEA. The second two bullet items use the term DSM to denote DSM activity within the broader definition of the term, such as outlined in the California Standard Practice Manual. As such, the second two bullet items refer to DSM activity that can contain both C&EM (i.e. DSM measures within the statutory definition of the CEA) as well as non-C&EM DSM activity (i.e. activities outside the statutory definition of the CEA).

- Develop, based on the results of the BC CPR and the 2017 LTGRP C&EM analysis (and in light of BC provincial energy goals), a C&EM expenditure schedule for the period beyond 2018 and submit this request to the Commission after submission of the 2017 LTGRP.
- Implement the near-term C&EM expenditure schedule for the period beyond 2018 in accordance with the BCUC's future decision on FEI's forthcoming expenditure application.
- Continue to examine the potential for all forms of DSM and analyse the potential benefits and risks for FEI and its customers of implementing new and creative programs that help meet customer energy needs, optimize the use of utility infrastructure, keep energy rates down and/or reduce customers' GHG emissions.
- Continue to work with federal, provincial and municipal governments and other potential partners to explore and identify ways in which FEI's DSM activities can continue to help meet government objectives while ensuring benefits for FEI and its customers.

28.0 Topic: Load building

Reference: Exhibit B-1, p.125, pdf p.150

FEI states that "Expenditures and cost recovery mechanisms for the [GHG reducing] fuel switching program and NGT initiatives are separate and distinct from the Company's C&EM activities and have been approved by the Commission at current levels through proceedings separate from the current one." [underline added]

FEI continues, "FEI is also examining the potential for adding new, large industrial load customers and is currently engaging a wide network of builders, developers and other influencers of natural gas use in order to increase awareness of the benefits of natural gas and encourage new load." [underline added]

More generally, FEI states:

> "Other demand side activities being undertaken by FEI include fuel switching to natural gas for space heating and hot water, NGT to shift fleets, heavy duty vehicles, marine and other vessels from higher carbon, petroleum based fuels to natural gas, and seeking to add new, large industrial customers. While these activities are not included in the DSM Regulation definition of a demand-side measure and are therefore not included in the C&EM activities described above, they are important for customers by adding throughput to the natural gas system and thereby reducing rates while also helping to achieve government energy and emissions policy objectives." [ES-5-6, pdf pp.17-18, underline added]

28.1 Under what program(s) is or are FEI's load-building activities undertaken (other than fuel switching and NGT)?

Response:

This response addresses BCSEA IRs 1.28.1, 1.28.2, 1.28.3 and 1.28.5.

FEI would not characterize all load-building efforts as a "program", rather they are a variety of activities that the Company undertakes, both directly and indirectly, to meet customers' energy needs. These efforts include various activities such as some programs, the development of service offerings, communicating with customers, working with HVAC manufactures to utilize gas equipment for residential and commercial customers, educating on the benefits of natural gas use, working closely with the contractor/builder/developer community to find natural gas solutions to meet its needs, advancing NGT solutions, increasing RNG supply, along with exploring more recent carbon abatement technologies such as carbon capture and power to gas. These various activities primarily aim to meet customer demand for gas service by attracting residential, commercial and industrial customers and to develop new markets for LNG and CNG such as for transportation and for remote communities. Not all of these load building activities increase GHG emissions as initiatives such as NGT, RNG, power to gas and the

advancement of new carbon abatement technologies all serve to reduce GHG emissions (also refer to Appendix E of the LTGRP).

It is not possible for FEI to identify the specific future activities that would be required over a 20-year horizon and the associated forecast as technologies, customer preferences and market opportunities will change over this period. FEI's load growth activities will continue to evolve to meet customers' energy needs as such activities help maintain rate competitiveness by increasing throughput on the gas delivery system.

28.2 Please provide the budgets and actual spending for FEI's load-building activities (other than fuel switching and NGT) for 2014 to 2018.

Response:

Please refer to the response to BCSEA IR 1.28.1.

28.3 What level of spending does FEI propose in the 20-year plan period for load-building activities (other than fuel switching and NGT)?

Response:

Please refer to the response to BCSEA IR 1.28.1.

28.4 Are FEI's load building activities (other than fuel switching and NGT) to the account of the shareholder or the ratepayers?

Response:

The expenditures for FEI's load building activities are recovered through delivery rates, which is consistent with FEI's other activities including DSM (C&EM programs), capital projects, sustainment capital and operating & maintenance, among other things.

28.5 What cost-effectiveness methodology does FEI apply to its spending on load-building activities (other than fuel switching and NGT)?

Response:

Please refer to the response to BCSCEA IR 1.28.1.

28.6 What GHG emissions reduction analysis does FEI apply to its spending on load-building activities (other than fuel switching and NGT)?

Response:

In addition to fuel switching and NGT, GHG emissions reduction analysis is conducted on RNG activities. Otherwise, all emissions from system throughput are reported annually to the BC Ministry of Environment as part of the Greenhouse Gas Industrial Reporting and Controls Act.

28.7 Regarding load building targeted at new, large industrial customers, what criteria does FEI apply to ensure that facilitating these new natural gas loads is consistent with the BC energy objectives regarding energy efficiency and GHG reductions?

Response:

For the addition of new, large industrial customers that require a main extension, FEI applies the Commission approved mains extension test.

For many industrial end-uses including medium and high-temperature process heat, natural gas is the optimal energy source to use and is an economical, technological and feasible lower-carbon energy source in order for the industry remain competitive. To support the provincial GHG reduction objectives FEI offers owners or long-term leaseholders of large industrial

facilities who are existing customers of FEI with incentives and equipment rebates to improve the energy efficiency in their industrial process and their facility such as for:

- the installation of a high-efficiency commercial boiler for space heating or process heat ;
- the upgrade to a high-efficiency direct contact water heater;
- the installation of air curtains on exterior doors of the industrial facility;
- the installation of insulation on hot water and steam pipes; and
- conducting a steam trap audit and for replacing the leaking traps.

In addition, FEI offers industrial customers a customized option of rebates for plant wide audits, feasibility studies and high efficiency upgrades.

29.0 Topic: Load building – Trans-Pacific Marine Vessels

Reference: Exhibit B-1, section 2.4.1.3, GHG Emissions from the Global Marine Sector page 55, pdf p.80

"For example, coastal freight vessels (which operate entirely within the currently-designated ECA zones) and trans-Pacific marine vessels (which operate a small portion of the total journey in the currently-designated ECA zones) are not included in the BC GHG inventory numbers. Specifically, emissions from shipping activities not included in the provincial GHG inventory amount to about 70 million metric tonnes of CO2e per year, which is greater than the combined 64 million metric tonnes of CO2e per year that the entire Province of BC emits per year." [underline added]

29.1 Please clarify what is the BC connection to the sources that amount to about 70 million metric tonnes of CO2e per year.

Response:

To clarify, the 70 million metric tonnes of CO2e per year from the marine vessels that call to ports in the region includes emissions of the entire voyage of these vessels from origin to destination.[8] The BC connection to these sources would be that if these vessels were to adopt LNG a maritime fuel and source that fuel from BC, the overall emissions of the global maritime transportation sector would be reduced. Not only would such an adoption reduce GHG emissions globally, air contaminant emissions in the province of BC would also be reduced, when these marine vessels are operating in the provincial water boundary or air shed. The reduction in air contaminants from the adoption of LNG would benefit all BC regions and communities that are impacted by maritime traffic.

[8] Stx Canada Marine – West Coast Marine Liquefied Natural Gas (LNG) Supply Chain Project; prepared for: Transportation Development Centre of Transport Canada; October 2013

30.0 Topic: "Connect to Gas" (formerly "Switch 'n' Shrink")

Reference: Exhibit B-1, pp.125-126; p.208

"FEI's fuel switching program (previously known as 'Switch 'n' Shrink') supports customer additions and demand growth, and includes initiatives designed to result in lower overall GHG emissions by using natural gas instead of other fuels such as coal, oil, diesel or propane. This program also promotes energy efficiency through installation of new high efficiency natural gas heating equipment."

30.1 Please characterize the 4,349 participants in the "Switch 'n' Shrink" program in terms of their heating fuel prior to participating in the program and the degree of efficiency of the NG equipment installed through the program.

Response:

The following tables show the 2010-2016 Switch 'n' Shrink program participant's fuel type prior to switching to natural gas:

Table 1: Distribution of fuel type prior to switching to natural gas

Fuel Type	% of program participants
Oil	97%
Propane	1%
Wood	1%
Other	1%
Total	**100%**

Table 2: Distribution of AFUE ratings of installed high efficiency heating systems

AFUE %	% of program participants
<95%	7%
95.0-95.9	31.5%
96.0-96.9	37%
97.0-97.9	23%
≥98%	1.5%
Total	**100%**

30.2 Does FEI consider the "Switch 'n' Shrink" program to have been a success? Please discuss in terms of the potential pool of participants captured and GHG emissions reduced.

Response:

This response also addresses BCSEA IR 1.30.5.

Yes, FEI considers the "Switch 'n' Shrink" program to be successful, as the program has enabled the heating fuel for over 4,000 homes to be converted from a high to low carbon fuel from 2010 to 2016. This has resulted in GHG emissions reduction of approximately 66,000 tonnes over the lifetime of the installed high efficiency equipment. The pool of potential program applicants that FEI targets consists of single family home owners, whose home is located close to a natural gas main and are likely to have an existing propane or heating oil home heating system. A large number of homes in Vancouver Island fall into this category, however the size of the potential pool is difficult to ascertain since FEI does not have reliable data on propane and fuel oil home heating systems for non-customers who are close to main. Since participation has remained consistent, FEI believes that this ongoing effort continues to be successful.

30.3 Please confirm, or otherwise explain, that "Connect to Gas" (formerly "Switch 'n' Shrink") supports only measures that reduce GHG emissions.

Response:

In 2012, the "Switch 'n' Shrink" program budget was moved from C&EM (then EEC) to O&M per Commission Order G-44-12.

FEI confirms that the previous "Switch and Shrink" program, now an offering that is run under the "Connect to Gas" umbrella, continues to provide customers with rebate incentives that support the reduction of GHG emissions.

The overarching "Connect to Gas" initiative is a branding umbrella under which FEI communicates to customers about becoming a gas customer as opposed to one specific program. Since the rebranding, FEI has expanded its efforts to additional offerings. Under the umbrella, FEI will continue to develop and pilot rebate and other offerings to meet customer needs and demands.

30.4 Does FEI have any fuel switching activities outside the Connect to Gas program? If so, please describe such activities and confirm, or otherwise explain, that such activities support only measures that reduce GHG emissions.

Response:

In addition to activities under the umbrella of the Connect to Gas initiatives FEI is also pursing a variety of natural gas for transportation initiatives that have the effect of lowering emissions in comparison to diesel. Customers who use RNG may also take this approach as a measure to lower emissions further by switching from a higher carbon fuel to a renewable natural gas. In addition, FEI works directly with commercial and industrial customers to encourage them to switch from fuels such as coal to natural gas.

30.5 Please discuss the target market for the Connect to Gas program in terms of customer numbers, fuel types and regions.

Response:

Please refer to the response to BCSEA IR 1.30.2.

30.6 Does FEI anticipate that the Connect to Gas program will continue indefinitely? Will there come a time when there are no remaining opportunities for switching from higher-carbon fuels to natural gas?

Response:

As noted in the response to BCSEA IR 1.30.3, Connect to Gas is now a branding umbrella under which FEI communicates to customers about connecting to the natural gas system as opposed to one specific program. Under the branding umbrella, FEI communicates differently to customers depending upon the specific offering at that time. The branding umbrella will

continue so long as there are offerings available for customers, customers are participating in the offerings and the message resonates with customers.

30.7 Please provide historical and LTGRP planned spending and GHG emissions reduction estimates for the Connect to Gas program.

Response:

The accumulated total historical spend from 2010 to 2016 for the Switch and Shrink program is approximately $6 million. The NPV of GHG emissions reductions from 2010 to 2016 are shown in the response to BCSEA IR 1.30.2 and, over the lifetime of the installed high efficiency equipment, the NPV is approximately 66,000 tonnes.

Future O&M spend for customer related offerings and services will be determined in future PBR or revenue requirement filings.

31.0 Topic: Woodfibre LNG Project

Reference: Exhibit B-1, p.47, 90, 126, 127, 164-165, 172-173, 187

It is understood that FEI is not seeking a Commission determination regarding potential service to the Woodfibre LNG Project in this proceeding. The following questions are asked for context.

31.1 What factors affect whether FEI would provide service to the Woodfibre LNG Project if so requested by the customer? Does FEI have an obligation to serve upon request, or does FEI have some discretion as to whether to serve the Project?

Response:

Section 28 of the *Utilities Commission Act* outlines the conditions under which a Utility must provide service *"a public utility must supply its service to premises that are located within 200 metres of its supply line or any lesser distance that the commission prescribes suitable for that purpose"*.

Service would be provided if the Woodfibre LNG project proceeds and comes into operation, and Woodfibre LNG becomes a customer under FEI's Rate 50 Large Volume Industrial Transportation tariff.

31.2 Would a decision by FEI to provide service to the Woodfibre LNG Project require Commission approval? If so, what form would this take?

Response:

No, FEI does not need Commission approval to serve Woodfibre LNG as any company can become a customer of FEI based on the conditions in which FEI is obligated to serve and there is an appropriate approved rate schedule (tariff) in which the customer can be accommodated. Transportation service to Woodfibre would be provided under Rate Schedule 50 Large Volume Industrial Transportation that was approved by the Commission pursuant to Order G-10-15.

31.3 What is the legal process by which natural gas service by FEI to the Woodfibre LNG Project would be confirmed? Would there be an agreement (contract) for service? What rate schedule would apply?

Response:

Please refer to the response to BCSEA IR 1.31.2.

31.4 What is FEI's understanding of when it can expect to receive a request for service from the Woodfibre LNG Project if one is to be forthcoming?

Response:

Woodfibre LNG advises that it expects to make a request for service to FEI at the same time as the positive final investment decision (FID) regarding the project. The service would commence approximately four years following FID.

31.5 Please confirm, or otherwise explain, that, at the time of the response, FEI has not received a firm decision and commitment by the customer for natural gas service for the Woodfibre LNG Project.

Response:

Confirmed. Please refer to the response to BCSEA IR 1.31.4 provided by Woodfibre LNG.

32.0 Topic: Revelstoke

Reference: Exhibit B-1, p.ES-8; 6.3.5.2 Revelstoke Propane System

"FEI continues to examine the needs of the Revelstoke satellite propane distribution system and the potential to convert it to a natural gas system via a satellite LNG station."

"Core demand growth in Revelstoke is forecast to be minimal and serviceable by the pipe, storage and send-out capacity of the current system. However, plans for a large scale ski hill and resort development could potentially double the area's load requirements in 20 years and would require FEI to expand the propane system with pipeline extensions, main looping, additional storage tanks and loading facilities. The development has been delayed though, and this delay has resulted in FEI delaying the planned expansion indefinitely, pending status of the development." [p.184, pdf p. 209, underline added]

32.1 What amount of lead time or notice could residents of Revelstoke expect if FEI decides to reopen consideration of the LNG project?

Response:

It is important to note that the underlined section in the preamble refers to the looping within the distribution system that would be required if the ski resort (Mt. MacKenzie) started to develop per its initial 2009 plans, and is unrelated to the conversion of Revelstoke to vaporized LNG referenced in the first paragraph of the preamble.

Should FEI consider filing an application to convert Revelstoke to vaporized LNG, the timing of discussion with stakeholders will be determined at that time.

33.0 Topic: GHG emissions reductions targets in BC's energy objectives

Reference: Decision and Order G-189-14; Exhibit B-1, Planning Environment, section 2.3.3, British Columbia (page 41)

In its decision regarding FEU's 2014 LTRP, the Commission directed FEU to provide in its next LTRP an analysis of the GHG targets in the BC energy objectives, an estimate of the portion of the required reduction that the Company believes it can reasonably attain over time, and (ii) an outline of the impact of the implementation of new initiatives on the demand forecast and GHG emission reductions. [p.49]

In the Application, FEI states:

> "In March 2011, BC experienced a change in government which caused a further calibration of provincial energy and emissions policy. This calibration resulted in a further focus on NGT, natural gas exports, energy efficiency in buildings, RNG, and efficient electrification. This creates the risk of a downward pressure on natural gas demand from buildings in BC but also provides an opportunity for FEI's NGT, C&EM and RNG initiatives." [p. 41]

The Premier's July 18, 2017 mandate to the Minister of Environment and Climate Change Strategy assigns the following top three priorities:

- Renew the Climate Leadership Team within the first 100 days of your mandate.
- Implement a comprehensive climate-action strategy that provides a pathway for B.C. to prosper economically while meeting carbon pollution reduction targets, including setting a new legislated 2030 reduction target and establishing separate sectoral reduction targets and plans.
- Work with the Minister of Finance to implement an increase of the carbon tax by $5 per tonne per year, beginning April 1, 2018 to meet the federal government's carbon-pricing mandate. Take measures to expand the carbon tax to fugitive emissions and to slash-pile burning. [partial copy at Appendix D-20, pdf p.2907]

33.1 Does FEI acknowledge that the current BC government has made reduction of BC GHG emissions a substantial priority?

Response:

Yes, FEI acknowledges that the BC government has made reducing GHG emissions a substantial priority. FEI is looking for opportunities to offer affordable, low-carbon solutions for households and businesses to help reduce overall GHG emissions in British Columbia. The

2017 LTGRP includes a scenario analysis to account for uncertainty about how policy priorities may evolve over the forecast horizon.

33.2 Does FEI expect that the new legislated 2030 sectoral GHG emissions reduction targets and plans will directly affect FEI and its customers?

Response:

Yes. FEI recognizes that commitments made by the federal and provincial governments to reduce GHG emissions by 2030 will impact the energy sector in British Columbia. While the approach to reduce GHG emissions is shifting under the new provincial government, the objective to reduce GHG emissions has been a goal of successive provincial governments dating back over a decade. FEI has been responding to this objective by developing a portfolio of low-carbon offerings to reduce GHG emissions. As outlined in the Application, FEI sees a number of opportunities to align with the goals of the provincial and federal governments, including developing low carbon fuels such as renewable natural gas, expanding energy efficiency, and substituting higher-carbon fuels in the transport sector with natural gas. In Appendix E of the Application, FEI explores the potential magnitude of GHG emissions reductions that could be made while utilizing the gas distribution system and associated infrastructure. FEI concludes that there are a number of technical possible opportunities to make large reductions in GHG emissions consistent with BC's medium and long-term climate objectives.

33.3 Please file a full copy of the Premier's July 18, 2017 mandate to the Minister of Environment and Climate Change Strategy.

Response:

Please refer to Attachment 33.3.[9]

[9] https://www2.gov.bc.ca/assets/gov/government/ministries-organizations/premier-cabinet-mlas/minister-letter/heyman-mandate.pdf

33.4 Please confirm that the BC Carbon Tax was raised by $5 per tonne on 1 April 2018, and that it is set to increase by $5 per tonne of CO2 (eq) until it reaches $50 per tonne in 2021.

Response:

Confirmed.

33.5 Please provide a table showing the projected per GJ carbon tax rate on natural gas from now to 2021.

Response:

Year	Carbon tax value (Canadian dollars per tonne of carbon dioxide equivalent)	Approximate tax rate (Canadian dollars per gigajoule of natural gas)
2018	35	1.74
2019	40	2.01
2020	45	2.26
2021	50	2.51

33.5.1 Please confirm that FEI has factored this increase into its demand forecast.

Response:

Confirmed; the 2017 LTGRP scenario analysis considers this increase. In September 2016, the Canadian federal government announced that it is planning to require the provinces to have a price of at least $10 per tonne of carbon dioxide equivalent emissions starting in 2018. The price would rise by $10 per tonne a year for the next four years, reaching $50 per tonne by 2022. The 2017 LTGRP end-use method annual demand Reference Case is based on this carbon price trajectory. The slight difference in carbon pricing between the BC budget assumptions and the 2017 LTGRP end-use method Reference Case prior to 2022 do not materially impact the 2017 LTGRP analysis. In any case, the 2017 LTGRP scenario analysis

also includes scenarios that assume annual increases of $10 per tonne and a more moderate case assuming annual increases of $5 per tonne.

The 2017 LTGRP end-use method Reference Case assumes the current level of $30 per tonne (in nominal terms) as the base case until 2020 after which time it increases by $10 per tonne per year until it reaches $50 per tonne (in nominal terms) by 2022. After this time, the Reference Case holds the carbon price constant in real terms, assuming that the carbon tax is increased to keep up with inflation over time. The recently announced BC budget proposes increases in the BC carbon tax of $5 per tonne per year for the next four years, beginning April 1, 2018, until the carbon tax rate is equal to $50 per tonne in 2021. FEI interprets this to be a nominal increase rather than an inflation-adjusted (real) increase. If the increase is maintained each year, as proposed in the BC budget, the carbon tax will increase to $50 per tonne per year one year earlier than in the 2017 LTGRP Reference Case (which reaches $50 per tonne by 2022. The current BC budget does not give any indication that increases to the carbon tax will continue to occur once it has reached the $50 per tonne target set by the federal government. Please also refer to the response to CEC IR 1.10.1.

34.0 Topic: Consistency with provincial energy and GHG emissions goals

Reference: Clean Energy Act, section 2; Exhibit B-1, section 1.3.3, page 5; section 7, pp. 189 - 192

The *Clean Energy Act* (SBC 2010), section 2 states:

> The following comprise British Columbia's energy objectives:…
>
> (g) to reduce BC greenhouse gas emissions …
>
> (iii) by 2020 and for each subsequent calendar year to at least 33% less than the level of those emissions in 2007,
>
> (iv) by 2050 and for each subsequent calendar year to at least 80% less than the level of those emissions in 2007,…
>
> (h) to encourage the switching from one kind of energy source or use to another that decreases greenhouse gas emissions in British Columbia;
>
> (i) to encourage communities to reduce greenhouse gas emissions and use energy efficiently;…

FEI states in section 1.3.3:

> "… FEI's DSM activities, NGT and RNG initiatives are key avenues through which FEI contributes to advancing BC's energy and GHG emission goals; the Company continues to examine and, where applicable, support potential programs, technologies and initiatives that will contribute to BC's energy and GHG emissions goals." [page 5]

34.1 Does FEI acknowledge that its NGT program will not achieve reductions in GHG emissions sufficient to meet a proportionate share of the BC energy objective to reduce BC GHG emissions by at least 80% below 2007 levels by 2050?

Response:

FEI does not acknowledge and agree with the assertion made in the question that NGT cannot achieve reductions in GHG emissions sufficient to meet a proportionate share of the BC energy objective to reduce GHG emissions by at least 80 percent below 2007 levels by 2050. Natural gas, when used to displace conventional diesel fuel for transportation applications, can reduce GHG emissions by between 20 percent and 25 percent depending on the application.[10]

[10] https://www.canadasnaturalgas.ca/en/natural-gas-potential/transportation-opportunity.

Further, compressed renewable natural gas (RNG) used in transportation can reduce GHG emissions by 65 percent compared to conventional petroleum fuels such as diesel.[11]

Through expanding the RNG supply program and program offerings to the transport sector, GHG emissions can be significantly reduced now, using existing and known technology and supply chains, without waiting for pre-commercial technologies such as battery electric freight trucks to enter the market. Currently, it is far too early to conclude on the likely share of heavy-duty vehicle technologies and the low carbon fuel mix in this sector. The technological pathway(s) to achieve deep reductions in heavy-duty vehicles and long-haul freight are still evolving and decarbonized gas as a fuel has some important advantages over other technologies like electric powertrains. RNG used in methane driven powertrains and other gases such as hydrogen in fuel-cell trucks are key technologies to address the specific duty-cycles of road freight carriers that will contribute to BC's long-term energy and climate objectives.

34.2 Please provide a figure and table showing GHG emissions from the subject transportation sources under (a) business as usual and (b) with reductions due to the NGT program.

Response:

FEI consulted with Posterity to provide the following response.

Figure 8-5 of the Application details annual GHG emissions reductions due to the NGT program and illustrates that this program may be able to contribute significantly to global GHG abatement. However, FEI does not forecast emissions for the sectors of BC's economy that are addressable by its NGT program. As explained in FEI's responses to BCSEA IRs 1.37.1 through 1.37.3, FEI's NGT emissions abatement analysis simply assumes that its forecast NGT activity displaces diesel fuel and applies the GHG intensity difference between diesel fuel and natural gas accounting for the differences in the energy density of the fuel and the energy efficiency ratios of vehicle powertrains for the respective fuels.

[11] The carbon intensity number for renewable natural gas is currently under review by the BC Ministry of Energy and Mines. For the purposes of modelling a response to this information request, FEIs based the analysis on a preliminary carbon intensity number of 10 gCO2e/MJ for renewable natural gas, which was obtained from the BC Low Carbon Fuels Compliance Pathway Assessment.

35.0 Topic: Natural gas and GHG emissions

Reference: Exhibit B-1, page 192

FEI says it received feedback that it considered but was unable to implement in the 2017 LTGRP, including a suggestion to include "a Resource Planning Objective in Section 1 of the 2017 LTGRP that specifically addresses cost effective GHG emissions reductions."

FEI says that "this objective is implicit in its existing objective *Ensure consistency with provincial energy objectives* (see Section 1.3.3). … [page 192]

35.1 Does FEI acknowledge that some stakeholders in the Resource Planning Advisory Group requested FEI to show in its LTGRP that FEI would take responsibility for a proportionate share of the GHG emissions that will be necessary for BC to meet its legislated GHG emissions targets?

Response:

FEI acknowledges that some stakeholders in the Resource Planning Advisory Group (specifically during the April 11, 2017, and the August 9, 2017, workshops) requested FEI to show in its 2017 LTGRP a scenario that would examine to what extent and at what impact to FEI ratepayers FEI could proportionally help meet BC GHG emissions targets. FEI notes that, during the same workshops, some stakeholders indicated that (1) BC's legislated GHG emissions targets are currently not sector-specific, (2) the compliance pathway to achieve the provincial targets is not specifically defined, and (3) the LTGRP is not an appropriate forum for developing BC's provincial energy and emissions abatement plans.

FEI's 2017 LTGRP scenario analysis framework (presented to the Resource Planning Advisory Group during the November 30, 2016, workshop) intentionally develops critical uncertainty inputs first before creating scenario plotlines and populating quantitative data in order to guard against inadvertently favouring certain visions of the future by presupposing scenario results rather than focusing on inputs. As such, FEI did not develop the requested scenario as one of the 2017 LTGRP end-use scenarios but did prepare Appendix E of the application in order to illustrate that potential pathways to a lower carbon future do exist that include, and may be better enabled by, the use of natural gas and natural gas infrastructure. Appendix E concludes that the size of the GHG abatement opportunity across the potential pathways supports investments into further analysis and development of these pathways. Appendix E also notes that, once more specific information about the potential pathways becomes available, it will be important to compare these potential pathways on an equal footing with alternative GHG emissions abatement pathways, such as domestic electrification.

35.1.1 Did FEI consider doing this? If not, why not?

Response:

Please refer to the response to BCSEA IR 1.35.1.

36.0 Topic: Natural gas and GHG emissions

Reference: Exhibit B-1, section 8.3.1, page 201

FEI states:

> "Natural gas is the cleanest, lowest GHG-emitting fossil fuel. The 2017 LTGRP's GHG emissions analysis simply details the CO2 equivalent emissions in metric tonnes of FEI's customers combusting natural gas. As such, the 2017 LTGRP's GHG emissions reduction analysis does not quantify impacts of GHG-reducing upstream initiatives, such as electrifying natural gas extraction and processing facilities or implementing methane leakage controls in extraction, processing, and storage facilities." [underline added]

36.1 Please confirm that the 2017 LTGRP's GHG emissions analysis excludes consideration of upstream GHG emissions, FEI T&D system GHG emissions from compression, venting and leaks, and GHG emissions from FEI's combustion of natural gas for CNG and LNG.

Response:

Not confirmed with respect to FEI's 2017 LTGRP NGT analysis. Please refer to the responses to BCSEA IRs 1.37.1 and 1.37.4 for a discussion of FEI's NGT approach. Confirmed with respect to non-NGT parts of FEI's 2017 LTGRP analysis.

FEI agrees that the production and transportation of natural gas causes upstream GHG emissions but disagrees that these emissions will necessarily contribute to climate change. The use of natural gas may lead to a global net reduction in GHG emissions depending on the energy sources it is substituting for. For example, natural gas used to displace liquid transport fuels would reduce net lifecycle GHG emissions by approximately 30 percent. Natural gas displacing coal-fired boilers in industry and residential buildings in China is a significant abatement option in a scenario conducted by the International Energy Agency (IEA) to achieve 2 degrees of warming.[12] The IEA scenarios are inclusive of GHG emissions from all sources in all countries meaning that fuel switching to natural gas captures all of the associated changes in upstream and downstream GHG emissions. As discussed on page 8 of Appendix E of the Application:

> Importantly, gas consumption is 30 percent higher in India and 10 percent higher in China in the SDS compared to the New Policies Scenario reference case. This means that increased gas consumption becomes more important as a CO2 abatement option as each of these countries drive to reduce emissions in line with the goal to limit global warming to two degrees above pre-industrial levels.

[12] IEA, (2017). World Energy Outlook. Paris: IEA/OECD.

What is more, upstream GHG emissions, FEI T&D system GHG emissions from compression, venting and leaks are small relative to end use combustion emission. The IEA conducted a detailed review of the scale of fugitive methane emissions around the world and estimated that there was a global average 1.7 percent leakage rate for natural gas across the supply chain.[13] This is further supported by calculations completed by FEI using data from the BC Ministry of Environment at which upstream and transmission/distribution vented, flared and fugitive emission was compared to the total amount of marketable gas produced in BC. Based upon 2015 values, the estimated methane leakage rate for natural gas in BC is 0.5 percent.

36.1.1 If confirmed, does FEI agree that the production and transportation of natural gas causes GHG emissions that will contribute to climate change? Why has FEI excluded these emissions from its analysis?

Response:

Please refer to the response to BCSEA IR 1.36.1.

36.1.2 If not confirmed, please point out where in the application these emissions are addressed.

Response:

Please refer to the response to BCSEA IR 1.36.1.

36.2 Would the statement, “natural gas is the cleanest, lowest GHG-emitting fossil fuel,” be more accurately phrased with the qualifier, “at the burner tip”?

[13] IEA, (2017). World Energy Outlook. Paris: IEA/OECD.

Response:

It would not be more accurate to qualify the statement in this way. GHGenius v4.03, a Canadian lifecycle GHG emissions assessment tool, concludes that natural gas has the lowest lifecycle GHG emissions compared to all other fossil fuels in all sectors in BC. On a fuel-cycle basis:

- Natural gas and natural gas liquids are 23 and 26 percent less carbon intensive than gasoline in the passenger transport sector.
- Compressed natural gas is 21 percent less carbon intensive than diesel in the heavy-duty transport sector.
- Natural gas is 55 percent less carbon intensive than coal and 50 percent less carbon intensive than crude oil in power generation.
- Natural gas 35 percent less carbon intensive than fuel oil for residential uses.
- Fuel oil is 55 percent more carbon intensive and coal is 71 percent more carbon intensive than natural gas in the industrial sector.

36.3 To what extent is the statement, "natural gas is the cleanest, lowest GHG-emitting fossil fuel," sensitive to assumptions or estimates of low rates of fugitive emissions and other methane leakage, and how robust are those assumptions or estimates?

Response:

FEI has not specifically conducted a sensitivity analysis of how methane leakage rates affect the lifecycle carbon intensity of natural gas compared to other fossil fuels but rather relies on publicly available statements from reputable sources to include this statement in the 2017 LTGRP. FEI uses the approach employed by the BC Government in calculating the lifecycle carbon intensity of natural gas for the BC Renewable and Low Carbon Fuels Requirement Regulation with the GHGenius lifecycle carbon assessment tool. In this tool, as discussed in IR BCSEA 1.36.2, natural gas has the lowest carbon intensity while accounting for fugitive methane emissions using the default methane leakage values.

FEI recognizes the importance that methane emissions can have on the global warming potential of natural gas along the lifecycle. For example, the IEA conducted an in-depth review of fugitive methane emissions around the world and estimated a global average 1.7 percent leakage rate for natural gas across the supply chain. The IEA concludes that a leakage rate

below 5.5 percent would mean a lower lifecycle carbon intensity for gas for heating end uses compared to coal.[14] The 2015 estimated methane leakage rate in BC is 0.5 percent, well below the world average. This is consistent a review conducted by FEI based on vented, flared, and fugitive data for upstream producers and transmission pipeline companies as published by the BC Ministry of Environment. This leakage rate is small enough to ensure that natural gas has a relatively low carbon intensity compared to other fossil fuels.

It is expected that methane leakage will further improve with new rounds of government policy to address fugitive emissions. BC has committed to reduce methane emissions by 45 percent from 2012 levels by 2025 for oil and gas production. When enacted, these targets will further underscore that natural gas is the lowest carbon intensity fossil fuel.

[14] IEA, (2017). World Energy Outlook. Paris: IEA/OECD.

37.0 Topic: NGT and GHG reductions

Reference: Exhibit B-1, Figure 8-5, page 204, pdf p.229

FEI states on page 204:

> "FEI's NGT customers generate emissions reductions because they use natural gas to displace consumption of higher-emitting fossil fuels. As such, NGT emissions reductions are a function of the NGT annual demand forecast presented in Figure 3-16 and the difference in emissions intensity between the incumbent fuels and natural gas."

37.1 Does FEI's analysis of the GHG emissions impact of the NGT program rely on GHGenius? Is so, please provide the version number and a link.

Response:

FEI did use the then-approved carbon intensity figures as accepted by the Province of British Columbia's Ministry of Energy and Mines to determine the GHG emissions impact of the NGT program. The GHGenius version used to derive the accepted carbon intensity figures was version 4.03a.[15]

Please refer to Attachment 37.1 for a copy of the most recent approved carbon intensities accepted by the Ministry of Energy and Mines for 2018. For clarity, the 2018 approved carbon intensities are slightly different than the then approved carbon intensities that FEI used to calculate the GHG emissions impact of the NGT program.

37.2 Please provide a quantified analysis to support the quoted statement and the curves shown in Figure 8-5, addressing each type or mode of NGT separately.

Response:

Please refer to the response to BCSEA IR 1.37.1. For clarity, FEI does not model carbon intensities for individual fuels but rather relies on approved carbon intensities as accepted by the Province of BC's Ministry of Energy and Mines. Please refer to Attachment 37.1, provided in the response to BCSEA IR 1.37.1 for the 2018 approved carbon intensities.

[15] https://ghgenius.ca/downloads.php.

As stated in response to BCSEA IR 1.37.1, FEI applied the then current and approved carbon intensity values for diesel fuel, compressed natural gas and liquefied natural gas to model the GHG emissions reductions as a result of the NGT program.

At a high level, the amount of natural gas demand forecasted over the planning horizon, as shown in Figures 3-15, 3-16 and 3-17 (combined CNG/LNG forecasts), were used to model the GHG emissions benefits of the NGT program using the Province of BC's approved carbon intensity values for natural gas and diesel fuel.

37.3 In particular, please provide the analysis and assumptions for the assertion that substituting LNG for bunker fuel will reduce GHGs for international marine shipping.

Response:

FEI assumed the incumbent fuel was diesel and used the then approved carbon intensity values for both natural gas and diesel in calculating the GHG emission reductions of adopting natural gas for marine shipping. FEI was not able to obtain a carbon intensity for bunker fuel, which would have a significantly higher carbon intensity than diesel fuel and would have yielded higher GHG emissions reductions.

The same analysis that was provided in response to BCSEA IR 1.37.2 was used to calculate the emissions reductions of adopting natural gas for marine shipping. However, if the carbon intensity of bunker fuel was used rather than diesel fuel, the stated GHG reductions would be materially greater.

For example, the following calculation shows modelling the GHG emissions reductions for a coastal freight vessel that consumes about 25 million litres of marine fuel a year. By displacing the incumbent fuel of diesel with natural gas, it would yield the following emissions reductions:

- 25,000,000 diesel litres
- 25,000,000 / 25.9 * 1.15 = ~ 1,100,000 GJ per year[16]
- 1,100,000 GJ / 0.055058 GJ/kg = 19,978,931 kg of LNG[17]

[16] 1 GJ (1,000 MJ) divided by the energy content of diesel fuel of 38,600 MJ/litre (per GHGenius model 4.03a) = 25.9. A natural gas engine is about 15% less efficient than an equivalent diesel engine; therefore, about 15% more fuel must be consumed to perform the same amount of work.

[17] Energy density of FEI's LNG produced at our LNG facilities; Rate Schedule 46, Section 12.3, page R-46.12

- Energy Content = 19,978,931 kg * 52.46[18] = 1,048,094,736
- (88.6 – 63.04)[19] * (1,048,094,736/1,000,000)
- = **26,789 tonnes of CO2e reduction**

Based on the analysis presented above, the conversion of one coastal freight vessel that consumes an average of 25,000,000 diesel litres of fuel per year would reduce emissions by more than 26,500 tonnes of CO2 equivalent per year by adopting natural gas procured from FEI's LNG facilities.

37.4 For each mode of NGT, please specify what sources of GHG emissions are included or excluded in the carbon intensity analysis, including, for example, upstream emissions, emissions from the FEI system, and emissions from compression of CNG or liquefaction of LNG.

Response:

As stated in the response to BCSEA IR 1.37.1, FEI used the carbon intensity values as approved and accepted by the Province of BC's Ministry of Energy and Mines, which are produced by GHGenius version 4.03a. These carbon intensities are based on a lifecycle basis and thus include upstream emissions, emissions from the FEI system and emissions from the compression of CNG and liquefaction of LNG at FEI's LNG facilities.

37.5 Please provide graphs similar to Figure 8-5 and tabulation showing forecast annual GHG emissions reductions of NGT customers, separately for CNG, LNG for trucking, LNG for marine transport where the GHG emissions count toward BC's emissions, and LNG for marine transport where the GHG emissions do not count toward BC's emissions.

[18] Energy density approved for LNG; Greenhouse Gas Reduction (Renewable and Low Carbon Fuel Requirements) Act; Renewable and Low Carbon Fuel Requirements Regulation http://www.bclaws.ca/civix/document/id/complete/statreg/394_2008_pit.

[19] Approved 2018 carbon intensities: 88.6 gCO2e/MJ for diesel fuel; 63.04 gCO2e/MJ for FEI LNG.

Response:

The graphs below are similar to Figure 8-5 showing forecast annual GHG emissions reductions of NGT customers, shown separately for CNG, LNG for on-road trucking, LNG for marine transport where GHG emissions count toward BC's emissions and LNG for marine transport where GHG emissions do not count towards BC's emissions.

Table 1: Annual GHG Emissions Reductions of NGT Customers Only (metric tonnes) – On-Road Trucking

Year	Reduction - Reference Case	Reduction - Upper Bound	Reduction - Lower Bound
2015	-21,800	-21,800	-21,800
2016	-23,879	-23,879	-23,879
2017	-28,208	-28,095	-26,557
2018	-28,114	-29,971	-21,523
2019	-29,218	-31,847	-20,977
2020	-28,888	-32,974	-18,784
2021	-30,912	-36,900	-18,906
2022	-28,663	-37,161	-14,795
2023	-30,338	-41,913	-14,567
2024	-31,664	-47,085	-14,031
2025	-33,514	-53,591	-14,019
2026	-34,666	-60,329	-13,309
2027	-36,690	-68,993	-13,471
2028	-38,714	-78,871	-13,592
2029	-40,739	-90,125	-13,754
2030	-42,763	-102,958	-13,916
2031	-44,787	-117,613	-14,078
2032	-46,811	-134,292	-14,240
2033	-48,835	-153,278	-14,442
2034	-50,859	-174,977	-14,604
2035	-52,883	-199,672	-14,766
2036	-54,908	-227,848	-14,928

The figure below, showing potential GHG reductions, includes all forecast natural adoption for on-road trucking.

Figure 1

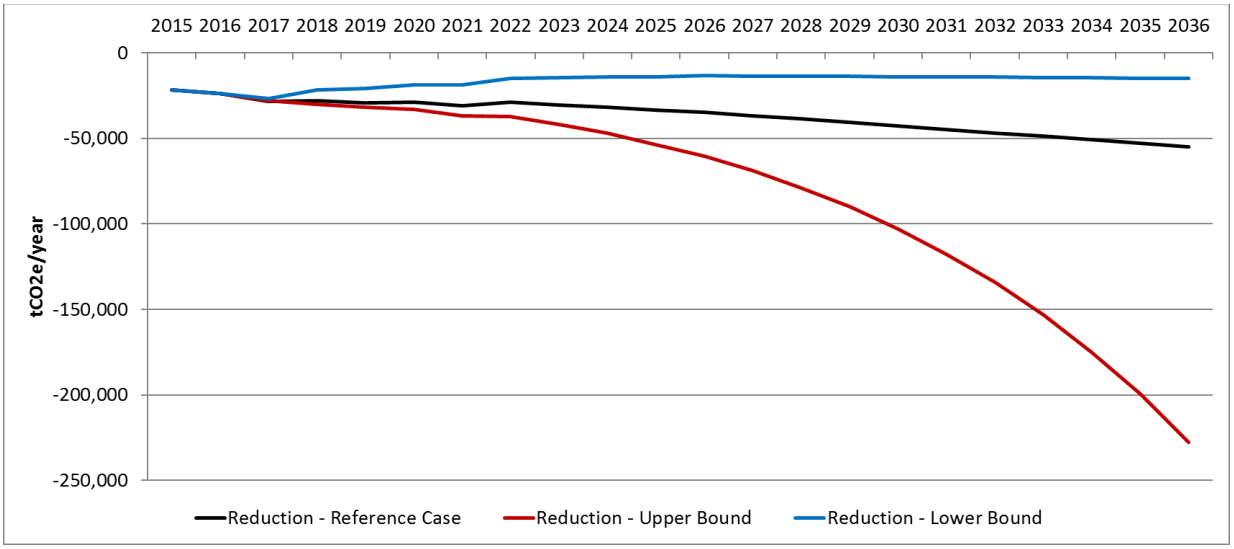


Table 2: Annual GHG Emissions Reductions of NGT Customers Only (metric tonnes) – BC Marine Transport

Year	Reduction - Reference Case	Reduction - Upper Bound	Reduction - Lower Bound
2015	0	0	0
2016	0	0	0
2017	-10,175	-10,175	-10,175
2018	-20,349	-20,349	-20,349
2019	-40,698	-40,698	-30,524
2020	-71,222	-71,222	-40,698
2021	-71,222	-71,222	-40,698
2022	-81,397	-81,397	-40,698
2023	-91,572	-91,572	-40,698
2024	-101,746	-101,746	-40,698
2025	-101,746	-101,746	-40,698
2026	-101,746	-101,746	-40,698
2027	-101,746	-101,746	-40,698
2028	-101,746	-101,746	-40,698
2029	-111,921	-111,921	-40,698
2030	-111,921	-111,921	-40,698
2031	-122,095	-122,095	-40,698
2032	-122,095	-122,095	-40,698
2033	-132,270	-132,270	-40,698

Year	Reduction - Reference Case	Reduction - Upper Bound	Reduction - Lower Bound
2034	-142,445	-142,445	-40,698
2035	-142,445	-142,445	-40,698
2036	-152,619	-152,619	-40,698

The figure below shows potential GHG reductions associated with those emissions that are presently counted in BC emissions inventory from marine transport. The Reference and Upper Bound Cases coincide as FEI forecasted that this market segment will adopt natural gas as a fuel in both of these growth scenarios. The overall size of this market segment is fixed and relatively small in terms of the number of marine vessels that could adopt natural gas. As a result, FEI forecasts that this market will adopt natural gas in both the Reference and Upper Bound Scenarios.

Figure 2

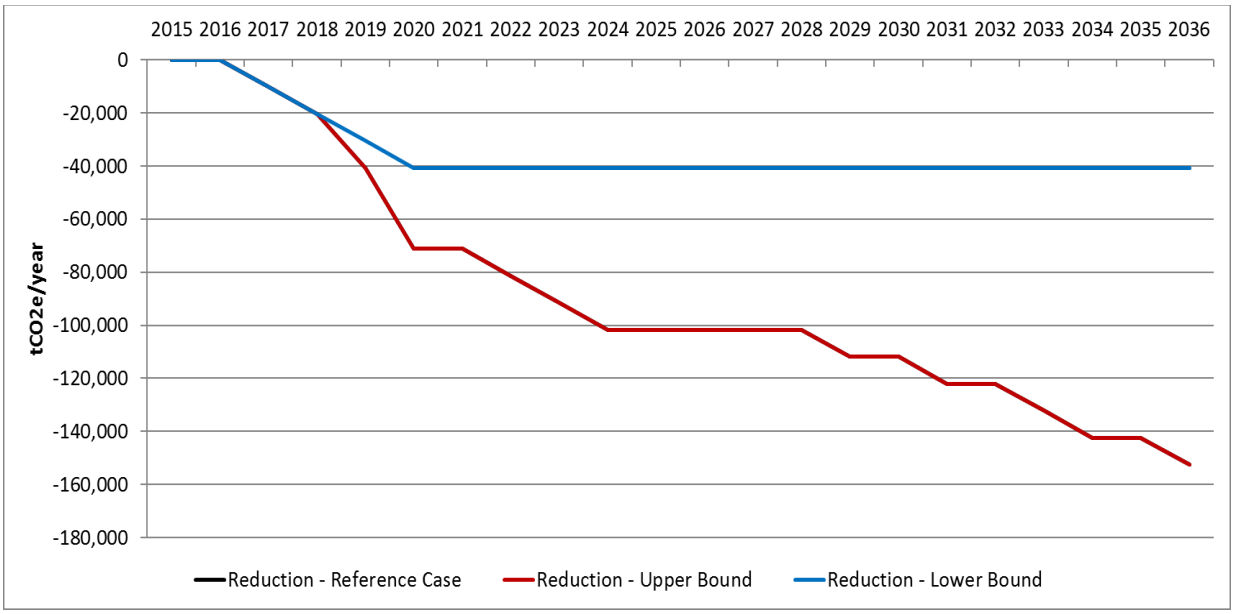


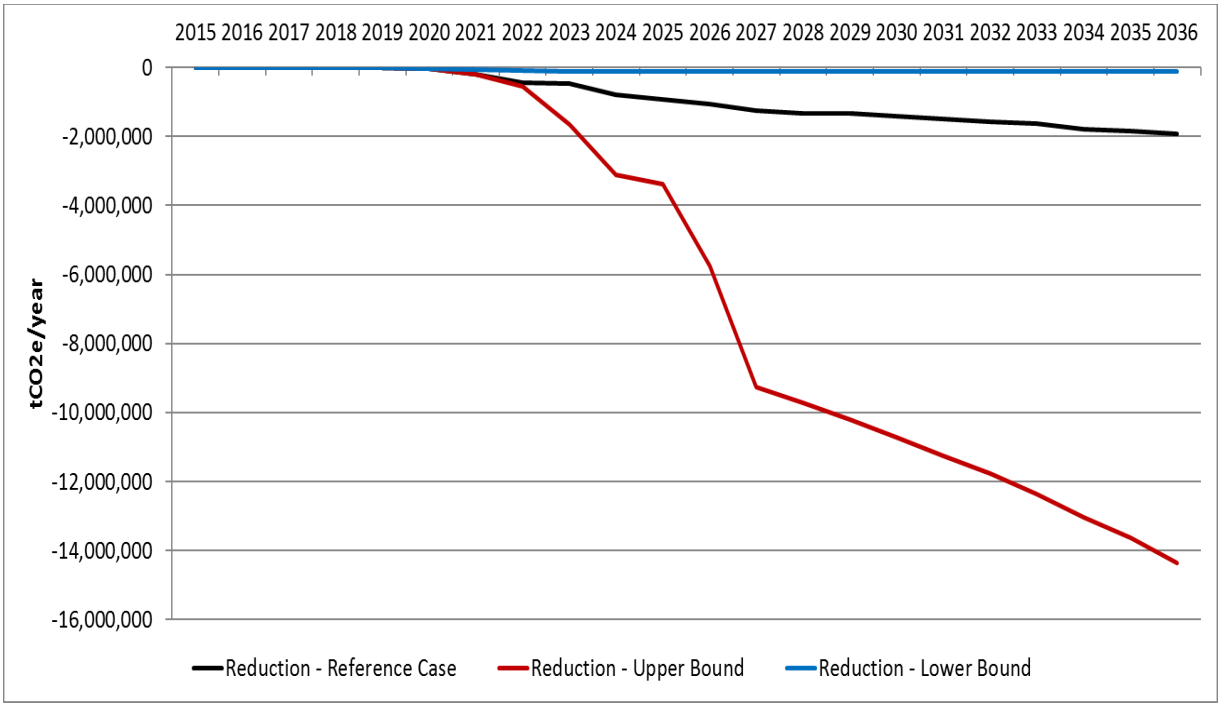
Table 3: Annual GHG Emissions Reductions of NGT Customers Only (metric tonnes) – Marine Transport Not Counted toward BC's Emissions Inventory

Year	Reduction - Reference Case	Reduction - Upper Bound	Reduction - Lower Bound
2015	0	0	0
2016	0	0	0
2017	0	0	0

Year	Reduction - Reference Case	Reduction - Upper Bound	Reduction - Lower Bound
2018	0	0	0
2019	0	0	0
2020	-31,977	-31,977	-31,977
2021	-191,864	-191,864	-63,955
2022	-447,683	-543,615	-95,932
2023	-479,661	-1,662,823	-127,909
2024	-799,434	-3,101,805	-127,909
2025	-927,344	-3,389,601	-127,909
2026	-1,055,253	-5,755,927	-127,909
2027	-1,247,117	-9,273,437	-127,909
2028	-1,343,050	-9,721,121	-127,909
2029	-1,343,050	-10,200,781	-127,909
2030	-1,407,004	-10,712,419	-127,909
2031	-1,502,936	-11,256,034	-127,909
2032	-1,566,891	-11,767,672	-127,909
2033	-1,630,846	-12,375,242	-127,909
2034	-1,790,733	-13,046,767	-127,909
2035	-1,854,687	-13,622,360	-127,909
2036	-1,918,642	-14,357,839	-127,909

The figure below shows potential GHG reductions in the marine market segment for those emissions that are not currently counted in BC's or Canada's emissions inventories. Specifically, emissions reductions shown in the figure below are from the coastal freight and trans-pacific marine market segments. Emissions from these two market segments are not counted in any one country's emissions inventories, as referenced in FEI's response to BCSEA 1.37.6.

Figure 3



37.6 Please explain in more detail how FEI distinguishes between the kinds of NGT where the GHG emissions are attributed to versus excluded from BC's GHG emissions for reporting purposes.

Response:

FEI distinguishes between different sources of GHG emissions in the transport sector based on the UN Framework Convention on Climate Change reporting requirements for Annex I countries. These reporting requirements adopt the 2006 International Panel on Climate Change Guidelines for National Greenhouse Gas Inventories which state that "Emissions from fuel sold to any air or marine vessel engaged in international transport (1 A 3 a i and 1 A 3 d i) should as far as possible be excluded from the totals and subtotals in this category and should be reported separately."[20]

[20] https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/1_Volume1/V1_8_Ch8_Reporting_Guidance.pdf.

For these purposes, GHG emissions from international marine transport are not included in any country's national inventory and are not included into Canada or BC's reduction target. The International Marine Organization (IMO) is responsible for developing, enacting and monitoring GHG emissions in this sector.

Nevertheless, this source of emissions is still sizeable, at approximately 1 billion tonnes of CO_2 equivalent[21] and will require concentrated actions to reduce emissions to achieve the newly developed IMO target of a 50% reduction in GHG emissions by 2050.

[21] http://www.imo.org/en/, direct link http://www.imo.org/en/OurWork/Environment/PollutionPrevention/AirPollution/Documents/Third%20Greenhouse%20Gas%20Study/GHG3%20Executive%20Summary%20and%20Report.pdf

38.0 Topic: FEI's contributions to BC's GHG emissions targets

Reference: Exhibit B-1, section 8.3.2, Table 8-1, page 206

"In order to show how forecast emissions reductions from FEI activities compare to BC's GHG emissions reduction goals, FEI used a linear regression to calculate targeted province-wide 2036 emissions levels from BC's 2014 reported province-wide emissions, the percentage emissions reductions target from the Government of Canada's 2017 Nationally Determined Contribution under the Paris Agreement (reducing GHG emissions by 30 percent from 2005 until 2030), and BC's legislated sector-agnostic 2050 emissions reduction target."

38.1 Please detail the calculation referenced and provide the projected annual GHG reductions in graph and tabular form.

Response:

Please see the table and figure below for calculations for the GHG reductions of 29.3 $MtCO_2e$ required BC Province-wide to meet the calculated 2036 target from the 2014 base year level as shown in Table 8-1 of the Application (also shown in Table ES-2 of the Application). FEI notes that this GHG reduction target is not an annual reduction as suggested by the question. Instead, it is the total cumulative GHG reduction target from the base year 2014 to 2036.

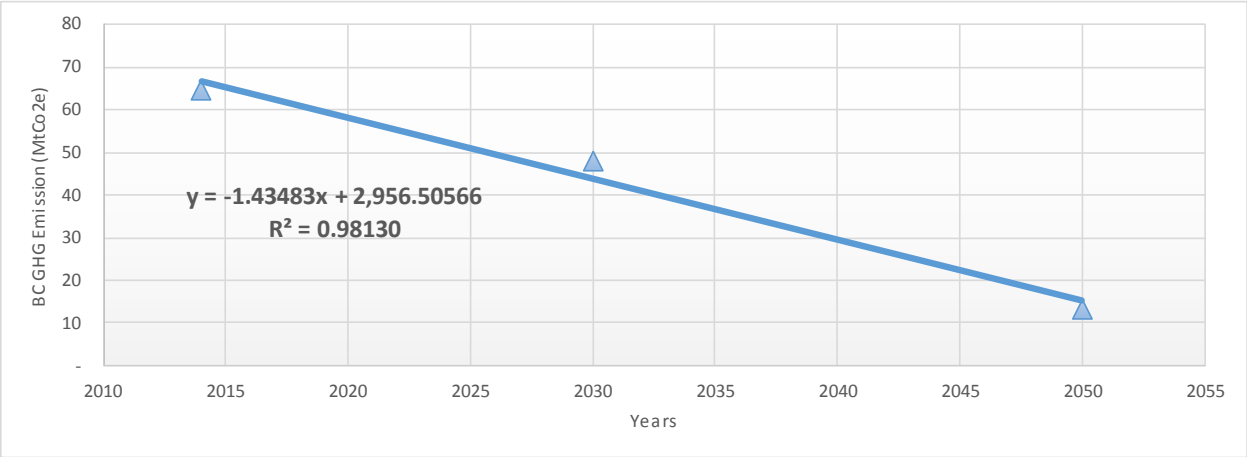
Line	Particular	GHG Emission ($MtCO_2e$)	Reference
1	2005 BC Province-wide emission	68.444	Provincial Greenhouse Gas Inventory, 2014 Report
2	2007 BC Province-wide emission	66.335	Provincial Greenhouse Gas Inventory, 2014 Report
3	2014 BC Province-wide emission	64.464	Provincial Greenhouse Gas Inventory, 2014 Report
4			
5	2030 BC Province-wide target emission	47.911	Government of Canada's 2017 Nationally
6			Determined Contribution under Paris Agreement
7			- Reduce 30% below 2005 by 2030; Line 1 x (1-30%)
8			
9	2050 BC Province-wide target emission	13.267	BC's legislated sector-agnostic 2050 emissions reduction target
10			- Reduce at least 80% below 2007 level by 2050; Line 2 x (1-80%)
12			
13	Linear Regression (Y = mX + b)		
14	m	(1.43483)	Linear regression of Line 3, 5, and 9; See Excel graph below
15	b	2,956.5057	Linear regression of Line 3, 5, and 9; See Excel graph below
16			
17	2036 Projected BC Province-wide target emission	35.2	(Line 14 x 2036) + Line 15
18	2036 Projected BC GHG Reduction	***29.3***	Line 3 - Line 17

Reference:

Provincial Greenhouse Gas Inventory, 2014 Report (https://www2.gov.bc.ca/gov/content/environment/climate-change/data/provincial-inventory/archive)

Government of Canada's 2017 Nationally Determined Contribution under Paris Agreement (http://climateactiontracker.org/countries/canada.html)

BC's legislated sector-agnostic 2050 emissions reduction target (http://www.bclaws.ca/Recon/document/ID/freeside/00_07042_01)



38.2 Please confirm that the regression goes to an 80% reduction in GHG emissions below 2007 levels by 2050. If not, please explain why not.

Response:

Not confirmed. The linear regression as illustrated in FEI's response to BCSEA IR 38.1 goes to an approximately 77 percent reduction in GHG emissions below the 2007 levels by 2050 as shown in the table below. There is a small variance of approximately three percent to the BC's legislated targeted of 80 percent reduction below 2007 levels by 2050 because the linear regression is based on a best fit of three data points that do not fall onto a perfectly straight line. FEI feels the variance from target due using the linear regression is immaterial to the analysis and does not change the overall directions of FEI's emissions reduction activities.

Line	Particular	GHG Emission ($MtCO_2e$)	Reference
1	2007 BC Province-wide emission	66.335	Provincial Greenhouse Gas Inventory, 2014 Report
2	BC Legislated 2050 GHG target emission	13.267	80% reduction from 2007 levels = Line 1 x (1-80%)
3	BC Legislated % reduction	80%	1 - Line 2 / Line 1
4			
5	Linear Regression (Y = mX + b)		
6	m	(1.43483)	BCSEA IR 38.1
7	b	2,956.5057	BCSEA IR 38.1
8	Calculated BC 2050 target emission (Regression)	15.104	(Line 6 x 2050) + Line 7
9	Calculated BC 2050 % reduction	**77%**	1 - Line 8 / Line 1

38.3 Please discuss qualitatively, and, if possible quantitatively, how FEI's emissions reductions would continue from 2037 to 2050, when BC's GHG target is 80% below 2007 levels.

Response:

FEI consulted with Posterity to provide the following response.

The requested discussion extends beyond the 2017 LTGRP planning horizon. As a result, FEI is unable to discuss quantitatively how its emissions reductions would continue from 2037 to 2050 because considerable uncertainty exists in the planning environment across such lengthy forecast periods. Qualitatively, FEI believes there are significant opportunities to reduce emissions on the natural gas system over this period and, additional quantitative analysis is warranted outside the scope of the LTGRP.

Notwithstanding the limitations of discussing quantitative long-term reductions, the high-level technical GHG reduction potentials described in Appendix E are aligned with scenario modelling exercises on the role of the gas system in a deep decarbonisation pathway in different jurisdictions. Quantitative analyses looking at the GHG reduction potential of gas in California and the European Union illustrate that the gas system could be an important component of a deep decarbonisation pathway. In those jurisdictions, utilizing the gas system with decarbonized energy carriers could serve to address difficult to decarbonize end-uses such as heating and heavy-duty freight, moderate costs of the low-carbon transition, reduce technology risk and assist with the integration of other renewable energy. These studies have demonstrated that, in various jurisdictions, the gas system is still relevant to achieve ambitious GHG reduction targets and emphasizes that there are still many unknowns and options to consider to reach the 2050 GHG targets.

For example, in California, close to 1,300 PJ of low-carbon gas would help achieve an 80 percent reduction in GHG emissions from 1990 levels while lowering system-wide costs by $27 billion. Similarly, in the EU, analysis concluded that utilizing the gas system with decarbonized gas would save €127 billion in costs to achieve the International Energy Agency's Below 2 Degrees Scenario.

The reports can be found at the locations below:

EU Gas for Climate
https://www.gasforclimate2050.eu/files/files/Ecofys_Gas_for_Climate_Feb2018.pdf

California Decarbonizing Pipeline Gas

http://docketpublic.energy.ca.gov/PublicDocuments/17-IEPR-10/TN220242_20170714T153738_SoCalGas_Comments_Decarbonizing_Pipeline_Gas_to_Help_Meet_Calif.pdf

39.0 Topic: GHG Emissions Reductions

Reference: Exhibit B-1, Table ES-2: Comparison of FEI's Emissions Reduction Activities with the Calculated Emissions Reduction Target, p.ES-11, pdf p.23

Table ES-2: Comparison of FEI's Emissions Reduction Activities with the Calculated Emissions Reduction Target

GHG Reductions Required to Meet the Calculated 2036 Target ($MtCO_2e$, 2014 Base)	Forecast Emissions Reductions in 2036 ($MtCO_2e$, 2015 Base)		
29.3	Reference Case	Upper Bound	Lower Bound
RNG	0.04	0.14	0.01
C&EM	0.8	0.8	0.3
NGT	2.3	14.9	0.2

39.1 Please confirm, or otherwise explain, that Table ES-2 shows that FEI's 2017 LTGRP would achieve at most approximately half of the GHG reductions in 2036 required to meet FEI's calculated share of the GHG reductions required to meet the Government of Canada's 2017 Nationally Determined Contribution under the Paris Agreement and BC's legislated 2050 emissions reduction target.

Response:

Not confirmed. First, the GHG reductions target of 29.3 $MtCO_2e$ as shown in Table ES-2 of the Application (also Table 8-1 of the Application) is the calculated reduction target for BC province-wide by year 2036, not FEI's share of the calculated GHG reduction target by 2036 as suggested by the question. FEI's calculated GHG reduction target in 2036 is shown in Table E-1 of Appendix E of the Application, which is estimated to be 9.6 $MtCO_2e$ by 2036 (4.5 $MtCO_2e$ domestic reduction target for stationary combustion sources and industrial processes as well as product use, plus 5.1 $MtCO_2e$ domestic reduction target for transport). FEI also clarified that FEI does not consider 9.6 $MtCO_2e$ to be FEI's "share" of the BC province-wide reduction target. As explained in Section 1.3 of Appendix E of the Application, the calculated reduction target of 5.1 $MtCO_2e$ for the transport category represents the total addressable market, and this reduction target may be met by a combination of FEI and non-FEI initiatives. If FEI were successful in capturing a larger proportion of the potential eligible transport market than what is assumed in the annual demand forecast from Section 3 of the Application, then FEI would contribute to a larger portion of the calculated reduction target for the transport category.

Second, as stated in a note below Table ES-2 of the Application, the forecast NGT emissions reductions include the amount realized outside the current boundaries of the BC emissions inventory. The forecast emissions reductions for the Upper Bound scenario from NGT domestically and internationally by 2036 is estimated to be 0.5 $MtCO_2e$ and 14.4 $MtCO_2e$. Based on these forecast emissions reductions, FEI's current initiatives have the potential to at most achieve 15 percent of FEI's calculated GHG reductions by 2036 (i.e. (0.14 + 0.8 + 0.5) / 9.6 = 15 percent), if international emissions reductions are excluded.[22] Although international emissions reductions are currently not included toward the BC province-wide reduction target, the net benefits to global GHG emissions reductions from transport are potentially significant as shown by Table E-1 of Appendix E of the Application, and therefore, the activities undertaken by FEI should also be recognized.

Last, it is important to note that Table ES-2 of the Application represents the forecast emissions reductions of FEI's current initiatives only. As discussed on page ES-11 of the Executive Summary as well as Section 8.3 of the LTGRP, other technologies exist (which are currently under development) that can decarbonize the natural gas stream and potentially enable natural gas infrastructure to store electric energy. FEI is monitoring and, where applicable, supporting the evolution of these emerging technologies. Within the context of a 20-year vision, FEI will continue to examine emerging initiatives and technologies that could help FEI to pursue long-term GHG emissions abatement. As demonstrated in Table E-1 of Appendix E of the Application, the top-of-range GHG reduction potential of FEI's initiatives under the Global Growth & Carbon Step Change scenario could be up to 7.4 $MtCO_2e$ by 2036 (excluding international transport), which will be approximately 77 percent of FEI's calculated GHG emission reduction required by 2036.[23]

39.2 Please confirm, or otherwise explain, that Table ES-2 shows that FEI's Reference Case for the 2017 LTGRP would achieve only approximately 11% of the GHG emissions reductions required to meet FEI's share of federal and provincial objectives in 2036. [(0.04 + 0.8 + 2.3 = 3.14) / 29.3 = 0.107 x 100 = 11%]

[22] NGT emissions reduction factors are sourced from GHGenius. RNG and C&EM emissions factors are sourced from the BC Ministry of Environment & Climate Change Strategy.

[23] NGT emissions reduction factors are sourced from GHGenius. RNG and C&EM emissions factors are sourced from the BC Ministry of Environment & Climate Change Strategy.

Response:

Not confirmed. As discussed in FEI's response to BCSEA IR 1.39.1, the 29.3 $MtCO_2e$ as shown in Table ES-2 of the Application is the calculated reduction target for BC province-wide by 2036 and FEI's calculated emission reduction target is 9.6 $MtCO_2e$. Furthermore, also discussed in FEI's response to BCSEA IR 39.1, the forecast emissions reductions by the NGT category shown in Table ES-2 includes emissions reductions achieved both domestically and internationally. Table E-1 of Appendix E of the Application shows forecast emissions reductions for the Reference Case from NGT domestically and internationally by 2036 to be 0.3 $MtCO_2e$ and 1.9 $MtCO_2e$, respectively. Based on these forecast emissions reductions, FEI's current initiatives under the Reference Case will have the potential to achieve approximately 12 percent of FEI's calculated reduction target by 2036 (i.e. (0.04 + 0.8 + 0.3) / 9.6 = 12 percent), excluding international emissions reductions.[24]

It is also important to note that Table ES-2 of the Application represents the forecast emissions reductions of FEI's current initiatives only. As discussed in FEI's response to BCSEA IR 1.39.1, considering the context of a 20-year vision for GHG reductions, new initiatives and technologies are emerging that, for those successfully brought to market, can help FEI to pursue additional long term GHG emissions abatement. As demonstrated in Table E-1 of Appendix E of the Application, the top range GHG of reduction under the Reference Case could potentially be 6.8 $MtCO_2e$, excluding international transport, which is 70 percent of FEI's calculated reduction target (i.e. (6.5 + 0.3) / 9.6 $MtCO_2e$ = 71 percent under the Reference Case).[25]

39.3 Is FEI satisfied with the 2017 LTGRP's GHG emissions reduction results?

Response:

FEI developed this emission reduction potential analysis to demonstrate a probable magnitude of the GHG reductions that could be achieved through FEI investments to 2036. The analysis concludes that there is considerable technical potential to reduce GHG emissions consistent with the provincial government's climate targets and goals. To this effect, FEI is confident that it offers a number of affordable and actionable solutions to help the provincial government achieve its climate targets. Within the context of a 20-year vision, FEI expanded this

[24] NGT emissions reduction factors are sourced from GHGenius. RNG and C&EM emissions factors are sourced from the BC Ministry of Environment & Climate Change Strategy.

[25] NGT emissions reduction factors are sourced from GHGenius. RNG and C&EM emissions factors are sourced from the BC Ministry of Environment & Climate Change Strategy.

examination in Appendix E of the Application to outline potential pathways for GHG emissions abatement through FEI activities.

With respect to whether FEI is satisfied with these emission reduction results, opportunities for further reduction exist. These reductions, however, are limited by adoption by industry (NGT) as well as cost to rate payers (RNG, C&EM), both of which are inherently tied to technological improvements within the sector and enabling policies from various levels of government.

39.4 Please provide a version of Table ES-2 adding a row for Total.

Response:

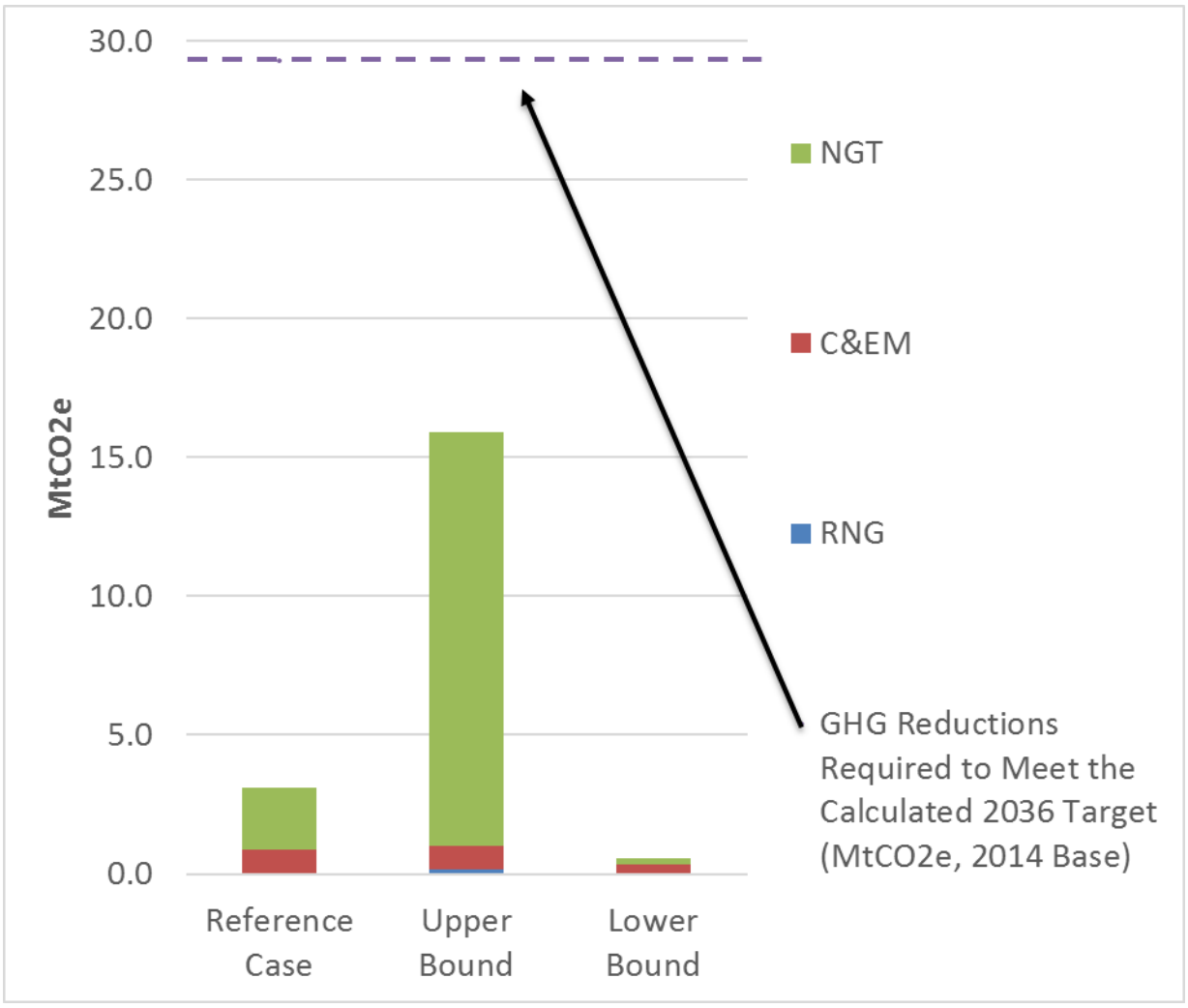
The table below reproduces Table ES-2 but includes a total row which sums the three preceding rows. Please note that NGT emissions reduction factors are sourced from GHGenius. RNG and C&EM emissions factors are sourced from the BC Ministry of Environment & Climate Change Strategy. Unlike NGT emissions, RNG and C&EM emissions reductions only consider the end-use emissions savings exclusive of associated reductions in the upstream sectors. As such, NGT emissions reductions are not directly comparable with RNG and C&EM.

GHG Reductions Required to Meet the Calculated 2036 Target ($MtCO_2e$, 2014 Base)	Forecast Emissions Reductions in 2036 ($MtCO_2e$, 2015 Base)		
29.3	**Reference Case**	**Upper Bound**	**Lower Bound**
RNG	0.04	0.14	0.01
C&EM	0.8	0.8	0.3
NGT	2.3	14.9	0.2
Total	**3.1**	**15.9**	**0.6**

Notes:

Some forecast NGT emissions reductions are realized outside the current boundaries of the BC emissions inventory.

The bar graph below illustrates the table data. As noted in Section 8.3.2 of the Application, the notional 2036 Target is a BC economy-wide target. This target is not currently assigned to any specific sectors or entities within the economy.



39.5 Please provide a graph showing the Table ES-2 results (including Total).

Response:

Please refer to the response to BCSEA IR 1.39.4.

39.6 Please explain with examples the note that states "Note: Some forecast NGT emissions reductions are realized outside the current boundaries of the BC emissions inventory."

Response:

As stated in the response to BCSEA IR 1.29.1, emissions from the coastal freight and trans-Pacific marine segments are not included in either the BC emissions inventory or the federal emissions inventory. Any fuel switching that would occur in these markets will not be explicitly captured in the provincial or federal emissions inventories. However, the switch from current incumbent higher carbon marine fuels to lower carbon fuels such as natural gas would have overall emissions reductions that would benefit the province of BC in terms of air quality and emissions in the provincial air shed and would reduce global GHG emissions.

40.0 Topic: Low carbon thermal energy

Reference: Exhibit B-1, Section 8.2.3 Low Carbon Thermal Energy, pp.198-199

"In the Lower Bound scenario, low carbon thermal energy demand grows significantly and displaces eight percent of 2015 base year natural gas demand by 2036." [pp.198-199, underline added]

40.1 Please provide a table showing low carbon thermal energy demand, natural gas demand, and the percentage, at the 2015 base year and 2036, for the Reference Case, Upper Bound and Lower Bound.

Response:

The table below summarizes the requested information. FEI interprets reference to "the percentage" in the question to mean each year's ratio of low carbon thermal annual demand to natural gas annual demand across the Reference Case, Upper Bound and Lower Bound, respectively. In contrast, the passage quoted by the question's preamble compares Lower Bound low carbon thermal energy annual demand to 2015 base year natural gas annual demand. As noted in Section 8.2.3 of the Application, low carbon thermal energy annual demand grows in the Reference Case, declines in the Upper Bound, and significantly grows in the Lower Bound. The percentage values shown in the table not only take into account growth/decline in low carbon annual demand but also growth/decline in natural gas annual demand for each scenario.

Year	Reference Case			Upper Bound			Lower Bound		
	(A) Natural Gas Annual Demand (GJ)	(B) Low Carbon Thermal Annual Demand (GJ)	B/A	(A) Natural Gas Annual Demand (GJ)	(B) Low Carbon Thermal Annual Demand (GJ)	B/A	(A) Natural Gas Annual Demand (GJ)	(B) Low Carbon Thermal Annual Demand (GJ)	B/A
2015	191,738,754	7,650,172	4%	191,738,754	7,650,172	4%	191,738,754	7,650,172	4%
2036	202,261,704	8,178,197	4%	241,245,597	6,986,470	3%	107,595,062	15,555,468	14%

"Low carbon thermal energy solutions such as geo-exchange systems, waste heat recovery systems and solar thermal systems can displace both existing and future expected demand for natural gas. While FEI does not offer these services to its customers, the potential for other third party service providers to do so creates a risk to FEI's annual demand profile and thus to the Company's revenue expectations." [p.198]

40.2 What services does FAES provide?

Response:

As stated in Appendix A of FEI's All-Inclusive Code of Conduct and Transfer Pricing Policy, approved by Order G-25-17, FAES is a wholly owned subsidiary of FortisBC Holdings Inc. that provides alternative energy solutions, including thermal-energy and geo-exchange systems. The company specializes in designing, owning, operating and maintaining regulated utility thermal assets to help its clients address deferred maintenance, reduce greenhouse gas emissions, support sustainability objectives and improve the performance of thermal energy systems in buildings. The specific services which FAES provides are available on the FAES website https://www.fortisbc.com/AlternativeEnergyServices/Pages/default.aspx.

40.3 Please confirm, or otherwise explain, that substitution of cost-effective low carbon thermal energy solutions for conventional natural gas is desirable and supported by the BC energy objectives.

Response:

BC's energy objectives are set out in section 2 of the *Clean Energy Act* (CEA), and specifically, section 2(h) states that one of BC's energy objectives is "*to encourage the switching from one kind of energy source or use to another that decreases greenhouse gas emissions in British Columbia*". As such, FEI confirms that that substitution of conventional natural gas with another thermal energy solution, so long as it results in reduced greenhouse gas emissions in BC, supports BC's energy objectives. While cost effectiveness of alternative energy solutions is not one of BC's energy policy objectives, it is certainly an important factor for customers considering adopting other thermal energy solutions. This importance is seen in the Premier of British Columbia's ministerial mandate letter to the Minister of Energy, Mines and Petroleum Resources, "Our [government's] first commitment is to make life more affordable."[26]

40.4 Please confirm, or otherwise explain, that the role of FEI's NGT program is to build natural gas load while reducing net GHG emissions in order to offset the

[26] July 18, 2017. https://www2.gov.bc.ca/assets/gov/government/ministries-organizations/premier-cabinet-mlas/minister-letter/mungall-mandate.pdf.

effect on delivery rates of reductions in natural gas load due to factors such as low carbon thermal energy solutions.

Response:

As emissions from the transportation sector make up the largest portion of the Province of BC's overall GHG emissions, developing lower carbon fuel solutions for transportation can play a key role in helping the province meet their GHG reduction objectives. FEI's NGT program also provides BC's commercial fleet operators with an affordable low-carbon energy solution. Serving fleet demand for affordable, lower-carbon fuels is another key driver of FEI's NGT program.

In addition, developing demand for NGT will increase the overall utilization of FEI's pipeline and liquefaction assets. This in turn will reduce the upward pressure on delivery rates for all customers, all else being equal. Increased utilization of the distribution system provides households and businesses with affordable energy options.

41.0 Topic: LTGRP scope

Reference: Exhibit B-1, Section 2.4, Customer Solutions, p.50, pdf p.75

Following the Commission's Alternative Energy Solutions Inquiry report in 2012, FEI's new initiatives in thermal energy service projects are being undertaken by a separate FEI affiliate. FEI is no longer delivering low carbon thermal energy alternatives.

41.1 Please confirm, or otherwise explain, that the FEI LTGRP does not include any of the activities of FortisBC Alternative Energy Services Inc.

Response:

Confirmed.

42.0 Topic: Renewable Natural Gas

Reference: Exhibit B-1, Section 8.2.4 RNG and other Innovative Natural Gas Technologies

"If cellulosic biogas technologies become commercially scalable at reasonable cost, RNG demand may account for a significant share of FEI's demand within 20 years."

"The LTGRP does not contain any requests in relation to the RNG program." [p.56, pdf p.81]

42.1 What is FEI doing to support the development of cellulosic biogas technologies?

Response:

FEI is supporting a project to demonstrate the conversion of forestry waste into renewable natural gas (RNG) for distribution through natural gas pipelines through a direct financial contribution to the Natural Gas Innovation Fund and in-kind support.

The project is hosted by ATCO and is supported by funding from Natural Resources Canada, Alberta Innovates, the Natural Gas Innovation Fund, and other Canadian Gas Association members, Enbridge Gas Distribution, Energir and Union Gas.

While FEI is providing both a financial and in-kind contribution to the project discussed above, FEI believes that the RNG Program currently supports the development of biogas technology overall including cellulosic biogas technologies. Under the RNG program, FEI may act as a purchaser of biogas/RNG through a Biomethane Purchase Agreement regardless of the source of biogas/RNG. Thus, should a cellulosic biogas project developer come forward with a project that meets the criteria of the RNG program, FEI would support the project through a Biomethane Purchase Agreement.

42.2 Why does the 2017 LTGRP not include measures to support the development of cellulosic biogas technologies?

Response:

Please refer to Section 9, Activity 8 on pages 219-220 of the LTGRP, which includes activities to support the development of cellulosic biogas technologies.

43.0 Topic: The "right fuel" and the "right end use"

Reference: Exhibit B-1, Executive Summary, page ES-3

"Using the right fuel effectively for the right end use and developing customer-driven energy services remain a key focus of FEI's customer solutions activities. Natural Gas for Transportation (NGT), Renewable Natural Gas (RNG), and Conservation and Energy Management (C&EM) are initiatives that FEI is currently undertaking toward this goal while helping to meet provincial goals for emissions reductions." [ES-3, pdf 15]

43.1 Does FEI apply criteria and an analytical process to assess the "right fuel" for the "right use" and how a fuel is used "effectively"?

Response:

The phrase "right fuel…for the right use" is dependent upon each individual customer and their specific circumstance. The needs of customers are too varied to apply any formal criteria. FEI believes that the customer should be free to choose the energy choice that best suits their needs. FEI thus helps customer find solutions to meet these needs. From a transportation sector perspective, FEI believes that natural gas can play a significant role in helping reduce GHG emissions from the transportation sector, which includes heavy-duty trucking, mine haul trucks, locomotives, remote power generation and marine based transportation. RNG and C&EM activities also provide customers with options to reduce GHG emissions from their activities and use energy more efficiently.

44.0 Topic: Planning Environment

Reference: Exhibit B-1, Section 2.3.4 Municipalities, p.48, pdf p.73

"Some municipalities are setting goals to supply 100 percent of their energy needs via clean and renewable sources by 2050. These goals focus on buildings, transport and municipal waste but are aspirational in nature as implementation pathways and municipal policy levers for achieving such goals are not clear yet. These municipalities include the City of Vancouver (COV), the City of Victoria, the District of Saanich, and various municipalities in the BC Kootenays. These municipal targets present a risk of downward pressure on natural gas demand but also provide an opportunity for FEI's RNG program and the Company's other initiatives for increasing the renewables portion of its energy supply."

44.1 Please confirm, or otherwise explain, that BC municipalities do have clear implementation pathways and policy levers to achieve their 100% renewable energy plans in relation to reduction of natural gas for space and water heating, such as authority over zoning bylaws and, in the case of the City of Vancouver, authority over the building code.

Response:

Not confirmed. Achieving 100 percent renewable mandates in municipalities require policy coordination among all levels of government. While municipalities can use land-use policies and bylaws that impact waste and transportation management, the transition to 100 percent renewables will require a portfolio of policy and market interventions from outside the municipal remit. This is because energy systems typically extend beyond municipal boundaries. For example, achieving 100 percent renewable energy in the transport sector will require planning and resource decisions at the provincial level for energy supply, resource adequacy and resiliency. Furthermore, transitioning to specific technologies that could utilize 100 percent renewable energy, such as electric passenger vehicles, will require federal and/or provincial mandates on vehicle standards well in advance of 2050 to ensure full market transformation. Municipalities also have a more limited set of levers to unlock the fiscal resources required to transition to 100 percent renewables.

For building space and water heating, municipalities have the ability to shape the patterns of new development through zoning bylaws and, in the case of the City of Vancouver, the Vancouver Building Bylaw. However, the challenge to achieve 100 percent renewable energy in all buildings extends further than the new building sector. The policy pathway for existing buildings to achieve 100 percent renewable energy in space and water heat is less clear and will require participation of many levels of government, utilities like FEI and other key stakeholders.

44.2 Please confirm, or otherwise explain, that the municipal 100% renewable energy strategies provide an opportunity for low carbon thermal energy solutions, in addition to FEI's RNG program and other initiatives.

Response:

FEI confirms that municipal 100 percent renewable energy strategies do provide opportunities for FEI's RNG program (which is a low carbon thermal energy solution). Municipal 100 percent renewable energy strategies would also provide opportunities for suppliers of low carbon thermal energy systems; however, FEI is not a supplier of low carbon thermal energy systems.

45.0 Topic: Next LTGRP

Reference: Exhibit B-1, p.ES-12, pdf p.24

FEI provides actions that it intends to pursue over the next four years.

45.1 When does FEI intend to file its next long term resource plan?

Response:

FEI typically files its Long Term Gas Resource Plans every three to five years from the time of the Commission's decision on the most recently filed LTGRP.

Attachment 15.1

REFER TO LIVE SPREADSHEET MODEL

Provided in electronic format only

(accessible by opening the Attachments Tab in Adobe)

Attachment 16.1

Diane Roy
Vice President, Regulatory Affairs

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March 29, 2018

British Columbia Utilities Commission
Suite 410, 900 Howe Street
Vancouver, BC
V6Z 2N3

Attention: Mr. Patrick Wruck, Commission Secretary and Manager, Regulatory Support

Dear Mr. Wruck:

Re: FortisBC Energy Inc. (FEI)
Natural Gas Demand-Side Management (DSM) – 2017 Annual Report

Attached please find the Natural Gas DSM Program 2017 Annual Report for FEI.

If further information is required, please contact Ken Ross, Manager, Integrated Resource Planning and DSM Reporting at 604-576-7343 or ken.ross@fortisbc.com.

Sincerely,

FORTISBC ENERGY INC.

Original signed:

Diane Roy

Attachment

FortisBC Energy Inc.

Natural Gas
Demand-Side Management Programs
2017 Annual Report

March 29, 2018

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List of Appendices

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1. REPORT OVERVIEW

FortisBC Energy Inc. (FEI or the Company), is committed to delivering a broad portfolio of cost-effective natural gas Demand-side Management[1] (DSM) measures that address the expectations of customers while meeting the requirements for public utilities to pursue cost-effective DSM. In 2017, total expenditures, including $1.104 million attributable to third party co-funding such as received from the British Columbia Ministry of Energy, Mines and Petroleum Resources (MEM), were $35.143 million. Based solely on FEI's DSM expenditures, the Company achieved a combined portfolio Modified Total Resource Cost (MTRC)[2] of 1.2 on expenditures of $34.039 million, meeting FEI's goal of cost-effective program delivery.

This DSM Annual Report (the Report) outlines the Company's actual results and expenditures for 2017. The Report follows a similar format to the 2016 and previous Annual Reports, relying on detailed tables to demonstrate Program results and expenditures. The Report compares 2017 actual activity and results to the Company's 2014-2018 DSM Plan, filed as part of FEI's 2014-2018 Performance Based Ratemaking (PBR) Application (2014-2018 PBR Plan) and accepted by the Commission in its Decision and Order G-138-14 (the Decision). Where the details of individual programs vary substantially from the 2014-2018 DSM Plan, explanations are provided in the applicable Program Area sections of the Report.

1.1 Purpose of Report: Transparency, Accountability and Update on Progress

The Report details the Company's activities for the overall DSM Portfolio and in each Program Area. Incentive and non-incentive expenditures are reported at the level of each program or measure, as well as at the program area and Portfolio levels. Results for the following cost effectiveness tests are provided for the overall Portfolio and each Program Area in Section 2, and for each program as appropriate in the respective Program Area sections: Total Resource Cost (TRC), Ratepayer Impact Measure (RIM), Participant Cost Test (PCT), and Utility Cost Test (UCT). In accordance with British Columbia's Demand-Side Measures Regulation (DSM Regulation), results of the MTRC calculations are also provided where appropriate (see Section 2.1).

The Report also demonstrates that the Company is meeting the accountability mechanisms directed by the Commission in Order No. G-36-09. One such mechanism was the requirement to file DSM Annual Reports, which states:

> A requirement that Terasen [now FEI] submit annually to the Commission, by the end of the first quarter following year-end, for each year of the funding period, a

[1] Throughout this Annual Report the use of the term Demand-Side Management or "DSM" is intended to refer to demand-side measures in BC as defined in the BC Demand-Side Measures Regulation.

[2] Pursuant to the BC Demand-side Measures Regulation, the Portfolio level MTRC is calculated based on costs and benefits of all programs in the Portfolio as well as any Program Area and Portfolio level administration costs, and including the benefit adders for those programs for which the MTRC is relied upon to determine cost effectiveness on an individual program basis (i.e. those programs that have been designated as being under the MTRC Cap as presented in Section 2.1 of this report).

report on all [DSM] initiatives and activities, expenditures and results for TGI and TGVI.

It should be noted that the DSM Regulation was amended by the Province in March, 2017. These amendments impact some of the cost-effectiveness calculations, increase spending limits under the MTRC Cap (see Section 2.1) and expand the adequacy requirements of a DSM Portfolio (see Section 2.3). At the time of filing and acceptance, the 2014-2018 DSM Plan was in compliance with the DSM Regulation. Due to the timing of the DSM Regulation amendments, certain aspects of the DSM Regulation amendments, particularly the adequacy requirements, could not be feasibly implemented in 2017, however FEI considers its 2014-2018 DSM Plan to be in compliance with the DSM Regulation at the time of acceptance by the Commission. As such, FEI is reporting its activity as related to adequacy requirements against the DSM Regulation in place at the time of acceptance. FEI will address the expanded adequacy requirements of the DSM Regulation noted above in its next DSM expenditure plan application for the period 2019 – 2022 to be submitted to the Commission in 2018.

1.2 Organization of the DSM Annual Report

The following describes how each section of the Report presents the results of 2017 DSM activities:

Section 1: Report Overview

- Provides a high-level background for the Report.

Section 2: Portfolio Overview

- Provides a summary and detail regarding the overall actual 2017 expenditures for DSM activities, along with an explanation of expenditures held in both the DSM deferral account and another deferral account set up for DSM incentive amounts provided to Alternative Energy Services (AES) projects in which FEI is a participant.
- Section 2.5 discusses any new requirements from the Commission concerning information to be included in the 2017 DSM Annual Report.

Section 3: Funding Transfers

- Provides a discussion on funding transfers.

Section 4: Advisory Group Activities

- Provides information regarding Energy Efficiency and Conservation Advisory Group (EECAG) activities in 2017, including a summary of meetings and accountability considerations.

Sections 5 - 9 provide information on:

- Residential, Low Income, Commercial, Innovative Technologies, and Industrial Energy Efficiency Program Areas, respectively;

- Each section contains a table summarizing the planned and actual expenditures for the respective Program Area in 2017, including incentive and non-incentive spending, annual and NPV gas savings, as well as TRC and other cost-effectiveness test results. Additional tables outline the individual 2017 programs, including program and measure descriptions, program assumptions and sources for these assumptions, and a breakdown of incentive and non-incentive spending. Where applicable, details on program closures or planned programs that were not launched in 2017 are also included in these program detail sections.

Section 10: Conservation Education and Outreach Initiatives

- Provides both a summary and details regarding actual 2017 expenditures for the Conservation Education and Outreach (CEO) Program Area.

Section 11: Enabling Activities

- Provides both summary and detail regarding actual 2017 expenditures for the Enabling Activities that support the work of the DSM Portfolio as a whole.

Section 12: Evaluation

- Provides both summary and detail regarding pending and actual expenditures for 2017 program evaluation activities, as well as summary results from evaluations and studies completed in 2017.

Section 13: Data Gathering, Reporting and Internal Control Processes

- Provides a summary of the Company's data tracking, process control, and reporting for 2017 DSM activities, and a high-level description of the Company's internal approval process for programs.

Section 14: 2017 DSM Annual Report Summary

- Provides a summary of the Report and FEI's 2017 DSM activity.

2. PORTFOLIO OVERVIEW

In this Section, FEI provides its DSM energy savings, expenditures and cost-effectiveness test results at an overall Portfolio level for 2017. A summary of the overall Portfolio results is provided in Table 2-1, demonstrating that the Company achieved a combined Portfolio MTRC of 1.2. FEI achieved DSM expenditures of $34.039 million and recorded annual natural gas savings of 533,538 GJ in 2017.

Table 2-1: Overall DSM Portfolio Results for 2017

Indicator - 2017 Results		Total
Annual Gas Savings (GJ/yr.)		533,538
NPV of Gas Savings (GJ)		4,769,193
Utility Expenditures, Incentives ($000s)		21,836
Utility Expenditures, Non-Incentives ($000s)		12,203
Utility Expenditures, Total ($000s)		34,039
Benefit/Cost Ratios	TRC	0.7
	MTRC	1.2
	Utility	1.2
	Participant	1.2
	RIM	0.7

Table 2-2 provides the expenditures and cost-effectiveness test results by Program Area for the overall DSM Portfolio.

Table 2-2: Overall DSM Portfolio Level Results by Program Area 2017

Portfolio	Annual Gas Savings (GJ/yr.)		NPV Gas Savings (GJ)	Utility Expenditures ($000s)						Benefit/Cost Ratios				
				Incentives		Non-Incentives		All Spending						
	2014-2018 DSM Plan	2017 Actual		2014-2018 DSM Plan	2017 Actual	2014-2018 DSM Plan	2017 Actual	2014-2018 DSM Plan	2017 Actual	TRC	MTRC	Utility	Participant	RIM
Portfolio Level Activities														
Total	No Direct Savings			n/a	n/a	n/a	1,559	n/a	1,559	No Direct Savings				
Residential Sector														
Total	136,672	137,161	1,446,618	7,486	9,688	3,214	2,515	10,700	12,203	0.5	1.7	1.0	1.1	0.5
Commercial Sector														
Total	237,665	238,688	1,906,805	8,424	8,847	1,992	1,987	10,416	10,834	0.8	n/a	1.4	1.4	0.6
Industrial Sector														
Total	190,300	105,516	1,007,011	2,193	1,614	789	485	2,983	2,099	1.3	n/a	4.5	0.7	2.0
Low Income														
Total	27,768	47,263	343,071	1,778	1,592	1,469	1,052	3,247	2,644	1.2	2.1	1.4	2.9	0.7
Conservation Education and Outreach														
Total	No Direct Savings			0	0	2,400	2,590	2,400	2,590	No Direct Savings				
Innovative Technologies														
Total	5,343	4,910	65,687	574	95	644	833	1,218	928	0.5	n/a	0.6	7.1	0.4
Enabling Activities														
Total	No Direct Savings			n/a	n/a	4,425	1,181	4,425	1,181	No Direct Savings				
TOTAL PORTFOLIOS														
Total	**597,748**	**533,538**	**4,769,193**	**20,455**	**21,836**	**14,933**	**12,203**	**35,388**	**34,039**	**0.7**	**1.2**	**1.2**	**1.2**	**0.7**

Notes:

- Portfolio Level Activities are those activities for which the costs cannot be assigned to individual DSM programs. It should be noted that these activities are distinct from the Enabling Activities specifically listed in Section 9 of the 2014-2018 DSM Plan. These distinct Portfolio Level Activities include expenditures such as EECAG activities, Portfolio level staff labour, staff training and conferences, research and association memberships, Portfolio level research studies, and regulatory work including consulting fees.

Throughout this Report, the following general notes also apply to all the Program Areas:

- In the above table, and in tables throughout the Report, any difference in the totals between the Portfolio Overview, Program Area, and individual program tables is due to rounding. Some "zero" values are a reflection of rounding to the $000 expenditure level when expenditures were under $500.
- A "Non-Program Specific Expense" line item has been included for each Program Area in Sections 5 through 10. These expenditures support multiple programs within that Program Area and, therefore, are not specific to only one program. Generally, these expenditures represent items such as training, travel, marketing collateral and consulting services that support the overall Program Area.

It is FEI's view that, as with prior annual reports, the savings reported herein continue to be conservative and lower than the savings experienced in the marketplace as a result of the Company's DSM activities, causing the cost-effectiveness test results reported to be lower than they would be otherwise, for the following reasons:

- Net to Gross Ratio - The Net-to-Gross ratio that FEI is using to report energy savings from DSM activity is highly conservative in that it includes the free ridership impact, which serves to reduce reported energy savings, but in most cases does not include the energy savings benefits of spillover effect.[3] FEI intends to continue identifying and incorporating spillover effects into reporting of energy savings impacts from DSM activity on a program-by-program basis, wherever spillover can be supported.

- Attribution from Government Regulation – The introduction of many municipal, provincial and federal minimum equipment and system performance standards is supported by the Company's DSM activity. Attribution savings for the implementation of a new standard on minimum fireplace efficiency have been identified and estimated as part of the Residential EnerChoice Fireplace Program (see Section 5.3). As the Province has shifted the implementation of the new standard to January of 2019, FEI expects to claim those attributed savings in its 2018 Annual Report. The Company continues to believe the claimed savings are conservative and do not represent all of the savings attributable to FEI's codes and standards work. FEI will continue to look for opportunities to claim energy savings from the implementation of new standards.

- Conservation Education and Outreach – CEO activities had expenditures of $2.5 million in 2017. These activities do result in energy savings; however, since these savings remain difficult to quantify, FEI does not currently attribute energy savings to them and these benefits are not reflected in the TRC.

[3] Free ridership refers to individuals who participate in a program who would have participated in the absence of an incentive. Spillover refers to individuals that adopt efficiency measures because they are influenced by program-related information and marketing efforts, though they do not actually participate in the program. These can be included in the Net-to-Gross ratio employed in the cost-effectiveness analysis to capture the additive effects of spillover to balance the reductive effects of free ridership.

- Enabling Activities – Enabling Activities similarly had expenditures of $1.1 million in 2017 for work that contributes to energy savings but that cannot currently be quantified. Since these savings are not included in the Portfolio TRC calculation, the Company believes the Portfolio energy savings benefits are higher than reported.

FEI's DSM activities include a number of specified demand side measures as defined the DSM Regulation. Specified demand-side measures within FEI's Portfolio include the Innovative Technologies programs (see Section 8), education and community engagement programs (see Section 10), and Codes and Standards related DSM activity (see Section 11). The DSM Regulation defines how the Commission must consider these specified measures. Section 4(4) of the DSM Regulation stipulates that the cost effectiveness of specified measures must be determined by the cost effectiveness of the Portfolio as a whole. These measures are therefore not subject to the 40 percent 'MTRC Cap' (see Section 2.1). Additionally, these measures cannot be determined to be not cost-effective under the Utility Cost Test.

In summary, FEI's 2017 DSM expenditures, including specified DSM, are cost-effective as defined under the DSM Regulation.

2.1 Portfolio Level MTRC Calculation and Results

In 2017, FEI met the conditions of the DSM Regulation, achieving a Portfolio MTRC value of 1.2 with 24 percent of the Portfolio enabled by the MTRC cost-effectiveness test (see Table 2-2). While FEI strives for TRC test results that approach or exceed 1.0 within each program and across all programs, there are benefits to implementing programs that do not meet this threshold. Some of these benefits include making programs available to those customers that would otherwise be underserved (such as low income and residential customers), water savings, increased human health and comfort, and economic benefits such as job creation. These benefits were recognized in the 2011, 2014 and 2017 amendments to the DSM Regulation, which enable the use of an MTRC in determining program and Portfolio cost effectiveness. The MTRC uses the long-run marginal cost of acquiring electricity generated from clean or renewable resources in British Columbia as a proxy for the avoided cost of natural gas and allows for the inclusion of non-energy benefits (NEBs).[3]

Utilities can implement DSM with TRC values less than 1.0 but that meet an MTRC threshold of 1.0[4] as long as expenditures on these activities do not exceed 40 percent of the total Portfolio

[3] The DSM Regulation was amended in July 2014 to allow for the whole cost of the long-run marginal cost of acquiring electricity generated from clean or renewable resources in British Columbia to be used as a proxy for the avoided cost of natural gas in the MTRC cost-effectiveness test. As the DSM Regulation stipulates, the updated value that FEI has used in 2017 for the avoided cost of gas in the MTRC calculation is $102/MWh, or $28.34/GJ, as indicated in BC Hydro's F2017 to F2019 Revenue Requirements Application, Appendix X, Table X-1, Exhibit B-1-2: Avoided Cost of Electric Energy. Further, the MTRC Cap was increased from 33% to 40% in the March 24, 2017 amendments to the DSM Regulation.

[4] The Commission approved the assessment of the cost effectiveness using an MTRC of 1 or greater on an overall portfolio basis as part of its Decision and Order G-44-12 on FEI's 2012-2013 Revenue Requirements Application (2012-13 RRA), page 174. While this approval was not explicitly stated in the most recent 2014-2018 PBR Plan Decision and Order G-138-14, FEI interprets this approval to be implicit in the acceptance of the 2014-2018 DSM Plan.

expenditure. FEI refers to this 40 percent as the "MTRC Cap". Table 2-3 shows both the TRC and MTRC of those programs to which the MTRC cost effectiveness test is applied and confirms that these programs make up 24.4 percent of FEI's 2017 DSM Portfolio spending.

Table 2-3: Programs Subject to MTRC and the Relative Proportion of 2017 Portfolio Spending

Program	Program TRC	Program MTRC	Expenditure ($000s) subject to cap	% of Portfolio Spending
Energy Star Domestic Hot Water	0.3	1.6	2,834	8.3%
Furnace Replacement	0.4	1.4	3,325	9.8%
New Home	0.3	1.7	220	0.6%
Energy Efficiency Home Performance (Home Renovation Rebate Program)	0.5	2.4	1,925	5.7%
Total			**$8,303**	**24.4%**

2.2 Meeting Approved Spending Levels

FEI's 2017 DSM expenditure limit of $35.4 million was accepted on September 12, 2014, pursuant to the Decision on FEI's 2014-2018 PBR Plan.[5] The Company's 2017 DSM expenditures were within accepted levels for 2017 and have increased from 2016 spending of just over $32 million.

As part of the Commission's decision, FEI was granted approval to add $15 million of the requested annual DSM budget to rate base each year of the PBR period, with any additional DSM spend being captured in a DSM non-rate base deferral account attracting AFUDC. Any new amounts accumulated in the non-rate base DSM deferral account are then transferred to the FEI rate base DSM deferral account in the following year. The Commission also approved the amortization of these amounts over 10 years. In accordance with the Commission's decision, $19.039 million was placed in the non-rate based DSM deferral account in early 2018.

FEI has managed its 2017 DSM activity within the funding limits approved by the Commission. Section 3 discusses funding transfers between program areas in 2017 within the overall DSM funding envelope and within rules for transferring funds between program areas as set out by the Commission.

2.3 Meeting Adequacy Requirements of the DSM Regulation

The adequacy requirements set out in the DSM Regulation at the time the 2014 – 2018 DSM Plan was accepted are as follows:

[5] BCUC Order G-138-14, page 277 of the Decision.

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 the following:

a) A demand-side measure intended specifically to assist residents of low-income households to reduce their energy consumption;
b) If the plan portfolio is introduced on or after June 1, 2009, a demand-side measure intended specifically to improve the energy efficiency of rental accommodations;
c) An education program for students enrolled in schools in the public utility's service area;
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.

Section 6 provides details regarding FEI's DSM programs for low income customers. FEI also continues to deliver the Rental Apartment Efficiency Program (RAP) through its Residential, Low Income and Commercial programs as discussed in each of the respective Program Area sections (Sections 5, 6 and 7) and a full program overview for RAP is presented in Section 7.3.1. Section 7 of the Report provides details on a number of other Commercial and Low Income energy efficiency programs intended for use by owners of rental buildings, including the Energy Specialist Programs. In terms of education programs, FEI's School Education Program, Commercial and Residential customer education programs, and other energy efficiency and conservation outreach initiatives are presented in Section 10.

2.4 Addressing BCUC Directives from the FEI 2014-2018 PBR Plan Application Decision

FEI filed for acceptance of its 2014-2018 DSM Plan and associated funding request as part of the 2014-2018 PBR Plan. The Decision on the 2014-2018 PBR Plan set out a number of Directives for the 2014-2018 DSM Plan. The following section addresses the Directives relevant to the overall 2017 DSM Portfolio. Program specific Directives are addressed in the applicable Program Area sections of the Report.

2.4.1 LABOUR COSTS

Pursuant to Directive 145[6] of the Decision, labour costs are included in the "Administration" expenditures for each program in the specific Program tables included in the applicable Program Area sections (Sections 5-11). FEI notes that the 2014-2018 DSM Plan as accepted by the Commission was not re-cast with labour included at the program level. This change therefore impacts the direct comparison of actual program and Program Area spending to plan spending. The inclusion of labour costs at the program level can cause program area expenditures to appear higher than the accepted amounts even though non-

[6] Decision, page 273.

labour costs are within accepted amounts. Actual spending in the "Enabling Activities" program area will also be lower than planned since a substantial amount of labour costs planned for this program area are being reported within other program areas. This issue is also discussed in Section 3 on funding transfers.

2.5 Collaboration & Integration

The Company continues to collaborate and integrate DSM programming among BC's largest energy utilities, as well as with other entities such as governments and industry associations. The Company recognizes that doing so will maximize program efficiency and effectiveness. Collaborative activity is captured in the individual Program Area sections and program descriptions found in Sections 5 through 11.

FEI, FortisBC Inc. (FBC) and BC Hydro and Power Authority (BC Hydro) (the BC Utilities) continued to collaborate on various programs and projects through their voluntary Memorandum of Understanding (MOU), the purpose of which is to develop enhanced utility integration in support of government legislation, policy and direction. The MOU currently covers 2016 through to August 2018. The BC Utilities also continue to experience cost efficiencies from their collaboration efforts, including streamlined application processes for customers, extended program reach and consistent and unified messaging resulting in improved energy literacy.

2.6 Summary

The Company's DSM Portfolio met the goal of cost effectiveness with a Portfolio MTRC value of 1.2 in 2017. The Company is of the view that both energy savings accounted for in the Portfolio and the resulting TRC remain conservative. Benefits from additional activities, such as CEO, play a very important role in supporting the development and delivery of programs, while creating a culture of conservation in British Columbia.

3. FUNDING TRANSFERS

Three Program Areas – Residential, Commercial and CEO – incurred actual program expenditures that appeared to be greater than their respective accepted Program Area funding amounts.[8] In the case of CEO and Commercial, however, exceedance of the accepted Program Area funding level was the result of reporting labour expenditures at the program level as directed by the Commission.[7] The accepted 2014-2018 DSM Plan was based on labour being reported at the Portfolio level, and planned Program Area expenditure levels were not re-stated subsequent to the Commission's decision regarding the reporting of labour costs at the program level. Therefore, the "accepted" or "plan" Program Area funding limits do not include labour. The expenditures for Commercial and CEO, as shown in Table 2.2, do not exceed planned values if labour costs are removed, therefore no funding transfer is required.

For the Residential Program Area, expenditures other than labour costs exceeded the accepted funding level by close to $1.0 million as a result of the success of the residential programs. To accommodate these additional expenditures in the Residential Program Area, $800,000 from the Industrial Program Area and $200,000 from the Innovative Technologies Program Area were moved into the Residential Program Area without exceeding 25% of approved expenditures within the respective Program Areas.[8]

[8] Order G-138-14.
[7] Directive 145, Order No. G-138-14
[8] As part of Order G-138-14, the Commission directed FEI to continue following the rules for funding transfers that were set by the Commission for the 2012-2013 test period. In Order G-44-12 the Commission determined that funding transfers greater than 25% from one approved Program Area to another required prior approval by the Commission. That limit has not been exceeded in 2017.

4. ADVISORY GROUP ACTIVITIES

4.1 Overview

The Energy Efficiency and Conservation Advisory Group (EECAG) provides insight and feedback on FEI's Portfolio of DSM activities and related issues. This includes DSM program and Portfolio performance, development and design, funding transfers, policy and regulations that may impact DSM activities, and other issues and activities as they arise.

EECAG members may be appointed based on their relevant subject matter expertise, representation of a common interest shared by stakeholders, or representation of a particular organization/group and/or interest. This includes, but is not limited to, governments, regions, First Nations organizations, customers, suppliers, industries, non-governmental organizations, research institutes and other groups that have historically intervened in FEI's regulatory proceedings.

Since the formation of the EECAG in 2009, FEI has gained valuable insight on DSM program design and implementation and developed positive working relationships with stakeholders. EECAG input continues to be instrumental as FEI moves forward with DSM activities, helping to ensure that efforts are aligned with the interests and suggestions of stakeholders.

In recent years, including 2017, FEI's DSM Portfolio has been stable in terms of overall funding and program activities, and therefore meetings with EECAG members have been less frequent than during the early years of program development and ramp-up. A single EECAG workshop late in the year was sufficient to inform EECAG members of the latest developments in DSM activities and to gain their feedback on Portfolio results and planning. EECAG members are also invited to take part in any of FEI's planning design workshops that bring together stakeholders who have an interest in a particular Program or Program Area. In 2017, a number of EECAG members took part in consultations, other than the EECAG workshop, that were designed to gather input into overall Portfolio planning.

4.2 Summary of the 2017 Workshop

The 2017 EECAG workshop was held on November 28 in Vancouver and was well attended by EEGAG members or their alternate delegates. The primary objective of the 2017 workshop was to engage EECAG members on development of the next DSM Plan for the 2019-2022 period. The EECAG Independent Facilitator was engaged in workshop design and facilitation of the workshop. Copies of materials and minutes for these meetings were distributed to EECAG members and other workshop attendees.

The November 2017 EECAG Workshop used a group breakout format to:

- Provide an update on the current (2014-2018) DSM Plan;
- Set the context and seek input for the next DSM Plan and expenditure application for the 2019-2022 time period; and

- Explain the next steps and timing for the DSM expenditure plan for 2019-2022, including additional opportunities for review and input by stakeholders.

Participants were provided with a draft version of the 2019-2022 DSM Plan in advance of the meeting and the group sessions were designed and facilitated to gather feedback on the Plan for each of the Program Areas. The FEI and FBC Conservation & Energy Management (C&EM) department presented both the gas and electric DSM Plans, however this section focuses on the feedback and input provided with respect to the natural gas DSM Plan.

EECAG members provided substantial feedback on the overall draft DSM Plan as well as each of the Program Areas. Overall impressions of the draft DSM Plan were that it is "going in the right direction". General feedback was positive with some areas identified as needing additional information. EECAG member ideas for strengthening the draft DSM Plan were noted for further investigation and consideration in finalizing the plan. A number of positive aspects of the draft DSM Plan were also noted, and additional opportunities for EECAG engagement on the development of the plan were outlined.

FEI continues to value the input from EECAG members. The 2017 workshop and additional consultation efforts with EECAG members that followed have been effective in improving the delivery of DSM activities and in improving the preparation of the 2019-2022 DSM Plan.

5. RESIDENTIAL ENERGY EFFICIENCY PROGRAM AREA

5.1 Overview

The Residential Energy Efficiency Program Area reduced annual natural gas consumption by 137,161 GJ, achieving an overall combined TRC/MTRC of 1.7. Over $12.2 million was invested in Residential Energy Efficiency programs in 2017, and 79 percent of this investment was customer incentive spending. Table 5-1 summarizes the expenditures for the Residential Energy Efficiency Program Area in 2017, including incentive and non-incentive spending, annual and NPV gas savings, as well as TRC/MTRC and other cost-effectiveness test results.

Residential programs serve over 912,000 customers in the FEI service territories. For DSM purposes, these customers predominantly include those living in single-family homes, row houses, townhomes or mobile homes.[9] Some in-suite measures, such as low flow fixtures and a small number of fireplaces and water heaters in multi-unit residential buildings are also included in this funding envelope. Residential programs serve retrofit and new home applications. In combination with the Company's education and outreach activities, these programs play an important role in driving a culture of conservation in British Columbia.

Table 5-1: Residential Energy Efficiency Program Area Results Summary

Program	Annual Gas Savings (GJ/yr.)		Actual NPV Gas Savings (GJ)	Utility Expenditures ($000s)						Benefit/Cost Ratios				
				Incentives		Non-Incentives		All Spending						
	2014-2018 DSM Plan	2017 Actual		2014-2018 DSM Plan	2017 Actual	2014-2018 DSM Plan	2017 Actual	2014-2018 DSM Plan	2017 Actual	TRC	MTRC	Utility	Participant	RIM
Non Program Specific Expenses														
Total	No Direct Savings			0	0	540	768	540	768	No Direct Savings				
Energy Efficiency Home Performance (Home Renovation Rebate Program)														
Total	47,131	15,846	208,584	1,228	1,391	423	534	1,651	1,925	0.5	2.4	0.9	1.1	0.5
Furnace Replacement Program														
Total	31,104	37,821	424,456	2,984	3,035	356	290	3,340	3,325	0.4	1.4	1.1	0.8	0.5
EnerChoice Fireplace Program														
Total	9,779	30,039	300,977	657	1,730	244	256	901	1,986	2.5	n/a	1.3	6.8	0.5
Appliance Service Program														
Total	No Direct Savings			356	385	100	62	456	447	No Direct Savings				
ENERGY STAR® Domestic Hot Water "DHW" Technologies														
Total	12,464	28,331	311,164	1,025	2,549	95	285	1,120	2,834	0.3	1.6	0.9	0.7	0.5
Domestic Hot Water Conservation Program /Low Flow Fixtures														
Total	12,825	3,157	30,151	190	269	100	-1	290	269	1.8	n/a	0.7	3.4	0.4
New Home Program														
Total	7,320	1,012	13,542	666	109	118	111	784	220	0.3	1.7	0.5	1.3	0.3
New Technologies Program														
Total	1,798	No Direct Savings		237	0	99	0	335	0			n/a		
Rental Apt Efficiency (RAP) *Residential Portion*														
Total	0	20,955	157,745	0	221	0	156	0	377			n/a		
Customer Engagement Tool for Conservation Behaviours														
Total	No Direct Savings			0	0	1,006	54	1,006	54			n/a		
On-Bill Financing														
Total	14250	No Direct Savings		143	0	133	0	276	0			n/a		
ALL PROGRAMS														
Total	**136,672**	**137,161**	**1,446,618**	**7,486**	**9,688**	**3,214**	**2,515**	**10,700**	**12,203**	**0.5**	**1.7**	**1.0**	**1.1**	**0.5**

Notes:

* RAP includes a combination of residential and commercial measures for both low income qualified and the able-to-pay rental apartment market, each funded from their respective Program

[9] Programs for Multifamily Dwellings served under Rate Schedule 2 or 3 are included in the Commercial Energy Efficiency Program Area (please refer to Section 7) with a few exceptions as noted.

Areas. RAP expenditures shown here are related only to the residential portion of RAP. Full RAP details are provided in Section 7.3.1, Table 7-10;

* Cost effectiveness values for the *Residential Portion* of RAP are not provided as they do not represent a complete program view. Please refer to Table 7-10 for RAP's cost effectiveness results.

5.2 Residential TRC and MTRC Results

FEI's DSM Program Principles state that programs should be universal, offering access to programs for all residential and commercial customers. Although many Residential programs are challenged in meeting a conventional TRC test where gas costs are relatively low, these programs, with their broad reach, are cost-effective when considering broader societal benefits such as water savings, increased human health and comfort, economic benefits such as job creation and greenhouse gas emissions reductions. This is recognized in the DSM Regulation which enables the inclusion of lower TRC programs through the application of the MTRC as discussed in Section 2.1. The overall 2017 Residential Program Area TRC was 0.5 with a combined TRC/MTRC result of 1.7.

5.3 2017 Residential Energy Efficiency Programs

Tables 5-2 through 5-8 outline the specific Residential Energy Efficiency programs undertaken in 2017, including program and measure descriptions and a breakdown of non-incentive spending.

Table 5-2: Energy Efficient Home Performance Program - Home Renovation Rebate

Program Description	This collaborative program, administered by the Utility Partners, promotes energy-efficiency home upgrades, while educating homeowners on the value of whole home performance. Federal, provincial and local governments co-promote this program and other related initiatives, including consumer education, capacity building for the trades, home labeling, and NRCan's Home Energy Rating System.					
Target Market	Residential customers					
New vs Retrofit	Retrofit					
Partners	BC Hydro, FortisBC (Electric), BC Ministry of Energy, Mines and Petroleum Resources, Natural Resources Canada, and local governments.					
Eligible Measures	Draftproofing	Attic Insulation	Basement Insulation	Wall Insulation	$750 Bonus Offer	
Incremental Measure Cost	$989	$1,147	$1,463	$1,953	N/A	
Incentive Amount	Up to $500	Up to $600	Up to $1,000	Up to $1,200	$750	
Savings Per Participant	6.6 GJ	8.9 GJ	6.1 GJ	5.6 GJ	N/A	
Measure Life	6 years for draftproofing; 25 years for insulation					
Free Rider Rate	20%					
Sources of Assumptions	Dunsky Energy Consulting Analysis, 2013, 2015 - 2016 Analysis of installation costs from participant data, FEI, November 2016 Consultations with BC Hydro, 2010 Conservation Potential Review, ICF Marbek, 2010 and Dunsky Energy Consulting. Review of 2017 participant data and Analysis of Net-to-gross Survey Results for the ecoENERGY Retrofit for Homes program, Bronson Consulting Group, August 2010					
Participants	2017	Projected	Actual			
	Total	3,780	2,505			
Expenditures ($,000s)			Non-Incentives			
	2017	Incentives	Industry Support	Admin	Communication	Research & Evaluation	Total
	Total	1,391	78	277	15	164	1,925

Notes:

- This program is a collaboration between FEI, FBC, and BC Hydro, with support from MEM, and Natural Resources Canada.
- The "$750 Bonus Offer" also includes the Municipal Partner Offer (MPO), where eligible participants from participating municipalities received a $500 top-up. In 2017, there were 15 eligible MPO participants.
- Industry support includes FEI's application support fees to Energy Advisors and contribution to the Home Performance Stakeholder Council (HPSC). The HPSC is an industry led group comprised of key industry players tasked with addressing the fragmented interests, opportunities and challenges that exist in BC's continuously evolving home performance industry. Funding for the HPSC is supported by FEI, FBC, BC Hydro, and MEM.
- Administration expenditures include FEI's contribution to the development of an online application form with BC Hydro to enable an enhanced customer experience and faster rebate processing times.
- Research & Evaluation includes the development of a Program Registered Contractor framework for insulators, training for contractors, and site visits to assess program compliance.

Table 5-3: Furnace and Boiler Replacement Program

Program Description	The Furnace and Boiler Replacement program targets customers with functioning furnaces (standard or mid-efficiency) or boilers. Through a combination of marketing, incentives and industry outreach, the program encourages customers to replace the equipment immediately, rather than waiting for it to fail at some point in the future.						
Target Market	Residential customers						
New vs Retrofit	Retrofit						
Partners	N/A						
Eligible Measures	Standard efficiency	Mid - efficiency	Boilers				
Incremental Measure Cost	$1,840	$1,840	$3,540				
Incentive Amount	$500	$500	$500				
Contractor Incentive	$50	$50	$50				
Savings Per Participant	6.9 GJs	5.0GJs	8.7GJs				
Measure Life	Furnace & boilers - 18 years						
Free Rider Rate	Early Replacement Methodology						
Sources of Assumptions	Documentation of FortisBC Furnace and Boiler Early Replacement Program, FEI, February 2018 Furnace Replacement Pilot Program – Preliminary Evaluation Results, Sampson Research, May 2014 Furnace Early Replacement Program – Preliminary Evaluation Year 1 Pilot, Habart & Associates Inc. May 2013 MEASURES AND ASSUMPTIONS FOR DEMAND SIDE MANAGEMENT (DSM) PLANNING, Appendix C: Substantiation Sheets by Navigant Consulting, High Efficiency (Condensing) Furnace – Residential" KEMA Measure Life Study: HVAC, 4.1697.190 Furnace (90% AFUE or greater)						
Participants	2017	Projected	Actual				
	Total	3,730	5,951				
Expenditures ($,000s)			Non-Incentive Expenditures				
	2017	Incentives	Dealer Incentives	Admin	Communication	Research & Evaluation	Total
	Total	3,035	91	94	20	85	3,325

Notes:

- Based on industry feedback, the 2017 Furnace and Boiler Replacement program involved reducing the incentive from $800 to $500 in order to leave the program in market for a longer duration, which drove higher quality installations and allowed a greater number of customers to participate in the program.
- A greater emphasis was placed on Quality Installation. To be eligible for the rebate, the program required the installation of a two-pipe direct vent system. Contractors were required to sign a set of terms and conditions, pass site verification and agree to complete installations according to the best practices outlined in the *High-efficiency furnace installation guide for existing houses.* This guide was developed in collaboration with industry associations including the Thermal Environmental Comfort Association (TECA) and the Heating, Refrigeration and Air Conditioning Institute of Canada (HRAI), and was co-funded by FEI and MEM.
- Contractor incentives of $50 per participant are allocated to the administration portion of non-incentive spend.

Table 5-4: EnerChoice Fireplace Program

Program Description	This program promotes the purchase and installation of energy-efficient EnerChoice fireplaces for zone heating. The program educates consumers and dealers about the EnerChoice label and the benefits of selecting natural gas fireplaces based on energy-efficiency and heating attributes, rather than just decorative features. Program awareness and participation was promoted through a combination of customer and dealer incentives, and promotional activities.						
Target Market	Residential customers						
New vs Retrofit	Both						
Partners	N/A						
Eligible Measures	EnerChoice Fireplace						
Incremental Measure Cost	$132						
Customer Incentive	$300						
Contractor Incentive	$50 (Retrofit only)						
Savings Per Participant	EnerChoice Fireplace (Retrofit): 7.8GJ EnerChoice Fireplace (New Construction): 5.0GJ						
Measure Life	15 years						
Free Rider Rate	37%						
Spillover	14% (Retrofit only)						
Sources of Assumptions	2010 Conservation Potential Review, ICF Marbek, 2010 Fireplace Impact Evaluation, Sampson Research, 2015 AFER Study, Apartment Fireplace Efficiency Retrofit (AFER) Project, Building Energy Solutions, April, 2017 Regulatory Proposal (Sept 2016), Prepared by: Energy Efficiency Branch, BC Ministry of Energy and Mines Pre-Feasibility Study: Upgrades for Decorative Fireplaces-Ref: P132144JGW Analysis of 2017 Participant Data John Sampson Analysis, February 2017						
Participants	2017	Projected Total		Actual			
				Retrofit	New Construction	Total	
	Total	2,190		4,214	1,553	5,767	
Expenditures ($,000s)	2017	Incentives	Non-Incentives				Total
			Dealer Incentives	Admin	Communication	Research & Evaluation	
	Total	1,730	197	52	7	0	1,986

Notes:

- The FortisBC eligible EnerChoice fireplace directory must be direct-vented, temperature modulating and not have a standing pilot. These requirements support the BC Building Code and provincial policy.
- Contractor incentives of $50 per participant are allocated to the administration portion of non-incentive spend.
- In 2016, the Energy Efficiency Branch of the B.C. Government introduced a regulatory proposal to increase the standard of efficiency for fireplaces sold in B.C., which is currently expected to take effect on January 1, 2019. The regulatory change in increasing the fireplace minimum efficiency standards presents an opportunity for FEI to claim attribution savings, pursuant to the DSM Regulation, as a result of FEI's efforts towards advancing fireplace standards. FEI has estimated the current attributed savings is 133,000 GJ/yr as of 2017. Once the fireplace regulation is in effect, FEI will claim the attributed savings, make appropriate adjustments to program design, and note changes to the cost effectiveness inputs. The approach to reporting code and standards attribution savings, similar to reporting DSM program savings, will be done through the annual DSM report for each respective measure.

Table 5-5: Appliance Service Program

Program Description	This program provides customer education related to the importance of regular appliance maintenance to ensure efficient operation of natural gas appliances. This program also creates opportunities for contractors to dialogue with customers about upgrading appliances to more efficient models.					
Target Market	Residential customers					
New vs Retrofit	Retrofit					
Partners	N/A					
Eligible Measures	Furnace Service (61%), Fireplace Service (33%), Boiler (6%)					
Incremental Measure Cost	N/A					
Incentive Amount	$25 incentive per service; Average of $31 per participant					
Savings Per Participant	N/A					
Measure Life	N/A					
Free Rider Rate	N/A					
Participants (no. of services)	2017	Projected	Actual			
	Total	14,250	15,394			
Expenditures ($,000s)			Non-Incentives			
	2017	Incentives	Admin	Communication	Research & Evaluation	Total
	Total	385	25	21	15	447

Table 5-6: ENERGY STAR® Water Heater Program

Program Description	This program promotes the replacement of standard efficiency water heaters with efficient ENERGY STAR® models. As part of a longer term market transformation strategy, the program introduced 0.67 EF storage tank water heaters and new technologies with energy factors (EF) greater than 0.80. Additional technologies include condensing and non-condensing tankless water heaters, and condensing storage tanks. The program is available to both retrofit and new construction markets. The program supports upcoming federal and provincial Minimum Efficiency Act Standards for natural gas- and propane-fired water heaters.								
Target Market	Residential customers								
New vs Retrofit	Both								
Partners	N/A								
Eligible Measures	**ESTAR 0.67 EF Storage Tank**	**Non-Condensing Tankless**	**Condensing Tankless**	**Condensing Storage Tank**					
Incremental Measure Cost									
Retrofit	$416	$1,877	$2,837	$2,666					
New Construction	$250	$1,130	$1,700	$1,600					
Incentive Amount	$200	$400	$500	$1,000					
Savings Per Participant	3.0 GJ	6.9 GJ	9.5 GJ	6.9 GJ					
Measure Life	17.2 years								
Free Rider Rate	27%								
Sources of Assumptions	Energy Savings Assumptions Review (of multiple energy savings data sources), FEI, November 2014, revisited February 2018 including Final Report 0.67 Energy Star Water Heater Pilot Project, June 12, 2014 Deemed savings review of other jurisdictions Review of program participant data from 2017, FEI, February 2018 Review of Technical Reference Manuals from other jurisdictions applied to actual program measure installation data from 2017. FEI, February 2018 including BC Hydro Powersmart F13 Effective Measure Life and Persistence								
Participants	2017	Projected Total	Actual						
			ESTAR 0.67 EF Storage Tank		Non-Condensing Tankless		Condensing Tankless		Condensing Storage Tank	
			Retrofit	New	Retrofit	New	Retrofit	New	Retrofit	New
	Total	1,950	2,613	173	95	253	1,643	1,000	275	256
Expenditures ($,000s)			Non-Incentives				Total			
	2017	Incentives	Dealer Incentives	Admin	Comm.	Research & Evaluation				
	Total	2,549	225	60	0	0	2,834			

Table 5-7: Domestic Hot Water Conservation - Low Flow Fixtures and Washer Promotions

Program Description	The objective of this program is to reduce hot water consumption in houses, row houses and MURBS through partnerships with utilities or government. Initiatives include the installation of low-flow fixtures and ENERGY STAR® washers and dryers.					
Target Market	Residential customers					
New vs Retrofit	Retrofit					
Partners	BC Hydro, FBC, and Municipalities					
Eligible Measures	Low-Flow Fixtures; ENERGY STAR® Washers and Dryers					
ENERGY STAR Washers:						
Incremental Measure Cost	$77					
Incentive Amount	**Partnership with BC Hydro:** • $50 rebate (FEI contributes $25) on qualifying ENERGY STAR® clothes washers - IMEF of 2.82 to 2.91, and WF of 3.50 or less • $100 rebate (FEI contributes $75) on qualifying ENERGY STAR® clothes washers - IMEF of 2.92 or higher, WF of 3.20 or less **Partnership with FBC:** • $50 rebate (FEI contributes $25) on qualifying ENERGY STAR® clothes washers - IMEF of 2.74 to 2.91, and IWF of 3.50 or less • $100 rebate (FEI contributes $75) on qualifying ENERGY STAR clothes washers - IMEF of 2.92 or higher, IWF of 3.20 or less					
Savings Per Participant	1.0 GJ Natural Gas plus 0.25 GJ electric - BC Hydro					
Measure Life	14 years					
Free Rider Rate	20%					
ENERGY STAR Dryers:						
Incremental Measure Cost	$50					
Incentive Amount	**Partnership with BC Hydro:** • $100 rebate (FEI contributes $100) on qualifying ENERGY STAR® gas dryers - CEF of 3.93 or higher **Partnership with FBC:** • $100 rebate (FEI contributes $100) on qualifying ENERGY STAR Natural gas dryers					
Savings Per Participant	0.7 GJs					
Measure Life	12 years					
Free Rider Rate	20%					
Low Flow Fixtures:						
Incremental Measure Cost	100 showerheads were provided to the City of Vancouver for piloting their water conservation initiative.					
Incentive Amount						
Savings Per Participant						
Measure Life						
Free Rider Rate						
Sources of Assumptions	Review of Clothes Washer Technology Analysis, BC Hydro, 2010, 2010 Conservation Potential Review, ICF Marbek, 2010 and Technical Reference Manuals from other jurisdictions. Market Review, ESource, December 2014 and High Efficiency Natural Gas Laundry Dryers, Posterity Group and Sampson Research, December 2014 Consultation with program partners Ontario Power Authority "2010 Prescriptive Measures and Assumptions: Release 1" BC Hydro and FortisBC based on market share of eligible washers					
Participants	2017	Projected	Actual			
	Total	N/A	3,959			
Expenditures ($,000s)	2017	Incentives	Non-Incentives			Total
			Admin	Communication	Research & Evaluation	
	Total	269	6	1	-7	269

Notes:

- The Washer promotion was a collaboration with BC Hydro for a spring promotion in May-June and fall promotion in October-November. In addition, FEI collaborated with FBC from January to December.

Table 5-8: New Home Program

Program Description	This program provides education and financial incentives to support energy-efficient building practices for the Residential sector. This program supports efficiency updates to the BC Building Code (effective Dec. 2014). In June 2015, the utilities launched ENERGY STAR® for New Homes as the new whole home performance standard.					
Target Market	Builders of residential properties – single family homes and townhomes and homeowner builders					
New vs Retrofit	New Construction					
Partners	BC Hydro and FBC					
Eligible Measures	**ENERGY STAR® Single Family Dwellings**		**ENERGY STAR® TH/RH/Duplex**			
Incremental Measure Cost	$3,238		$1,873			
Incentive Amount	$2,000		$700			
Savings Per Participant	20.7 GJs		10.4 GJs			
Measure Life	25 years					
Free Rider Rate	15% for ENERGY STAR					
Sources of Assumptions	New Construction Costs and Savings and Life Cycle Costs, First published in 2011 and updated in 2014, Cooper and Habart, and Dunsky Energy Consulting ISE Consulting Group Analysis, March 2014 Analysis of program participants and data					
Participants	2017	Projected	Actual			
			SFD	Row/Townhome	Duplex	Total
	Total	1,338	52	9	2	63
Expenditures ($,000s)	2017		Non-Incentives			
		Incentives	Program Administration	Communication	Research & Evaluation	Total
	Total	109	90	3	18	220

Notes:

- FEI collaborates with BC Hydro and FBC on this program. As of January 2016, BC Hydro no longer offers incentives, although they continue to provide education to builders and energy advisors, and support policy regarding High Performance Homes in BC.
- The participant counts in this table are for the ENERGY STAR component of the program. Incentives for natural gas water heaters and fireplaces installed in new home construction are noted under their respective program tables.
- In 2017, FEI initiated plans to provide support for the adoption of the BC Energy Step Code within the New Home Program, as directed in the 2017 Amendment to the DSM Regulation, which supports utilities' ability to provide incentives for builders who adopt and comply with the Energy Step Code in municipalities across BC.

5.4 2017 Residential Energy Efficiency Programs Planned But Not Launched

5.4.1 CUSTOMER ENGAGEMENT TOOL

In Q4 of 2017, FEI and FBC conducted a Request for Information process for the Customer Engagement Tool (CET), in preparation for a 2018 Request for Proposal process to begin CET development.

5.4.2 ON-BILL FINANCING

On-bill financing initiatives have been found to be expensive and administratively burdensome, with low uptake rates. Partnerships with third party financial organizations supporting this initiative ended in 2017.

5.4.3 NEW TECHNOLOGIES

FEI continues to explore new technologies through the Innovative Technologies Program. There were no new technologies deployed in 2017.

5.5 Summary

Residential Energy Efficiency Program Area activity in 2017 resulted in over 137,000 GJ/year of natural gas savings. These programs enabled customers to upgrade appliances and capture energy savings, and continued to build on relationships with the trades for education and program awareness. The combination of financial incentives, policy support, contractor outreach, and effective marketing in these programs is instrumental to the ongoing success of these programs in generating natural gas savings and fostering market transformation in the residential sector.

6. LOW INCOME ENERGY EFFICIENCY PROGRAM AREA

6.1 Overview

During 2017, DSM investments in the Low Income Program Area grew by over 10% relative to 2016. This equates to 47,263 GJ in annual gas savings which is considerably higher than the 27,768 GJ in the 2014-18 DSM Plan.

Table 6-1 summarizes the planned and actual expenditures for the Low Income Program Area in 2017, including incentive and non-incentive spending, annual and NPV gas savings, as well as the cost-effectiveness test results. The TRC and MTRC for Low Income programs use a value of 140% of the benefits in accordance with the DSM Regulation.

Table 6-1: 2017 Low Income Program Results Summary

Program	Annual Gas Savings (GJ/yr.)		Actual NPV Gas Savings (GJ)	Utility Expenditures ($000s)						Benefit/Cost Ratios				
				Incentives		Non-Incentives		All Spending						
	2014-2018 DSM Plan	2017 Actual		2014-2018 DSM Plan	2017 Actual	2014-2018 DSM Plan	2017 Actual	2014-2018 DSM Plan	2017 Actual	TRC	MTRC	Utility	Participant	RIM
Non Program Specific Expenses														
Total	No Direct Savings			0	0	305	255	305	255	No Direct Savings				
Energy Saving Kit (ESK)														
Total	7,554	29,019	218,451	70	234	46	134	116	368	5.5	n/a	6.4	9.4	1.0
Energy Conservation Assistance Program (ECAP)														
Total	9,161	8,251	71,004	1,333	1,193	901	427	2,234	1,620	0.4	1.8	0.5	1.5	0.3
Residential Energy Efficiency Works (REnEW)														
Total	No Direct Savings			0	0	81	184	81	184			n/a		
Low Income Space-Heat Top Up														
Total	2,261	1,883	22,454	63	80	13	0	76	80	2.8	n/a	3.2	3.5	0.9
Low Income Water-Heating Top Up														
Total	661	353	3,036	10	9	5	0	15	9	3.2	n/a	3.7	4.1	0.9
Non-Profit Custom Program														
Total	8,131	0	0	302	0	119	34	421	34			n/a		
Rental Apt Efficiency (RAP) *Low Income Portion*														
Total	0	7,757	28,127	0	76	0	18	0	94			n/a		
ALL PROGRAMS														
Total	**27,768**	**47,263**	**343,071**	**1,778**	**1,592**	**1,469**	**1,052**	**3,247**	**2,644**	**1.2**	**2.1**	**1.4**	**2.9**	**0.7**

Notes:

- RAP includes a combination of residential and commercial measures for both low income-qualified and the able-to-pay rental apartment market, each funded from their respective Program Areas. RAP expenditures shown here are related only to the Low Income portion of RAP. Full RAP details are provided in Section 7.3.1, Table 7-10
- Cost effectiveness values for the *Low Income Portion* of RAP are not provided as they do not represent a complete program view. Please refer to Table 7-10 for the program's cost effectiveness results.

6.2 2017 Low Income Programs

Tables 6-2 through 6-7 outline the specific Low Income programs undertaken in 2017, including program and measure descriptions and a breakdown of non-incentive spending.

Table 6-2: Energy Saving Kit (ESK) Program

Program Description	The goal of this program is to reach a broad audience of Low Income customers and enable them to take some simple steps towards saving energy by installing a bundle of easy-to-install items that are delivered to their door. Promotional activities include bill inserts, event promotions such as food banks, targeted digital campaigns and partnerships with government ministries and non-profits that serve the low income population.					
Target Market	Low Income Residential Customers					
New vs Retrofit	Retrofit					
Partners	BC Hydro and FortisBC Inc. (FBC)					
Eligible Measures	Bundle of measures including high efficiency water fixtures, draft proofing tape, outlet gaskets, window film, etc.					
Incremental Measure Cost	$ 21.61 Average based on the full cost of the gas measures included in the ESK.					
Incentive Amount	$ 21.61 Since the program is free to participants, the incentive equals the incremental cost.					
Savings Per Participant	2.7 GJ per year					
Measure Life & Source	10 years - Average based on the individual gas measures included in the Energy Saving Kit					
Free Rider Rate & Source	0% - E Source Review of Low Income Net to Gross in other Jurisdictions : Low-income, Income Assisted Customers or Charitable Programs Oct. 30, 2017; BC Hydro, Oct. 30, 2017					
Participants	2017	Projected	Actual			
	Total	5,174	10,828			
Expenditures ($,000s)	2017	Incentives	Admin	Communication	Research & Evaluation	Total
	Total	234	38	96	0	368

Notes:

- Participation in the ESK Program is above the 2014-2018 DSM Plan and is aligned with recent years' participation although not quite as high as 2016.

Table 6-3: Energy Conservation Assistance Program (ECAP)

Partners	BC Hydro and FortisBC Inc. (FBC)					
Eligible Measures	Bundle of customized measures, which may include low-flow fixtures, water heater pipe wrap, professional draft proofing, outlet gaskets, window film, insulation, improved ventilation, CO detectors, and furnaces.					
Incremental Measure Cost	$627 Based on average cost of the customized bundle of measures installed. Includes the full cost of the gas measures installed in gas heated homes.					
Incentive Amount	$627 Since the program is free to participants, the incentive equals the incremental cost.					
Savings Per Participant	3.72 GJ per year					
Measure Life & Source	12 years - Average based on the individual gas measures installed.					
Free Rider Rate & Source	0% - E Source Review of Low Income Net to Gross in other Jurisdictions : Low-income, Income Assisted Customers or Charitable Programs Oct. 30, 2017; BC Hydro, Oct. 30, 2017					
Participants	2017	Projected	Actual			
	Total	1,645	2,218			
Expenditures ($,000s)	2017	Incentives	Admin	Communication	Research & Evaluation	Total
	Total	1,193	158	142	127	1,620

Notes:

- Participation in ECAP is above the 2014-2018 DSM Plan and saw the strongest participation in the Program since launch.
- In 2017 ECAP piloted furnace installations and duct sealing for the first time in manufactured homes.

Table 6-4: Residential Energy Efficiency Works (REnEW) Program

Program Description	The goal of this program is to enhance the energy efficiency trade sector in BC in a manner that also enhances communities. This program targets individuals facing barriers to employment and provides training in energy efficiency retrofitting. The training is delivered by industry experts at no cost to participants.					
Target Market	Low income individuals facing barriers to employment					
New vs Retrofit	N/A					
Partners	Ministry of Energy and Mines, FortisBC Inc. (FBC)					
Eligible Measures	N/A					
Incremental Measure Cost	N/A					
Incentive Amount	N/A					
Savings Per Participant	N/A					
Measure Life & Source	N/A					
Free Rider Rate & Source	N/A					
Participants	2017	Projected	Actual			
	Total	20	12			
Expenditures ($,000s)	2017	Incentives	Admin	Communication	Research & Evaluation	Total
	Total	0	148	4	32	184

Table 6-5: Low Income Space Heat Top Up

Program Description	The existing Commercial Space Heat Program offers rebates to commercial customers for the installation of high efficiency space heating equipment in commercial applications. The Low Income Space Heat Top Up Program is an add-on to the existing Commercial Space Heat Program and offers an additional rebate over and above the commercial rebate if the customer meets the eligibility criteria. Promotional activities include partnerships with BC Housing, BC Non-Profit Housing Association (BCNPHA), and the provincial and regional BCNPHA conferences, trade shows and educational seminars.					
Target Market	The Low Income Space Heat Top Up Program is primarily focused on apartment buildings that are owned or operated by a First Nations band, a non-profit housing provider, or a housing co-operative.					
New vs Retrofit	Both					
Partners	N/A					
Eligible Measures	Condensing boilers and mid-efficiency boilers.					
Incremental Measure Cost	$7,683 per appliance - Analysis of 2016 Program Participant Data, FEI, November, 2017 for Efficient Boiler, and Vendor Costing Survey, FEI, 2015 for Base Efficiency Boiler					
Incentive Amount	Condensing: $6/MBH Mid-efficiency: $3/MBH					
Savings Per Participant	129 GJ/yr - EBP Deemed Savings Analysis by FEI applying results from Update of Energy Savings Analysis From FortisBC Efficient Boiler Program – Final Report, August 2013, Prism Engineering.					
Measure Life & Source	20 years - Review of Technical Reference Manuals from other jurisdictions, FEI, 2017 including KEMA: Boilers & Burners 1.2796.040 High Efficiency Modulating Hot Water Boiler ASHRAE Equipment Life Tables					
Free Rider Rate & Source	0% -E Source Review of Low Income Net to Gross in other Jurisdictions : Low-income, Income Assisted Customers or Charitable Programs Oct. 30, 2017; BC Hydro, Oct. 30, 2017					
Participants	2017	Projected	Actual			
	Total	22	15			
Expenditures ($,000s)	2017	Incentives	Admin	Communication	Research & Evaluation	Total
	Total	80	0	0	0	80

Note:

- 2017 was the first full year with this program in market.

Table 6-6: Low Income Water Heating Top Up

Program Description	The existing Commercial Water Heater Program was launched in 2010 and it offers rebates to commercial customers for the installation of high efficiency water heating equipment in commercial applications. The Low Income Water Heater Top Up Program will piggyback on the existing Commercial Water Heater Program and offer an additional incentive over and above the commercial rebate if the customer meets the eligibility criteria. Promotional activities will include partnerships with BC Housing, BC Non-Profit Housing Association (BCNPHA), and the provincial and regional BCNPHA conferences, trade shows and educational seminars.					
Target Market	The existing Commercial Water Heating Program offers rebates to commercial customers for the installation of high efficiency water heating equipment in commercial applications. The Low Income Water Heating Top Up Program is an add-on to the existing Commercial Water Heating Program and offers an additional rebate over and above the commercial rebate if the customer meets the eligibility criteria. Promotional activities include partnerships with BC Housing, BC Non-Profit Housing Association (BCNPHA), and the provincial and regional BCNPHA conferences, trade shows and educational seminars.					
New vs Retrofit	Both					
Partners	N/A					
Eligible Measures	High Efficiency Storage Tanks, High Efficiency Domestic Hot Water Boilers, High Efficiency Tankless Domestic Hot Water					
Incremental Measure Cost	$4890 per appliance - Analysis of 2016 Program Participant Data, FEI, November, 2017 for Efficient Boiler, and Vendor Costing Survey, FEI, 2016 for Base Efficiency Boiler					
Incentive Amount	Storage tank water heater: $2/MBH Hot water supply boiler (84%-89.9% thermal efficiency): $1/MBH Hot water supply boiler (90%+ thermal efficiency): $2/MBH High-efficiency tankless water heater: $1/MBH					
Savings Per Participant	34 GJ/year per appliance - Energy Savings Assumptions Review (of multiple energy savings data sources), FEI, November 2014, revisited February 2018 including Final Report 0.67 Energy Star Water Heater Pilot Project, June 12, 2014 Deemed savings review of other jurisdictions A Canadian High-Efficiency Natural Gas Water Heater Pilot Project, Natural Gas Technologies Centre, July 2014					
Measure Life & Source	12 years -Review of Technical Reference Manuals from other jurisdictions applied to actual program measure installation data from 2017. FEI, February 2018, including BC Hydro Powersmart F13 Effective Measure Life and Persistence and MEASURES AND ASSUMPTIONS FOR DEMAND SIDE MANAGEMENT (DSM) PLANNING, Appendix C: Substantiation Sheets by Navigant Consulting					
Free Rider Rate & Source	0% - E Source Review of Low Income Net to Gross in other Jurisdictions : Low-income, Income Assisted Customers or Charitable Programs Oct. 30, 2017; BC Hydro, Oct. 30, 2017					
Participants	2017	Projected	Actual			
	Total	18	11			
Expenditures ($,000s)	2017	Incentives	Admin	Communication	Research & Evaluation	Total
	Total	9	0	0	0	9

Note:

- 2017 was the first full year with this program in market.

Table 6-7: Non-Profit Custom Program

Program Description	This program is designed to encourage social housing apartment buildings to replace inefficient equipment and systems with high-efficiency solutions. The program is built around three components: 1) An energy study: Currently there are two avenues available to non-profit housing providers to receive a free energy audit and study. Most participants are having their energy study performed by BC Non-Profit Housing Association (BCNPHA). Some participants are opting to go through the RAP Low Income program for these services. 2) Implementation support: Currently the implementation support is available through the RAP Low Income program. There is additional work still under development for this component of the program. Future implementation support could be offered to housing providers that have used BCNPHA for their energy study. 3) Incentives for Measures: At this point, it is only the Space Heat Top Up and the Water Heater Top Up measures that are available. Analysis is currently being performed on additional measures to offer additional incentives for.					
Target Market	The Non-Profit Custom Program is primarily focused on apartment buildings that are owned or operated by First Nations bands, non-profit housing providers, or housing co-operatives.					
New vs Retrofit	Both					
Partners	N/A					
Eligible Measures	Eligible measures include boilers and water heaters. Additional measures may in the future include items such as heating controls (i.e. zone controls, temperature set back controls, etc.) and potentially building envelope measures.					
Incremental Measure Cost	N/A					
Incentive Amount	N/A					
Savings Per Participant	N/A					
Measure Life & Source	N/A					
Free Rider Rate & Source	N/A					
Participants	2017	Projected	Actual			
	Total	12	2,347			
Expenditures ($,000s)	2017	Incentives	Admin	Communication	Research & Evaluation	Total
	Total	76	44	0	7	127

Note:

- In 2017 the Low Income Rental Efficiency Program (RAP Low Income) continued to address several of the objectives of the Non-Profit Custom Program. As well, additional development was completed including multiple meetings with key stakeholders to identify gaps, gaining clarity on the needs of the non-profit housing sector, and expanding the scope of the Non-Profit Custom Program to include more electrical measures by partnering with BC Hydro and FBC.

6.3 Summary

The Low Income Program Area has been an important priority for the Company since the initial creation of the DSM Program Principles. In 2017 all historical Low Income programs were operating at some of their highest participation levels to date and programs continue to evolve to include more energy efficiency opportunities for low income customers.

7. COMMERCIAL ENERGY EFFICIENCY PROGRAM AREA

7.1 Overview

In 2017, Commercial Energy Efficiency programs continued to encourage commercial customers to reduce their overall consumption of natural gas and associated energy costs. The Commercial Energy Efficiency Program Area reduced annual natural gas consumption by approximately 238,688 GJs and achieved an overall TRC of 0.8. $10.834 million was invested in Commercial Energy Efficiency, of which 82% was incentive spending. Table 7-1 summarizes expenditures for the Commercial Energy Efficiency Program Area in 2017, including incentive and non-incentive spending, annual and NPV gas savings, as well as TRC and other cost-effectiveness test results.

Table 7-1: 2017 Commercial Energy Efficiency Program Results Summary

Program	Annual Gas Savings (GJ/yr.)		Actual NPV Gas Savings (GJ)	Utility Expenditures ($000s)						Benefit/Cost Ratios				
				Incentives		Non-Incentives		All Spending						
	2014-2018 DSM Plan	2017 Actual		2014-2018 DSM Plan	2017 Actual	2014-2018 DSM Plan	2017 Actual	2014-2018 DSM Plan	2017 Actual	TRC	MTRC	Utility	Participant	RIM
Non Program Specific Expenses														
Total	No Direct Savings			0	0	1,100	554	1,100	554	No Direct Savings				
Space Heating Program														
Total	61,825	73,264	873,565	2,053	3,041	75	289	2,128	3,330	1.6	n/a	2.3	2.4	0.8
Water Heating Program														
Total	16,946	11,703	126,897	269	301	38	127	307	428	0.9	n/a	2.5	1.3	0.8
Commercial Food Service Program														
Total	17,802	10,078	86,723	392	287	108	147	500	434	1.0	n/a	1.7	2.1	0.7
Customized Equipment Upgrade Program														
Total	51,817	51,383	512,567	2,226	2,242	272	435	2,498	2,677	0.6	n/a	1.2	1.0	0.5
EnerTracker Program														
Total	0	0	0	0	0	0	0	0	0	n/a	n/a	n/a	n/a	n/a
Continuous Optimization Program														
Total	88,276	47,472	202,568	1,215	781	173	6	1,389	788	1.0	n/a	2.0	1.8	0.7
Commercial Energy Assessment Program														
Total	0	14,671	14,671	379	61	81	38	460	99	0.9	n/a	1.0	3.0	0.5
Energy Specialist Program														
Total	0	7,549	7,549	1,890	1,567	144	129	2,034	1,696	n/a	n/a	n/a	n/a	n/a
Commercial EDX/Portfolio Manager														
Total	0	0	0	0	0	0	79	0	79	n/a	n/a	n/a	n/a	n/a
Rental Apt Efficiency (RAP) *Commercial Portion*														
Total	0	22,569	82,264	0	568	0	183	0	751	n/a				
ALL PROGRAMS														
Total	**237,665**	**238,688**	**1,906,805**	**8,424**	**8,847**	**1,992**	**1,987**	**10,416**	**10,834**	**0.8**	**n/a**	**1.4**	**1.4**	**0.6**

Notes:

- FEI has not used the MTRC for Commercial programs as the low TRC value observed in the Customized Equipment Program is due in large part to timing between energy study payments and recording of implemented measures and thus recording of savings. Also see notes to Table 7-5.
- RAP includes a combination of residential and commercial measures for both low income-qualified and the able-to-pay rental apartment market, each funded from their respective Program Areas. RAP expenditures shown here are related only to the commercial portion of RAP. Full RAP details are provided in Section 7, Table 7-10.

- Cost effectiveness values for the Commercial portion of RAP are not provided as they do not represent a complete program view. Please refer to Section 7.3.1, Table 7-10 for the program's cost effectiveness results.

7.2 2017 Commercial Energy Efficiency Programs

The following tables outline the specific Commercial Energy Efficiency programs undertaken in 2017, including program and measure descriptions and a breakdown of non-incentive spending.

Table 7-2: Space Heat Program

Program Description	This program provides rebates for the installation of high efficiency space heating equipment in commercial applications. Currently only rebates for high efficiency boilers are offered. Rebates for condensing rooftop units may also be offered via the program in 2018.					
Target Market	Commercial					
New vs Retrofit	Both					
Partners	N/A					
	Retrofit		New Construction			
Incremental Measure Cost	$24,227		$21,541			
Incentive Amount	$13,641		$23,429			
Savings Per Participant	407 GJ		639 GJ			
Measure Life	20 years					
Free Rider Rate	18%					
Source of Inputs	EBP Deemed Savings Analysis by FEI applying results from Update of Energy Savings Analysis From FortisBC Efficient Boiler Program – Final Report, August 2013, Prism Engineering Analysis of 2016 Program Participant Data, FEI, November, 2017 for Efficient Boiler, and Vendor Costing Survey, FEI, 2015 for Base Efficiency Boiler Review of Technical Reference Manuals from other jurisdictions, FEI, 2017 including KEMA: Boilers & Burners 1.2796.040 High Efficiency Modulating Hot Water Boiler ASHRAE Equipment Life Tables Efficient Boiler Program Impact Evaluation, June 12, 2003					
Participants	2017	Projected	Actual			
	Total	204	203			
Expenditures ($,000)	2017	Incentives	Admin	Communication	Research & Evaluation	Total
	Total	3,041	289	0	0	3,330

Table 7-3: Water Heating Program

Program Description	This program provides rebates for the installation of high-efficiency commercial water heaters with thermal efficiencies greater than or equal to 84%.					
Target Market	Commercial					
New vs Retrofit	Both					
Partners	N/A					
	Retrofit	New Construction				
Incremental Measure Cost	$7,582	$15,065				
Incentive Amount	$1,824	$3,813				
Savings Per Participant	140 GJ	167 GJ				
Measure Life & Source	17 years					
Free Rider Rate & Source	38%					
Input Sources	Efficient Commercial Water Heater Evaluation – Final Report, Prism Engineering, February 2017. Analysis of 2016 Program Participant Data, FEI, November, 2017 for Efficient Boiler, and Vendor Costing Survey, FEI, 2016 for Base Efficiency Boiler. Review of Technical Reference Manuals from other jurisdictions, FEI, 2017 including MEASURES AND ASSUMPTIONS FOR DEMAND SIDE MANAGEMENT (DSM) PLANNING, Appendix C: Substantiation Sheets by Navigant Consulting. KEMA Measure Life Study. Efficient Commercial Water Heater Evaluation – Final Report, Prism Engineering, February 2017					
Participants	2017	Projected	Actual			
	Total	141	128			
Expenditures ($,000)	2017	Incentives	Admin	Communication	Research & Evaluation	Total
	Total	301	127	0	0	428

Table 7-4: Commercial Food Service Program

Program Description	This program offers a suite of rebates for the installation of high-efficiency cooking appliances and it may also provide other incentives relevant to commercial food service participants such as low-flow pre-rinse spray valve or faucet aerator installations.					
Target Market	Commercial					
New vs Retrofit	Both					
Partners	N/A					
	Retrofit	New Construction				
Incremental Measure Cost	$4,831	$5,461				
Incentive Amount	$2,695	$3,175				
Savings Per Participant	52 GJ	135 GJ				
Measure Life & Source	**Food Service** - 12 Years; **Pre-Rinse Spray Valve** - 5 Years; **Aerator** - 10 Years					
Free Rider Rate & Source	20%					
Input Sources	Commercial Food Service Incentive Program Evaluation, Final Report, Fish and River Consultants, February 2018. Food Service Incentive Program Study, Fisher_Nickel, Inc. (FNi), November 2011. Review of actual program data 2010 - 2016, FEI, February 2018. Program Cost Data Review, FEI, 2017 and Vendor costing survey 2017-2018. Review of TRMs from other jurisdictions, FEI, 2017 including KEMA Measure Life Study. Ontario Energy Board: OEB-2015-0344 New and Updated DSM Measures - Joint Submission from Union Gas Ltd. and Enbridge.					
Participants	2017	Projected	Actual			
	Total	490	103			
Expenditures ($,000)	2017	Incentives	Admin	Communication	Research & Evaluation	Total
	Total	287	101	1	45	434

Notes:

- In 2017 as part of the Commercial Food Service Program, FEI, in partnership with The City of Vancouver, offered a program to install low-flow pre-rinse spray valves (PRSV) and faucet aerators in food service establishments. Installation of 163 pre-rinse spray valves and 291 faucet aerators in the City of Vancouver occurred in 2017, however FEI has not paid any of the incentives and therefore is only claiming the associated GJs.
- The GJ savings from the PRSV and Food Service Program are blended and included in the average values for the retrofit market. The Incentive Amount and Incremental Measure Cost include the Food Service Program only as FEI was not billed for any PRSV installations in 2017.

Table 7-5: Customized Equipment Upgrade Program

Program Description	This program provides eligible customers with funding towards the completion of a detailed Energy Study, to identify energy saving opportunities specific and customized to their facilities, and subsequent capital incentive funding to encourage the implementation of any cost effective measures identified therein. The program seeks to capture energy savings associated with measures that are otherwise difficult to incent as part of a prescriptive program because they are complex, and one project may include multiple measures with interactive effects. The expected energy savings, measures, capital cost, incentives etc., will necessarily vary depending on the customer, though each project is submitted to a TRC test and must be approved by the utility.					
Target Market	Commercial customers					
New vs Retrofit	Both					
Partners	BC Hydro (New Construction) FortisBC (New Construction and Retrofit programs - Program development/testing stage)					
Eligible Measures	Utility funded energy study, and utility incented Energy Saving Measures as identified in the energy study and approved by the utility. Energy Saving Measures are variable.					
Incremental Measure Cost	Variable. Dependent upon participant's proposed Energy Saving Measures.					
Incentive Amount	If TRC ≥ 1.0 then $5 / discounted GJ saved over 50% of the Energy Measure Life (EML), up to 10 yrs.					
Savings Per Participant	Variable. Dependent upon participant's proposed Energy Saving Measures.					
Measure Life & Source	Variable. Dependent upon participant's proposed Energy Saving Measures.					
Free Rider Rate & Source	Variable. Dependent upon participant's proposed Energy Saving Measures.					
Participants	2017	Projected	Actual			
	Total	78	69			
Expenditures ($,000s)	2017	Incentives	Admin	Communication	Research & Evaluation	Total
	Total	2,242	430	0	6	2,677
Expenditures ($,000s)	2017	Incentives	Admin	Communication	Research & Evaluation	Total
New Construction	Total	340	54	0	6	400
Expenditures ($,000s)	2017	Incentives	Admin	Communication	Research & Evaluation	Total
Retrofit	Total	1,902	375	0	0	2,277

Notes:

- The Customized Equipment Upgrade Program is complex in nature and has variable measure savings, costs, incentives and/or cash flows that, unlike in prescriptive programs, occur over a period of years. Consequently, providing results for this program within an annual report format is challenging. In general, the savings in this program occur in later years after the participants have had the time to implement customized Energy Conservation Measures, while some program incentives and costs are payable at the outset. As a result, the TRC in 2017 appears low when considering only costs and savings in a single year. Please refer to the notes provided below for additional details.

- New Construction Program:
  - Participation in this program can last for approximately five years. This is broken down into approximately 24 months to prepare the required whole building energy simulation, followed by up to 36 months to build the proposed building. The program incurs incentive expenditures upon the successful completion of the energy simulation, as well as upon completion of the building, while natural gas savings are only obtained upon completion of the proposed building.
  - This program is in partnership with BC Hydro. Participants are recorded when the energy simulations or the new buildings are complete, and the incentive becomes payable.
  - The '2017 Actual' participants include 12 completed energy simulations, and two completed buildings with implemented measures. The associated natural gas savings from these two projects is approximately 9,912 GJ/year.
- Retrofit Program:
  - Participation in this program can last for approximately two years. This is broken down into approximately 6 months to prepare the required energy study, followed by 18 months to implement the proposed Energy Conservation Measures. The program incurs incentive expenditures upon the successful completion of the energy study, as well as upon installation of the approved Energy Conservation Measures, while natural gas savings are only obtained upon installation of the approved Energy Conservation Measures.
  - The '2017 Actual' participants includes 23 completed energy studies, and 21 projects where Energy Conservation Measures were installed. The associated natural gas savings from these 21 projects is approximately 65,652 GJ/year.

Table 7-6: Continuous Optimization Program

Program Description	The Continuous Optimization Program (C.Op) is designed to help commercial building owners identify and correct energy wasting operation faults, and continuously monitor building performance to help maintain and improve energy efficiency, resulting in reduced operating costs. C.Op is offered in partnership with BC Hydro. In the FortisBC electric service territory, C.Op is offered in partnership with FortisBC Inc. as the Building Optimization Program (B.Op). The program funds re-commissioning services to study the participant's building and recommend energy efficiency improvements, as well as access to an energy management information system (EMIS) to assist in tracking the building's performance after the re-commissioning work is complete. In return, participants must implement, at their costs, measures identified by the re-commissioning study that when combined have a payback period of two years or less.					
Target Market	Commercial customers with buildings >50,000 ft^2 who consume an average of 7,500 GJ of natural gas per year or natural gas is 40% of their building's total energy consumption.					
New vs Retrofit	Retrofit					
Partners	BC Hydro FortisBC					
Eligible Measures	RE/Retro-commissioning study, employee training, and "near time" energy consumption monitoring.					
Incremental Measure Cost	Average nominal program duration incremental cost (7 years): $41,275 2016 observed average implemented incremental cost: $31,303					
Incentive Amount	Average nominal program duration incentive amount (7 years): $15,915 2016 observed average implemented incentive amount: $19,527					
Savings Per Participant	Average expected annual natural gas savings: 1,465 GJ/year 2016 observed average implemented natural gas savings: 1,187 GJ/year					
Measure Life & Source	5 years - the duration of utility support for the energy management information system, plus one year.					
Free Rider Rate & Source	0% - BC Hydro					
Participants	2017	Projected	Participants Implementing in 2017	Cumulative Program Participants		
	Total	567	40	373		
Expenditures ($,000s)	2017	Incentives	Admin	Communication	Research & Evaluation	Total
	Total	781	6	0	0	788

Notes:

- The Continuous Optimization Program is conducted in partnership with BC Hydro. BC Hydro acts as the primary administrator of program activities, with FEI providing financial and process support for gas customer participants.
- Participation in this program lasts for approximately seven years for a typical participant. The seven years are composed of approximately 12 months of baseline data collection, 24 months of re-commissioning study work plus the implementation of a recommended bundle of energy conservation measures, and 48 months of monitoring and continuous improvement.
- Participants are recorded as soon as they are accepted into the program, however natural gas savings do not occur until they have completed the implementation of a recommended bundle of energy conservation measures, approximately 36 months later. As such, the program incurs incentive expenses (for the upgrading of meter equipment, re-commissioning costs and EMIS costs) before natural gas savings are obtained.

- The average nominal program duration incremental cost represents the total incremental cost expected to be incurred when an average participant completes the full 7 year run in the program. The 2017 observed average implemented incremental cost represents the incremental costs incurred specifically in 2017 divided by the total number of participants who implemented in 2017.

- The average nominal program duration incentive amount represents the total incentive expected to be paid when an average participant completes the full seven year run in the program. The 2017 observed average implementation incentive amount represents the incentive paid specifically in 2017 divided by the total number of participants who implemented in 2017. Due to the nature of the program, the incentive amount paid is not solely attributable to those who implemented in 2017.

- The average expected annual natural gas savings represent the expected annual natural gas savings per participant after they have completed the implementation of a recommended bundle of energy conservation measures. The 2017 observed average implemented natural gas savings represent natural gas savings attributed to customers who have completed the implementation of a recommended bundle of energy conservation measures specifically in 2017 divided by the total number of participants who implemented in 2017.

Participant count clarification:

- "2017 Actual" represents the number of new participants who were approved in 2017. There were no new participants because the current program is fully subscribed and closed to new participants.

- "Participants implementing in 2017" represents the number of participants who have successfully completed implementing the bundle of energy conservation measures in 2016.

- "Cumulative Program Participants" represent the total number of approved program participants from the entire multi-year duration. Program participants have the option to discontinue participation in the program during the multi-year duration. A number of program participants chose to discontinue participation in 2017 which, combined with the program being closed to new participants, resulted in a lower cumulative participation number than the previous year.

Table 7-7: Commercial Energy Assessment Program

Program Description	This program identifies inefficiencies at the participant's facilities via an on-site walkthrough assessment by an energy-efficiency consultant. The consultant then produces a report that describes the observed inefficiencies, outlines proposed solutions, and identifies any applicable incentive programs. FortisBC then forwards the report to the participant. Simple measures, such as low-flow faucet aerators and pre-rinse spray valves, are provided to the participant at no charge.					
Target Market	Medium commercial and small industrial customers with an average annual consumption between 1,500 and 10,000 GJ.					
New vs Retrofit	Retrofit					
Partners	FortisBC Inc.					
Incremental Measure Cost	$1,529					
Incentive Amount	$1,328					
Savings Per Participant	491.0 GJ					
Measure Life & Source	**Energy Assessment** - 1.17 Years - Conservative estimate based on the implementation of low-cost, simple recommendations (such as operational adjustments) from the energy assessment report, past spray valve program data and database for Energy Efficiency Resources (DEER). San Francisco, CA, California Public Utilities Commission, 2011. **Pre-Rinse Spray Valve** - 5 Years - KEMA – State of Wisconsin Public Service Commission of Wisconsin, Focus on Energy Evaluation, Ontario Energy Board, Measures and Assumptions for DSM Planning, February 6, 2009 **Aerator** - 10 Years - Terasen Gas TRC Model RES (3/4/2013) & Navigant Consulting, Measures and Assumptions For Demand Side Management Planning (April 16, 2009; Page C-102)					
Free Rider Rate & Source	35% - 2010 Friuch Energy Assessment Evaluation, past spray valve program data					
Participants	2017	Projected	Actual			
	Total	524	46			
Expenditures ($,000s)	2017	Incentives	Admin	Communication	Research & Evaluation	Total
	Total	61	38	0	0	99

Notes:

- At the time of writing the 2014-2018 DSM Plan, FEI was unsure whether the Provincial Government's Business Energy Advisor (BEA) program would continue or not. A contingency measure was planned for this program to ensure small businesses had access to energy analysis if the BEA program was discontinued. Participation from small business customers was foreseen in the 2014-2018 DSM Plan. As the BEA program was continued, the scope of the Commercial Energy Assessment Program was not expanded to include small businesses and the number of participants in 2017 is significantly less than was estimated in the 2014-2018 DSM Plan. In addition, a significant number of multi-family apartment customers now receive their energy assessments through the RAP Program.

Table 7-8: Energy Specialist Program

Program Description	This program funds Energy Specialist positions within customers' organizations, up to $60,000 based on an annual contract. Funded Energy Specialists' key priority is to identify and implement opportunities for their organization to participate in FortisBC's DSM programs, while also identifying and implementing non-program specific opportunities to use natural gas more efficiently. This program is funded as an enabling program.					
Target Market	Large Commercial and Institutional Customers					
New vs Retrofit	Retrofit					
Partners	BC Hydro, FortisBC Inc.					
Eligible Measures	Energy Specialist position					
Incremental Measure Cost	$60,000					
Incentive Amount	$60,000					
Savings Per Participant	Total 2017 (non-C&M program) annual natural gas savings = 7,549 GJ/ year					
Measure Life & Source	N/A					
Free Rider Rate	29% - Based on an evaulation study conduted in 2015 by Prism on projects that were outside of the incentive funding.					
Participants	2017	Projected	Actual			
	Total	32	31			
Expenditures ($,000s)	2017	Incentives	Admin	Communication	Research & Evaluation	Total
	Total	1,567	114	0	15	1,696

Notes:

- The Energy Specialist Program continues to experience success as an enabling program. In 2017, organizations with Energy Specialists were responsible for 45% of the natural gas savings and 48% of the incentives paid out by Commercial C&EM programs. This is in addition to the Conservation Education and Outreach, Innovative Technologies, Low Income, and Residential programs and incentives that Energy Specialists promoted and used in 2017.
- Some organizations had Energy Specialists for part of the year only as their funding agreements concluded and were not renewed.
- The energy savings listed only apply to natural gas projects completed by Energy Specialists in 2017 that did not directly receive incentive funding from another C&EM program. These energy savings are only reported and have not been included in the calculations for the benefit/cost tests, as the required inputs are not available.
- The energy savings of 7,549 GJs / year is an estimation submitted by Energy Specialists for savings that are not captured by C&EM programs. A third party review was undertaken on projects that claimed over 100 GJs saved. At the time of filing, only a portion of the evaluation study had been completed. Therefore, the savings that are claimed are partially verified by a third party, and projects that had not been fully reviewed yet were vetted for accuracy by FEI's internal engineering team at a high level.

7.3 2017 Programs with Joint Program Area Budgets

7.3.1 RENTAL APARTMENT EFFICIENCY PROGRAM (RAP)

RAP includes a combination of residential and commercial measures for both the low income and the able to pay rental apartment market, each funded from their respective Program Areas. This program is

specifically designed to overcome barriers to adopting energy efficiency measures otherwise experienced by rental building owners and their tenants, and includes expenditures from each of the Residential, Low Income and Commercial Program Areas. The expenditures and related savings for this program attributable to each program area are provided in Table 7-9 and correspond to the RAP expenditures shown in the Program Area Summary Tables for each of the three program areas.

Table 7-9: Rental Apartment Efficiency (RAP) – Full Program Summary

Program	Annual Gas Savings (GJ/yr.)		Actual NPV Gas Savings (GJ)	Utility Expenditures ($000s)						Benefit/Cost Ratios				
				Incentives		Non-Incentives		All Spending						
	2014-2018 DSM Plan	2017 Actual		2014-2018 DSM Plan	2017 Actual	2014-2018 DSM Plan	2017 Actual	2014-2018 DSM Plan	2017 Actual	TRC	MTRC	Utility	Participant	RIM
Rental Apt Efficiency (RAP) - Commercial Portion														
Total	0	22,569	82,264	0	568	0	183	0	751	0.9	n/a	0.9	2.9	0.8
Rental Apt Efficiency (RAP) - Low Income Portion														
Total	0	7,757	28,127	0	76	0	18	0	94	0.8	2.1	3.2	1.1	0.7
Rental Apt Efficiency (RAP) - Residential Portion														
Total	0	20,955	157,745	0	221	0	156	0	377	2.7	n/a	3.4	7.3	0.7
Overall Program														
Total	**0**	**51,281**	**268,136**	**0**	**864**	**0**	**357**	**0**	**1,221**	**1.4**	**n/a**	**1.9**	**3.4**	**0.8**

Table 7-10: Rental Apartment Efficiency (RAP)

Program Description	There are three components to the RAP program. The first component is to provide direct install in-suite energy efficiency upgrades. These devices will be installed by an agent of FortisBC into each individual rental suite. The second component is to provide those participants with energy assessments recommending building-level energy efficiency upgrades such as condensing boilers, high efficiency water heaters and control upgrades. The last component is to provide participants with support in implementing those energy efficiency recommendations and applying for rebates. Expenditures for RAP are budgeted within 3 program areas based on the in-suite versus the common area expenses. All the in-suite related expenses are budgeted in the Residential Program Area, while the common area related expenses are budgeted in the Commercial Program Area. This includes expenditures associated with the energy assessment, implementation support common area upgrades. For the low income rental customer all expenditures related to both the in-suite and common area expenses are budgeted in the Low Income Program Area.
Target Market	Purpose-Built Rental Apartment Buildings
New vs Retrofit	Retrofit
Partners	FortisBC Inc.
Eligible Measures	1.5 GPM Showerheads, 1.5 GPM Handheld Showerheads, 0.8 GPM Bathroom Aerators, 0.8 GPM Kitchen Aerators Walkthrough Energy Audits, Implementation Support, Condensing Boilers, Energy Efficiency Water Heaters
Incremental Measure Cost	Varies
Incentive Amount	Varies
Savings Per Participant	Varies
Measure Life & Source	Varies
Free Rider Rate & Source	Varies

Participants

2017	Total	Commercial	Low Income	Residential
Projected	0			
Actual	24206	183	2347	21676

Participants by Measure Type

	Commercial	Low Income	Residential
Non-SST 1.5 Showerhead		645	6056
Non-SST 1.5 GPM Handheld		86	1172
Non-SST 1.5 GPM Bathroom Aerator		818	7329
Non-SST 1.5 GPM Kitchen Aerator		769	7119
Energy Assessment Reports	130	25	
Implementation Support Partial	3		
Implementation Support Full	24	2	
Boiler Top Ups (40% of the rebate)		2	
Water Heaters	4		
Condensing Boilers	22		
Total	183	2,347	21,676

Expenditures ($,000s)

		Non-Incentives			
2017	Incentives	Admin	Communication	Research & Evaluation	Total
Commercial	568	121	51	11	751
Low Income	76	18	0	0	94
Residential	221	97	45	14	377
Total	864	235	96	25	1,221

7.4 Summary

Commercial Energy Efficiency Program Area activity in 2017 achieved approximately 238,688 GJ of annual natural gas savings and a TRC of 0.8. All programs continue to maintain steady performance in terms of participation, incentive expenditures and natural gas savings. Of particular note are the Space Heat Program and Commercial Custom Design Program, which remain cornerstone programs for the Commercial Program Area. These programs invested over $3 million and $2.2 million respectively in customers' natural gas efficiency projects in 2017. The programs continue to focus on generating natural gas savings and fostering market transformation in the commercial sector.

8. INNOVATIVE TECHNOLOGIES PROGRAM AREA

8.1 Overview

A primary objective of the Innovative Technologies Program Area is to identify market-ready technologies that are not yet widely adopted in British Columbia, and which are suitable for the development of or inclusion in the Portfolio of ongoing DSM programs in other Program Areas. This is accomplished through pilot and demonstration projects, pre-feasibility studies and the use of Industry Standard Evaluation, Measurement and Verification (EM&V) protocols to validate manufacturers' claims related to equipment and system performance. Results from Innovative Technologies activities are used in making future DSM programming decisions and technology inclusions.

Just as important as identifying new technologies that should be incorporated into the DSM Portfolio are findings that indicate which technologies should not. Section 8.3 summarizes how the activities and processes for the Innovative Technologies Program Area were successful in identifying proposed projects that should not proceed to full pilot phase or further.

All 2017 activities undertaken in this Program Area meet the definition of technology innovation programs as set out in the DSM Regulation. It should be noted that Innovative Technologies are considered a "specified demand-side measure"[10], meaning that the Program Area or the measures therein are not subject individually to a cost-effectiveness test. Instead the cost-effectiveness of these expenditures will be evaluated as part of the DSM portfolio as a whole.[11] Innovative Technologies expenditures are also not subject to the 40 percent cap on programs for which the MTRC is utilized as a cost-effectiveness measure according to Section 4 (4) of the DSM Regulation .[12]

Table 8.1 summarizes expenditures for the Innovative Technologies Program Area in 2017, including incentive and non-incentive spending, annual and NPV gas savings, as well as TRC and other cost-effectiveness test results where applicable.

[10] BCUC Log No. 36730, Request for Clarification of Order G-44-12 and Decision on the 2012 – 2013 Revenue Requirements Application and Natural Gas Rates Application

[11] Subsection 4(4) of the Demand-Side Measures Regulation, and the Decision on the 2012 – 2013 Revenue Requirements Application and Natural Gas Rates Application, page 175.

[12] BCUC Log No. 36730, Request for Further Clarification of Order G-44-12 and Decision on the 2012 – 2013 Revenue Requirements Application and Natural Gas Rates Application and the Commission's May 11, 2012 letter.

Table 8-1: 2017 Innovative Technologies Program Area Results Summary

Program	Annual Gas Savings (GJ/yr.)		Actual NPV Gas Savings (GJ)	Utility Expenditures ($000s)						Benefit/Cost Ratios				
				Incentives		Non-Incentives		All Spending						
	2014-2018 DSM Plan	2017 Actual		2014-2018 DSM Plan	2017 Actual	2014-2018 DSM Plan	2017 Actual	2014-2018 DSM Plan	2017 Actual	TRC	MTRC	Utility	Participant	RIM
Non Program Specific Expenses														
Total	No Direct Savings			n/a	0	n/a	375	n/a	375	No Direct Savings				
Pilot/Demonstration Projects														
Total	5,343	4,910	65,687	574	95	644	342	1,218	437	1.1	n/a	1.3	7.1	0.6
Studies														
Total	No Direct Savings			n/a	0	n/a	117	0	117	No Direct Savings				
ALL PROGRAMS														
Total	**5,343**	**4,910**	**65,687**	**574**	**95**	**644**	**833**	**1,218**	**928**	**0.5**	**n/a**	**0.6**	**7.1**	**0.4**

8.2 2017 Innovative Technologies Activities

Tables 8-2 outlines the specific Innovative Technologies Pilot activities undertaken in 2017, including program and measure descriptions and a breakdown of non-incentive spending.[13]

[13] As Innovative Technologies activities are considered pilots rather than DSM programs, they were not presented in individual program tables as in other Program Area sections in the Report.

Table 8-2: Pilots

Program Description	The Pilot Program focused on evaluating market-ready technologies and conducting small scale pilots to gather data to validate manufacturers' claims about measure system performance and energy savings. The data from pilots can also be used to help improve the quality and installation of future systems, and to understand and reduce market barriers. Technologies that successfully emerge from the Innovative Technologies Program will be considered for inclusion in the various program areas within the larger C&EM portfolio.					
Target Market	Variable					
New vs Retrofit	Retrofit					
Heat Reflector (HRP) Pilot	To assess energy savings, costing and customer acceptance data related to the installation of a Reflector Panel behind a perimeter heating system in rental MURBs. Energy saving details will be achieved through analysis of billing consumption data on a building level, costing data from the completion of 30 installations and customer acceptance from surveying all building managers at the end of the heating season. Results handed off to program area team Q2 2017.					
	2017	Participants				
	Total	30				
Smart Learning Thermostat Pilot	This joint pilot between FortisBC Energy Inc. and FortisBC Inc. is designed to gauge the customer acceptance and energy savings associated with smart learning thermostats where the results will inform future Demand Side Management (DSM) and Demand Response (DR) program offerings. Smart Learning Thermostat ("SLT") pilot focuses on the Nest, Ecobee3 and Honeywell Lyric products. The objectives of the pilot are to fill the information gaps identified with customer acceptance, costing and savings for SLTs for both natural gas and electric residential customers. The overall end goal is to provide usable results to the appropriate program teams for them to make a decision for next steps. Results are expected Q3 2019.					
	2017	Participants				
	Total	0				
Combination Space and Water Heating System (CURP) Pilot	Objectives of the pilot are to identify field-validated energy performance of each combination system type, technical issues, field-validated incremental costs, customer acceptance and the effective marketing channels for promoting a combination system retrofit rebate. The results will provide insight into a cost-effective rebate program for residential customers to upgrade their existing space and water heating equipment to combination systems. Results handed off to program area team Q2 2017.					
	2017	Participants				
	Total	0				
Participants	2017	Projected	Actual			
	Total	n/a	30			
Expenditures ($,000s)			Non-Incentive Expenditures			
	2017	Incentives	Admin	Communication	Research & Evaluation	Total
	Total	95	64	98	181	437

Notes:

- HRP Pilot participants were enrolled and reported in 2016, therefore no (new) participants reported in 2017.
- Participants and savings in the Smart Learning Thermostat Pilot will be attributed when final incentive payments are provided. No final incentive payments made in 2017, therefore no participants reported.
- CURP pilot wrapped up in 2017, therefore no (new) participants reported in 2017.

Tables 8-3 outlines the specific Innovative Technologies Study activities undertaken in 2017, including program and measure descriptions and a breakdown of non-incentive spending.

Table 8-3: Studies

Description	Studies are used to assess the market opportunity, technical characteristics and projected energy savings of commercially available DSM technologies. The results can be used to determine the feasibility of launching a pilot or to make future program area inclusion decisions.					
Target Market	Variable					
New vs Retrofit	N/A					
Direct Vent Wall Furnace Study Prefeasibility Study	Direct Vent Wall Furnaces are compact self-contained combustion units that are installed on exterior walls so that combustion by-products are discharged outside through a vent. Direct Vent Wall Furnaces can be a good alternative to central heating systems, especially if a home does not have existing ducting or is built on a concrete slab. The objective of the study was to investigate Direct Vent Wall Furnaces that can be installed to replace lower efficiency space heating systems and lower efficiency fireplaces in both new construction and retrofit applications for all suitable residential building types. The study was completed in Q3 2017.					
Web Enabled Thermostats Prefeasibility Study	Web-enabled programmable thermostats allow users to control temperature setbacks as well as HVAC controls remotely using the internet. A large number of thermostats can be controlled and programmed through a central portal. This allows commercial building owners to optimize the heating and cooling energy usage of their buildings without having to physically be at the property and/or without having to physically interact with each thermostats in their facility. The objective of the study was to assess the market opportunity, technical characteristics and projected energy savings for web-enabled programmable thermostats that can be installed in both new construction and existing commercial buildings for all suitable commercial building types across FortisBC's service territory. The study was completed in Q3 2017.					
Commercial Boiler Controls Prefeasibility Study	Boiler load controls can reduce the energy consumption of existing boiler systems, and are generally applied to hydronic building heating systems, although they can also be used for DHW systems and combination boilers. The control systems fall broadly into two categories, Boiler cycling controls which reduce the energy consumption of the boiler through a reduction in boiler cycling and Building zoning controls which is an automation systems that controls the quantity of heat provided to different zones within the building to reduce the overall heating energy provided. The objective of this study was to investigate combination of space heating boiler operation or set point adjustment controls, hot water distribution controls and occupied space heating controls for central gas fired boiler systems in commercial building. The study was completed in Q2 2017.					
Expenditures ($,000s)			Non-Incentive Expenditures			
	2017	Incentives	Admin	Communication	Research & Evaluation	Total
	Total	0	117	0	0	117

8.3 Summary

Innovative Technologies represent a key component of FEI's overall commitment to DSM activities by identifying viable technologies and projects that have the potential to support the development of new programs within the larger DSM Portfolio.

Overall, the Innovative Technologies initiatives successfully achieved results in evaluating the feasibility of new technologies and providing insights used towards the design of future DSM programs. The Innovative Technologies Program Area continues to use consistent criteria to ensure the greatest potential for screening technologies for further development as full programs in other areas of the DSM Portfolio.

9. INDUSTRIAL ENERGY EFFICIENCY PROGRAM AREA

9.1 Overview

In 2017, the Industrial Energy Efficiency Program Area continued to encourage industrial customers to consume natural gas more efficiently and achieved an overall TRC of 1.3, with a combined net natural gas savings of 105,516 GJ/yr. Table 9-1 summarizes expenditures for the Industrial Energy Efficiency Program Area in 2017, including incentive and non-incentive spending, annual and NPV gas savings, as well as TRC and other cost-effectiveness test results.

Table 9-1: 2017 Industrial Energy Efficiency Program Results Summary

Program	Annual Gas Savings (GJ/yr.)		Actual NPV Gas Savings (GJ)	Utility Expenditures ($000s)						Benefit/Cost Ratios				
				Incentives		Non-Incentives		All Spending						
	2014-2018 DSM Plan	2017 Actual		2014-2018 DSM Plan	2017 Actual	2014-2018 DSM Plan	2017 Actual	2014-2018 DSM Plan	2017 Actual	TRC	MTRC	Utility	Participant	RIM
Non Program Specific Expenses														
Total	No Direct Savings			n/a	n/a	262	150	262	150	No Direct Savings				
Industrial Optimization Program														
Total	122,474	103,429	982,135	1,609	1,558	447	330	2,056	1,888	1.3	n/a	4.9	0.7	2.2
Specialized Industrial Process Technology Program														
Total	67,826	2,086	24,875	584	56	81	5	665	61	1.1	n/a	3.9	1.3	0.9
ALL PROGRAMS														
Total	**190,300**	**105,516**	**1,007,011**	**2,193**	**1,614**	**789**	**485**	**2,983**	**2,099**	**1.3**	**n/a**	**4.5**	**0.7**	**2.0**

Note:

- For the purpose of cost-effectiveness tests, 105,516 GJ in savings has been claimed for 2017. As a project's total incentive can be made across multiple years, the annual natural gas savings are pro-rated based on the proportion of the project's incremental cost that is reported in that year. Please refer to the Industrial Optimization Program description below for further details on this methodology.

9.2 2017 Industrial Energy Efficiency Programs

Tables 9-2 and 9-3 show the Industrial Energy Efficiency Program Area activity undertaken in 2017, including program and measure descriptions and a breakdown of non-incentive spending.

Table 9-2: Industrial Optimization Program

Program Description	The program includes measures that allow customers to identify, assess, and implement customized cost-effective energy efficiency projects for industrial processes using natural gas as process heat or an energy source.					
Target Market	Medium and large industrial facilities					
New vs Retrofit	Both					
Eligible Measures	Variable. Natural gas measures with a TRC ≥ 1.0					
Incremental Measure Cost	Dependent upon participant's proposed energy conservation measures.					
Incentive Amount	Variable. Dependent on project characteristics.					
Savings Per Participant	Variable. Dependent on project characteristics.					
Measure Life & Source	Variable. Dependent upon participant's proposed energy conservation measures					
Free Rider Rate & Source	10% Technology Implementation; 20% Industrial Energy Audit, Plant Wide Audit, Feasibility Study. Source: Preliminary determination based on Commercial Performance Program: FEI (2010), Review of Technical Reference Manuals from Other Jurisdictions (Updated on a Project by Project Basis) and best jusdgement.					
Participants	2017	Projected	Actual			
	Total	31	24			
Expenditures ($,000s)	2017	Incentives	Admin	Communication	Research & Evaluation	Total
	Total	1,558	276	0	53	1,888

Notes:

- Participation in the program can span multiple years due to the timescales associated with completing an energy study, procuring and installing an energy conservation measure, and multi-year measurement and verification analysis.
- Measures include Industrial Energy Audit, Plant Wide Audit, Feasibility Study, and Technology Implementation. FEI is no longer accepting applications for the Energy Audit measure as this was replaced by the Plant Wide Audit and Feasibility Study measures in 2015. Energy Audit participants that completed energy studies and received incentives in 2017 are reported herein.
- The net natural gas savings reported in 2017 under the Industrial Optimization Program are solely attributable to projects implemented through the Technology Implementation measure. Natural gas savings from energy conservation measures identified, installed, but not receiving incentives through the Technology Implementation measure of the Industrial Optimization Program are not claimed at this time.
- In 2017, two Plant Wide Audits and thirteen Feasibility Studies were completed. Eleven projects progressed to Technology Implementation measure and are expected to save 290,792 GJ/yr. of natural gas once installed.
- Depending on the size of the incentive, Technology Implementation project incentive payments are either paid fully on project commissioning or are paid across several years after commissioning and based on the natural gas saving performance. Hence, for larger incentives, only a portion of the incentive is paid on project commissioning. For consistency in performing cost benefit analyses, only a prorated portion of the natural gas savings and project costs are included in the determination of the cost benefit ratios. In 2016, FEI reviewed and revised the proration methodology adopted in 2013. The revised methodology results in a more accurate reflection of program cost effectiveness by mitigating the risk of not fully reporting a project's incremental cost and more accurately presenting natural gas savings in a given year. The revised approach is used for the 2017 reporting period.

- In 2017, FEI worked to align the incentive and M&V approach for Technology Implementation projects signed between 2013 and 2016 with the approach adopted in 2016. This alignment was done to simplify the payment structure and condense the program participation period.

Table 9-3: Specialized Industrial Process Technology Program

Program Description	This program provides prescriptive incentives to Industrial customers to encourage the implementation of specific technologies and best practices targeted at particular industrial processes using natural gas as process heat or an energy source.					
Target Market	Small, Medium and Large Industrial Facilities					
New vs Retrofit	Both					
Incremental Measure Cost	Variable. Dependent on measure.					
Incentive Amount	Variable. Dependent on measure.					
Savings Per Participant	Variable. Dependent on measure.					
Measure Life & Source	Variable. Dependent on measure.					
Free Rider Rate & Source	20% - steam trap audit and replacement; 18% - hot water process boilers; 20% - steam boiler upgrades; 20% pipe insulation; 20% other measures. Sources: Preliminary determination based on Commercial Prescriptive Program (to be formalized in 2018). Efficient Boiler Program Impact Evaluation (2003). Specialized Industrial Process Technology Program business case					
Participants	2017 Total	Projected 18	Actual 3			
Expenditures ($,000s)	2017	Incentives	Admin	Communication	Research & Evaluation	Total
	Total	56	5	0	0	61

Notes:

- Applications for this measure are administered through the Commercial Program Area's Space Heating Program for efficiency, however participation counts, incremental costs, and natural gas savings are reported under the Specialized Industrial Process Technology Program.
- Incentive structure, natural gas savings methodology, and free ridership rates used for the hot water process boiler measure are sourced from the Commercial Program Area's Space Heating Program.
- FEI launched the steam trap audit and replacement, pipe and tank insulation, air curtains and direct contact water heater prescriptive measures in Q4 2017. Applications for these measures are administered under the Industrial Program Area. Due to the timing of the program release to market no applications were received in 2017.

9.3 Summary

The Industrial Energy Efficiency Program Area activity in 2017 resulted in 105,516 GJ/yr. of net natural gas savings and a TRC of 1.3. Enhancements to the Industrial Optimization Program have resulted in increased participation and greater natural gas savings in 2017 relative to 2016. Launching the Specialized Industrial Process Technology Program into market was a significant milestone as it represents the first time FEI has been able to support a customer consuming less than 10,000 GJ/yr. to implement high efficiency equipment for their industrial processes.

10. CONSERVATION EDUCATION AND OUTREACH INITIATIVES

10.1 Overview

The CEO Program Area continues to support the DSM Portfolio goals of energy conservation in a variety of ways. In order to foster a culture of conservation, several programs and campaigns were undertaken in 2017, providing new information about behaviour change and customer attitudes on efficiency. Educating all types of customers including residential, commercial and students – remains a strong priority and FEI is continuing to ensure steps are taken to make the information relevant and timely for these customers.

Continued collaboration with FBC was ongoing in 2017 to maximize efficiencies across both teams. Costs continue to be shared on school, residential and commercial outreach as applicable. The fourth annual Efficiency in Action awards were held recognizing natural gas commercial organizations that have most effectively utilized C&EM programs and achieved natural gas savings. FEI's partnership with BC Hydro continued in 2017. This included collaboration on the Energy Wise Network Program for commercial customers that led to over 80 natural gas behavior change projects being submitted in 2017 with a completion date of March 31, 2018. The multi-lingual outreach program, Empower Me, continued to reach new Canadians in nine languages through a community based social marketing approach. Empower Me received City of Surrey's Clean Energy City Award: Innovation in Energy Conservation & Efficiency, Community Category. A pilot initiative was also undertaken in 2017 using the Empower Me approach to reach multi-lingual small businesses.

CEO continued to provide information to customers and the general public on natural gas conservation and energy literacy and sought out new opportunities to reach customers face-to-face. In collaboration with FBC a new initiative was successfully piloted with small businesses in the shared service territory focused on face-to-face efficiency education. The development and testing phase for the curriculum-connected on-line resource initiative "Energy Leaders" for BC elementary and secondary school teachers was completed and the initiative moved to a full offering for teachers. Discovery for Grade 10-12 curriculum was completed. FEI also continues to support various training seminars and educational workshops in collaboration with such organizations as the Greater Vancouver Home Builders Association and other industry associations.

As these are not incentive-based programs, FEI has not attributed direct savings to them in 2017. The following tables do not contain information about eligible measures, incentive amounts, savings levels, free-ridership, spillover or participation levels. CEO costs are included at the Portfolio level and incorporated into the overall DSM Portfolio cost-effectiveness results. Although there were no energy savings attributed to the CEO Program Area in 2017, FEI continues to focus on behavioural change opportunities that lead to potential energy savings.

Table 10-1 summarizes expenditures for the CEO Program Area in 2017. The approved spending for 2017 was $2.400 million and actual spending in 2017 was $2,590 million.

Table 10-1: 2017 CEO Initiative Results Summary

Program	Annual Gas Savings (GJ/yr.)		Actual NPV Gas Savings (GJ)	Utility Expenditures ($000s)						Benefit/Cost Ratios				
				Incentives		Non-Incentives		All Spending						
	2014-2018 DSM Plan	2017 Actual		2014-2018 DSM Plan	2017 Actual	2014-2018 DSM Plan	2017 Actual	2014-2018 DSM Plan	2017 Actual	TRC	MTRC	Utility	Participant	RIM
Non-Program Specific Expenses														
Total	No Direct Savings			0	0	240	99	240	99	No Direct Savings				
Residential Education Program														
Total	No Direct Savings			0	0	990	1,480	990	1,480	No Direct Savings				
Commercial Education Program														
Total	No Direct Savings			0	0	450	449	450	449	No Direct Savings				
School Education Program														
Total	No Direct Savings			0	0	720	562	720	562	No Direct Savings				
ALL PROGRAMS														
Total	No Direct Savings			**0**	**0**	**2,400**	**2,590**	**2,400**	**2,590**	**No Direct Savings**				

10.2 2017 CEO Programs

Tables 10-2 through 10-4 outline the CEO initiatives undertaken in 2017. This includes program descriptions as well as a breakdown of spending, all of which is classified as "non-incentive spending".

Table 10-2: Residential Education Program

Program Description	This program provides information to Residential customers and the general public on natural gas conservation and energy literacy by seeking opportunities to engage with customers broadly and directly. This audience also included low income and multi-lingual customers. Promotional activities in 2017 included a multimedia general rebates awareness campaign, engagement campaigns as well as educational seminars and participation in home shows and community events. The Program also included the cost of production of materials for events and prizing for audience engagement that are utilized at events targeting Residential customers and children. In addition, continuing partnerships with the regional Canadian Home Builders' Associations and local sports organizations expanded outreach opportunities to engage with Residential customers. Furthermore, FEI continues to focus on behavioural change opportunities that lead to energy savings however we currently do not verify and report on those savings. Collaborations between internal departments and with other utilities and partners were sought to achieve cost efficiencies in the budget, particularly for advertising and for outreach events.					
Target Market	Residential customers and general public					
New vs Retrofit	Both					
Expenditures ($,000s)			Non-Incentive Expenditures			
	2017	Incentives	Admin	Communication	Research & Evaluation	Total
	Total	0	876	604	0	1,480

Table 10-3: Commercial Education Program

Program Description	This program provides ongoing communication and education about energy conservation initiatives as well as encourages behavioural changes that help Commercial customers reduce their organization's energy consumption. The Commercial sector is made up of small and large businesses in a variety of sub sectors such as retail, offices, multi-family residences, schools, hospitals, hospitality services and municipal/institutions. Promotional activities for 2017 included print and online communications, industry association meetings and tradeshows, award and development of face-to-face engagement opportunities specific to small businesses. Our fourth annual Efficiency in Action Awards, which recognizes Commurecial customers for their innovation in energy efficiency also took place. In addition, continuing partnerships with the Business Improvement Associations of BC (BIABC) and Climate Smart expanded outreach to small to medium-sized businesses. This program area continued to guide and support behaviour education campaigns delivered by energy specialists (or an energy manager) in their respective organizations. Collaborations between internal departments, FortisBC Inc. as well as with other utilities, were pursued to achieve cost efficiencies such as the Energy Wise Network joint initiative with BC Hydro.					
Target Market	Commercial customers, multi-family, energy specialists, energy management staff					
New vs Retrofit	Retrofit					
Expenditures ($,000s)			Non-Incentive Expenditures			
	2017	Incentives	Admin	Communication	Research & Evaluation	Total
	Total	0	190	250	9	449

Table 10-4: School Education Program

Program Description	This is an education program for students enrolled in [K-12] schools and post secondary schools in the Company's service area. This program now has an online resource for teachers directly linking to the K-9 curriculum. Other activities include assembly style presentations related to conserving energy for K-7 students, delivered internally through our Energy is Awesome presentations and externally through our BC Lions Energy Champions initiative. These activities also include distribution of energy efficient fixtures and colouring books. Partnerships and funding support for post-secondary activities included on-campus education campaigns.					
Target Market	Students and teachers					
New vs Retrofit	Retrofit					
Expenditures ($,000s)			Non-Incentive Expenditures			
	2017	Incentives	Admin	Communication	Research & Evaluation	Total
	Total	0	328	111	123	562

10.3 Summary

All of the initiatives described in CEO are designed to foster a culture of energy conservation in BC. This Program Area is important to deliver overall conservation messaging, support energy efficiency literacy and assist with increasing program awareness. By changing attitudes and behaviours, the Company will help communities reach their goals, help customers save energy and money, increase participation in DSM programs and ultimately support the shared goals of FEI and the Provincial Government. This Program Area continues to explore new ways and seek out new opportunities and channels to connect with customers to ultimately grow the culture of energy conservation.

11. ENABLING ACTIVITIES

11.1 Overview

In 2017, Enabling Activities continued to support and supplement FEI's DSM program development and delivery, advancing energy efficiency in British Columbia. This included:

- the ongoing Trade Ally Network Program;
- work completed in advancing national and provincial building codes, appliance/equipment standards, and regulations;
- maintenance of the Company's DSM program tracking system;
- completion of the Conservation Potential Review; and
- continued funding to support post-secondary energy management programs.

While these activities play a very important role in FEI's Portfolio of DSM activities by advancing the delivery of all Program Areas, the Company has not claimed any energy savings in 2017 for work completed in this area.

While no energy savings will be claimed for Enabling Activities in 2017, FEI identified energy efficiency savings from Codes and Standards advancement as part of the EnerChoice Fireplace Program. As discussed in Section 5.2, the BC government will implement the new standard for ensuring minimum fireplace efficiency in January of 2019. As such, FEI expects to claim these energy savings in 2018 when the new standard implementation is confirmed. No other opportunities to identify attribution savings were identified in 2017. FEI will continue to examine and, where appropriate, adopt methodologies for claiming energy savings from Codes and Standards for future programs. Table 11-1 summarizes the projected and actual expenditures for the Enabling Activities in 2017.

Table 11-1: 2017 Enabling Activities Results

Program	Annual Gas Savings (GJ/yr.)		Actual NPV Gas Savings (GJ)	Utility Expenditures ($000s)						Benefit/Cost Ratios				
				Incentives		Non-Incentives		All Spending						
	2014-2018 DSM Plan	2017 Actual		2014-2018 DSM Plan	2017 Actual	2014-2018 DSM Plan	2017 Actual	2014-2018 DSM Plan	2017 Actual	TRC	MTRC	Utility	Participant	RIM
Trade Ally Network														
Total	No Direct Savings			n/a	n/a	500	723	500	723	No Direct Savings				
Codes and Standards														
Total	No Direct Savings			n/a	n/a	35	184	35	184	No Direct Savings				
TrakSmart Maintenance														
Total	No Direct Savings			n/a	n/a	80	107	80	107	No Direct Savings				
Conservation Potential Review														
Total	No Direct Savings			n/a	n/a	0	54	0	54	No Direct Savings				
Commercial End-Use Study														
Total	No Direct Savings			n/a	n/a	30	0	30	0	No Direct Savings				
New Homes Study														
Total	No Direct Savings			n/a	n/a	30	0	30	0	No Direct Savings				
Home Energy Efficiency Web Portal														
Total	No Direct Savings			n/a	n/a	100	0	100	0	No Direct Savings				
Energy Management Education Funding														
Total	No Direct Savings			n/a	n/a	150	114	150	114	No Direct Savings				
ALL PROGRAMS														
Total	No Direct Savings			**n/a**	**n/a**	**925**	**1,181**	**925**	**1,181**	No Direct Savings				

11.2 2017 Enabling Activities by Program

The following tables outline the specific Enabling Activities undertaken in 2017 by activity, including activity descriptions and a breakdown of spending. Note that all expenditures under Enabling Activities are considered non-incentive spending.

Table 11-2: Trade Ally Network

Program Description	This program develops and manages a contractor network to promote DSM programs and energy-efficiency messaging. FEI identifies trade allies as equipment manufacturers, service contractors, and distributors, and recognizes the influence these industry groups have with the end-use Residential and Commercial customers who make energy-efficiency decisions. This program also supports funding energy efficiency training as outlined in the DSM Regulation.				
Expenditures ($,000s)	2017	Admin	Communication	Research & Evaluation	Total
	Total	178	523	22	723

Table 11-3: Codes and Standards

Program Description	Utilities have a unique understanding of energy supply and customer demand cycles, which can be of assistance in the development of codes and standards. The content and timing of code implementation directly affects market transformation in all program areas. FEI's level of regulatory involvement typically includes one of three involvement classifications: monitoring, stakeholder engagement and developing regulations. The Codes & Standards area "supports the development of or compliance with specified standard or a measure respecting energy conservation or the efficient use of energy" as referred to in the definition of "specified demand-side measures" in the DSM Regulation.
Policy Initiatives consultation process	Evaluation, analysis and review of national, provincial and municipal initiatives for energy efficiency.
Industry consultation process	Collaboration with entities like BC Hydro and the Home Owner Protection Office (HPO) for the development of industry training and guidelines on implementation of new energy efficiency measures. Participation with the BC Safety Authority Gas Technology Committee industry stakeholder group.
Involvement with supporting projects	Active participation for supporting projects like: the Natural Resources Canada new EnerGuide rating system and Leadership in Energy Efficiency Partnerships (LEEP).
Codes and Standards Strategy	Active participation on the Canadian Standards Association (CSA) Strategic Steering Committee on Fuel Burning Equipment. This committee is the highest level committee in the fuel sector at CSA and oversees all committees and sub-committees in the fuel burning sector. Consultation with the Canadian Gas Association (CGA), Canadian Institute of Plumbing and Heating (CIPH), Heating Refrigeration and Air-conditioning Institute (HRAI) and the Canadian Home Builders Association (CHBA) on codes and regulations that are common to our industries. Research on the new provincial performance path for residential and commercial buildings i.e. the BC Energy Step Code was conducted. The research study focused on understanding technical changes to traditional building approaches, along with the economic impacts of building to the step code tiers including choices of mechanical and HVAC systems.
Codes and Standards Maintenance	Active participation on the CSA Technical Committee on Energy Efficiency and Related Performance of Fuel-Burning Appliances and Equipment. This committee oversees all of the eleven existing performance standards for gas-fired equipment and is looking to develop new needed standards for equipment. Participation in the Standards Council of Canada, committee on Domestic gas cooking appliances ISO/TC 291.
Internal awareness of Code and Regulatory changes	Development of internal documents and updates for relevant program areas and personnel.
Standards library	Purchase of up to date testing standards and up to date building codes for reference.
Expenditures ($,000s)	2017 Admin Communication Research & Evaluation Total Total 78 2 104 184

Table 11-4: TrakSmart Maintenance

Program Description	Ongoing IT license and maintenance costs related to the portfolio DSM tracking system.				
Expenditures ($,000s)	2017	Admin	Communication	Research & Evaluation	Total
	Total	107	0	0	107

Table 11-5: Conservation Potential Review

Program Description	FEI considers the CPR to be an important tool for use in developing, supporting, and assessing current and future DSM expenditure applications, as well as for directional input into program development. The purpose of a CPR study is to examine available technologies and determine their conservation potential, which includes the amount of energy savings that can be achieved through energy-efficiency and conservation programs over the study period. This project was worked on in collaboration with BC Hydro, Pacific Northern Gas and FortisBC Electric. Core work on the CPR began in 2015 and continued through 2016. The CPR econonmic potential and market potential reports were completed in 2017.				
Expenditures ($,000s)	2017	Admin	Communication	Research & Evaluation	Total
	Total	54	0	0	54

Table 11-6: Energy Management Education Funding

Program Description	Funding to support post-secondary energy management programs such as the UBC Master of Engineering Leadership Program in Clean Energy Engineering and the BCIT Sustainable Energy Management Advanced Certificate.				
Expenditures ($,000s)	2017	Admin	Communication	Research & Evaluation	Total
	Total	114	0	0	114

11.3 2017 Enabling Activities Planned But Not Launched

11.3.1 HOME ENERGY EFFICIENCY WEB PORTAL

FEI's vision for the Home Energy Efficiency Web Portal has changed over time. In 2017, through Innovative Clean Energy (ICE) funds provided by the BC government, the BC Home Energy Coach service was established. BC residents can phone or email this free service to receive information on how to improve energy efficiency in their home. A database of province-wide incentives are included as part of this initiative, which fulfils the original objectives of the

Home Energy Efficiency Web Portal project.[14] Given the Province's implementation of the Home Energy Coach service, FEI will no longer be pursuing the Home Energy Efficiency Web Portal.

11.3.2 RESIDENTIAL END USE STUDY (REUS)

The REUS provides a snapshot of the FEI Residential customer base. It provides information about the building characteristics, the fuel choice for heating, cooling and cooking, the types and ages of installed appliances, energy-use behaviours, and customer attitudes towards energy issues. The REUS also includes a billing analysis to determine natural gas consumption by appliance type. The study was originally forecast to take place in 2016. Initial scoping for the study was started in 2016. The questionnaire was drafted and the study was fielded in 2017. The report will be delivered in 2018. C&EM's portion of the costs will be incurred upon the report being delivered in 2018.

11.3.3 COMMERCIAL END USE STUDY (CEUS)

The CEUS provides a snapshot of the FEI Commercial customer base including multi-family residential buildings. The survey collects information about the building, the business(es) occupying the building, the fuel choice for heating, cooling and cooking, the types and ages of appliances installed, energy-use behaviours, and customer attitudes towards energy issues. The CEUS was originally forecast to take place in 2017 but that timing was changed and the study was conducted in 2014. Reporting of the CEUS expenditures were included in the FortisBC Energy Utilities 2014 Energy Efficiency and Conservation Annual Report. The next CEUS is expected to be conducted in 2019.

11.3.4 NEW HOMES STUDY

The New Homes study was not completed in 2017 as the objectives for New Homes research changed over time. In 2017, significant resources supported the introduction and adoption of the BC Energy Step Codes, which remove the need for the New Homes Study as originally intended.

11.4 Summary

Enabling Activities are critical initiatives that support and supplement DSM program development and delivery. The success of the Residential Furnace Replacement Program (see Section 5.3, Table 5-3), which was promoted through the contractor network, demonstrates the value of the Trade Ally Network Program. Communications were immediate and responsive through the network and at the end of the program, 72 percent of the program's participants used contractors who were members of the Trade Ally Network.

FEI's involvement in codes and standards work in 2017 continued to encompass varying degrees of activities including monitoring, reviewing and responding to existing and proposed

[14] More information can be found at www.BCEnergyCoach.ca.

regulatory changes and direct participation in various working groups that explore the development of future targets, codes and standards. The Conservation Potential Review Economic and Market Potential reports were finalized in the first half of 2017. This project involved a collaboration between BC Hydro, Pacific Northern Gas, FEI and FBC.

12. EVALUATION

In alignment with the Company's EM&V Framework and industry standard practice, program evaluation activities are assessed at different stages of each program's lifecycle.[15] Based on this ongoing assessment, all programs are evaluated when appropriate. The 2017 evaluation activities presented here reflect the number of programs in market, the different stages of their lifecycle, and the type of evaluation activities required to provide program feedback.

12.1 2017 Program Evaluation and Evaluation Research Activities

In 2017, FEI's various evaluation activities included quantifying energy savings, assessing participant awareness and satisfaction, identifying barriers to participation, assessing customer usability and engagement with various FEI DSM outreach activities, and conducting industry research. Measurement and Verification (M&V) activities focused on identifying and verifying project and measure level savings assumptions and understanding any issues associated with equipment installation in the field.

Table 12-1 provides a summary of all program evaluation and evaluation research related activities undertaken in 2017. Expenditures for these activities have been accounted for within the applicable program or Program Area non-incentive costs included in previous sections, but are also reported here in order to provide a concise, easy-to-view summary of evaluation activities. Included in the table are: a list of all the 2017 evaluation activities; the Program Area each activity occurred in; the general type of evaluation activity undertaken; the Company's actual 2017 evaluation expenditures; and a status update on each activity. The total expenditure for program evaluation and research activities in 2017 is approximately $703,000.

[15] Types of evaluation activities include: Communications evaluations, which focus on advertising and media outreach; Evaluation studies, where quality assurance or inspection is conducted to gain more insight on the incented measure; Market studies, research and interviews with industry stakeholder to assess market penetration; Process evaluations, where surveys and interviews are used to assess customer satisfaction and program success; Impact evaluations, to measure the achieved energy savings attributable from the program; Market Analysis, to characterized the industry and the program's effect on market penetration and, Measurement & Verification, to monitor real time energy savings associated with energy conservation measures.

1 **Table 12-1: Inventory of DSM Program Evaluation and Evaluation Research Activities Conducted in 2017**[18]

Evaluation Name	Program Area	Type of Evaluation	Years the program has been running [19]	Evaluation Partnership	Actual Evaluation Expenditure (000's)	Evaluation Status [20]
FortisBC Communication Tracking: Energy Efficiency Conservation	C&EM Portfolio	Communication	ongoing	none	$3	Customer engagement and awareness of C&EM activities. **Completed October 2017 by Sentis Research**
C&EM Rebates UX Testing	C&EM Portfolio	Communication	ongoing	none	$7	Usability testing of the rebates section of FortisBC.com website. **Completed July 2017 by FortisBC**
Review of Net-to-Gross Assumptions (FEI & FBC Energy Efficiency Programs)	C&EM Portfolio	Evaluation Study	none	FortisBC Energy Inc. & FortisBC Inc.	$13	Review of net-to-gross (NTG) methods, data sources, and assumption used by FortisBC to ensure alignment with the industry best practices. **Completed December 2017 by Sampson Research**
Contractor Research Survey	Residential	Process	Ongoing	FortisBC Energy Inc. & FortisBC Inc.	$37	Survey with program participants and non-participants within the Contractor community. **Completed May 2017 by Participant Research and Sentis Research Inc.**
Appliance Maintenance Rebate Program -Evaluation 2017	Residential	Process	8	none	$15	Quantitative research study among 2017 program participants to assess the program and gather feedback for future program design. **Expected completion by Q2 2018**
Evaluation & Contractor Outreach	Residential	Evaluation Study	1	none	$1	Educating contractors on best practices based on learnings from the Home Energy Rebate Offer (HERO) Quality Study of Insulation evaluation study completed May 2016 and reported in the 2016 Annual Report.
Home Renovation Rebate Program - Insulation & Program Compliance Site Visits	Residential	Evaluation Study	3	none	$56	Ongoing site visit of homes with insulation and draft proofing measures with a focus on quality assurance and program compliance.
Program Registered Contractor Training	Residential	Evaluation Study	Ongoing	none	$17	Ongoing contractor training to provide installation best practices and ensure quality workmanship.
Furnace Replacement Program - Participant Survey	Residential	Process	5	none	$28	Quantitative research study among 2016 program participants to assess customer satisfaction and gather feedback for future program design. **Completed July 2017 by Sentis Research Inc.**
Furnace Replacement Program - Market Evaluation for Quality Installation	Residential	Market Study	5	none	$8	Market assessment to gather feedback and recommendations for furthering quality installation of furnaces. **Expected completion by Q2 2018**

2

[18] Table 12.1 does not include Prefeasibility Studies. Please refer to the Innovative Technologies section (Section 8) for details.

[19] Measurement & Verification studies require time to conduct activities which include, but are not limited to, project commissioning, installing and removal of monitoring equipment, data collection and, data analysis and reporting. The column 'Years the program has been running' will refer to the time required to conduct the M&V activities. M&V activities align with the International Performance Measurement and Verification Protocol (IPMVP). Concepts and Options for Determining Energy and Water Savings. Prepared by the Efficiency Valuation Organization: www.evo-world.org. January 2012.

[20] M&V completion refers to the time period where the actual monitoring and data collection ends. Analysis and reporting will require additional time

Table 12-1: Inventory of DSM Program Evaluation and Evaluation Research Activities Conducted in 2017 (continued)

Evaluation Name	Program Area	Type of Evaluation	Years the program has been running [19]	Evaluation Partnership	Actual Evaluation Expenditure (000's)	Evaluation Status [20]
Furnace Replacement Program - Quality Assurance & Program Compliance Site Visits	Residential	Evaluation Study	5	none	$48	Ongoing site visit of homes with furnace/boiler upgrades with a focus of quality assurance and program compliance.
Rental Apartment Efficiency Program (RAP) - Evaluation 2016	Residential / Commercial	Process	2	FortisBC Energy Inc. & FortisBC Inc.	$3	Building owner and Tenant survey for program evaluation with 2015 and 2016 program participants. **Completed December 2016 by Cohesium Research. Results reported in 2016 Annual Report**
Rental Apartment Efficiency Program (RAP) - Evaluation 2017	Residential / Commercial	Evaluation Study	2	none	$3	Ongoing performance testing for RAP participants.
Rental Apartment Efficiency Program (RAP) - Evaluation 2017	Residential / Commercial	Process	2	FortisBC Energy Inc. & FortisBC Inc.	$19	Building owner and Tenant survey for program evaluation with 2017 program participants. **Expected completion by Q1 2018**
Low Income General Survey	Low Income	Process	ongoing	none	$60	Survey and interviews were conducted to gather feedback for low income program design and marketing strategies. **Completed February 2017 by Participant Research and Sentis Research Inc.**
Energy Conservation Assistance Program (ECAP)	Low Income	Evaluation Study	6	FortisBC Energy Inc. and BC Hydro	$60	Ongoing Quality Assurance to ensure products are installed according to program policies and procedures.
Energy Conservation Assistance Program (ECAP) - Overall Program Evaluation 2017	Low Income	Process & Impact	6	FortisBC Energy Inc. and FortisBC Inc.	$28	Participant survey and monthly consumption usage conducted for the program. **Expected completion by Q2 2018**
Energy Conservation Assistance Program (ECAP) - Ongoing Feedback Survey	Low Income	Process	6	FortisBC Energy Inc. and BC Hydro	$3	Ongoing survey with program participants to gather frequent and ongoing feedback on customer experience, satisfaction with the program and its program evaluators.
Energy Specialist Program - Evaluation 2017	Commercial	Process & Impact	8	FortisBC Energy Inc. & FortisBC Inc.	$15	The evaluation study includes program and industry stakeholder surveys and an energy savings audit on a subset of completed 2017 projects. **Expected completion by Q2 2018.**
Commercial Food Service Incentive Program - Evaluation 2017	Commercial	Process & Impact	6	none	$45	The evaluation consisted of a participant survey and energy impact analyses of the program from 2012 to 2016 **Completed December 2017 by Fish+River Consultants**

Table 12-1: Inventory of DSM Program Evaluation and Evaluation Research Activities Conducted in 2017 (continued)

Evaluation Name	Program Area	Type of Evaluation	Years the program has been running [19]	Evaluation Partnership	Actual Evaluation Expenditure (000's)	Evaluation Status [20]
Combination Space/Water Heating Units Pilot	Innovative Technologies	Process & Impact	3	none	$51	Combination of surveys with program participants and contractors, and analysis of the monthly consumption usage pre and post installation. **Completed July 2017 by Sampson Research**
Smart Learning Thermostat Pilot	Innovative Technologies	Measurement & Verification	1	FortisBC Energy Inc. & FortisBC Inc.	$54	Gauging customer acceptance and energy savings associated with smart learning thermostats. **Expected completion Q3 2019**
Heat Reflector Pilot (HRP)	Innovative Technologies	Evaluation Study & Measurement & Verification	2	none	$76	Customer survey, thermal imaging, equipment recording, and analysis of the consumption usage pre and post installation. **Completed November 2017 by RDH Building Science**
Industrial Optimization Program	Industrial	Measurement & Verification	6	none	$53	M&V was conducted on 14 projects in 2017 of which 2 completed its M&V requirements. The M&V activities include the completion of an M&V plan, commissioning validation site visits, and M&V reports.

Table 12-2 contains a summary of all program evaluation studies and pilot program reports completed in 2017 and includes a brief description of the methodologies and key findings.

Table 12.2: Summary of Key Findings and Methodology for 2017 Completed DSM Program Evaluation Studies and Pilot Program Reports

Evaluation Name	Program Area	Type of Evaluation	Methodology	Outcome from Key Findings
FortisBC Communication Tracking: Energy Efficiency Conservation	C&EM Portfolio	Communications	Online interviews conducted with 800 British Columbia adults living within the FortisBC service territory.	**Results:** The percentage of participants had aided awareness of at least one of the three main energy efficiency activities undertaken by FortisBC trended upward from 66% in 2016 to 78% in 2017. The engagement index was redefined to provide greater differentiation between levels of engagement. Overall, nearly three-quarters of participants were at least moderately engaged, four-in-ten were extremely or highly engaged. **Outcome of Key Findings:** Continue to emphasize the overarching energy efficiency activities rather than individual programs to build awareness.
C&EM Rebates UX Testing	C&EM Portfolio	Communications	One-on-one user testing sessions with both Commercial and Residential customers.	**Results:** Improvements identified for the web page particularly in regard to search functionality and the use of imagery to guide customers. **Outcome of Key Findings:** As a results of the study, improvements were made to the rebates section of the corporate website.
Review of Net-to-Gross Assumptions (FEI & FBC Energy Efficiency Programs)	C&EM Portfolio	Evaluation Study	Interviews with FortisBC program managers and evaluation specialists, review of program evaluations, market research, and other FortisBC internal documents and industry literature review.	**Results:** Net-to-Gross methods were identified and best practice methods were recommended. **Outcome of Key Findings:** The results of the study will help inform future program evaluations.

Table 12-2: Summary of Key Findings and Methodology for 2017 Completed DSM Program Evaluation Studies and Pilot Program Reports (continued)

Evaluation Name	Program Area	Type of Evaluation	Methodology	Outcome from Key Findings
Contractor Research Survey	Residential	Process	Telephone surveys were conducted with 119 program participants and 100 non-participant contractors between March 16 to April 7, 2017. Six focus groups sessions were held in Coquitlam, Kelowna and Prince George. 13 program participants and 13 non-participants attended the sessions between April 12 to April 20, 2017. The research assisted in gathering feedback regarding; FortisBC, its various DSM initiatives, the Trade Ally Network and the Electrical Contractor Program.	**Results**: Overall, contractors are highly satisfied with the DSM program rebate application process. 71% of contractors rated the current program rebate amount as "Good deal/saves money" and "Good selling tool/incentive". Two-thirds (67%) of contractors who considered the timing of the furnace/boiler replacement rebate offer important would like the rebate to be offered all year round. 88% of TAN Members and 61% of non-participant gas contractors helped the customer complete the rebate application form. **Outcome of Key Findings:** Results were taken under consideration for 2018 program design and 2019-2022 DSM Plan development.
Furnace Replacement Program - Participant Survey	Residential	Process	3,554 program participants were contacted by telephone to participant in an online survey and to take photos of their installed furnace. A total of 422 participants completed the survey between June 1 to June 23, 2017.	**Results:** The survey results showed an overall program satisfaction rating of 88%. Over half the participants who completed the survey (57%) were satisfied with the rebate amount. 77% of the participants survey indicated "excellent" or "very good" with the overall satisfaction with the contractors who installed their furnace. **Outcome of Key Findings:** Feedback from the survey was taken into account for the new program design and offer.

Table 12-2: Summary of Key Findings and Methodology for 2017 Completed DSM Program Evaluation Studies and Pilot Program Reports (continued)

Evaluation Name	Program Area	Type of Evaluation	Methodology	Outcome from Key Findings
Rental Apartment Efficiency Program (RAP) - Evaluation 2017	Residential/Commercial	Process	This study is an ongoing evaluation conducted annually for the program. Two separate surveys were conducted; a building owner survey and tenant survey. A telephone survey was completed for 45 property owners/managers and an online survey was completed for 166 tenants.	**Results**: The survey results continue to show positive feedback with 93% of the building owners and 70% of the tenants surveyed indicating "very" or "somewhat satisfied" with the overall program. Owners/managers continue to view the program's communications positively with approximately 9 in 10 owners/managers "very" or "somewhat satisfied" with the accessibility of the program information, the ease of understanding the information, knowing how/who to contact regarding the program, and the level of communications throughout the entire program process. **Outcome of Key Findings**: Continue to conduct ongoing tenant and building owner surveys to provide feedback to program design.
Low Income General Survey	Low Income	Process	The evaluation study consisted of; an online survey with 1,483 BC residents (842 low income and 641 non-low income households), and follow-up interviews with 16 low income households. The evaluation objectives were to understand the low income population as a function of their demographics, impression of FortisBC, concerns regarding finances, and their attitudes and actions toward energy savings.	**Results:** Four key segment groups were identified within the low income participants group. Insights were garnered on considerations for marketing communications geared to each of the segments. **Outcome of Key Findings:** The study will inform future program communications and marketing strategies.

Table 12-2: Summary of Key Findings and Methodology for 2017 Completed DSM Program Evaluation Studies and Pilot Program Reports (continued)

Evaluation Name	Program Area	Type of Evaluation	Methodology	Outcome from Key Findings
Commercial Food Service Incentive Program - Evaluation 2017	Commercial	Process & Impact	The evaluation consisted of a participant survey and energy impact analyses of the program from 2012 to 2016. A combination of an online survey and telephone survey approach was used to gather feedback from a total of 328 participants. Program deemed savings analysis was conducted using data from the program application forms and from the participant survey.	**Results:** 197 out of the 328 program participants responded to the survey (60% response rate) with an average program satisfaction rating of 70%. A review of the 328 program participants which included 548 appliances that had been installed through the program resulted in a deemed savings of approximately 33,840 GJ per year. **Outcome of Key Findings:** Results from the study will inform future program design.
Combination Space/Water Heating Units Pilot	Innovative Technologies	Process & Impact	The study was conducted over a one year period and consisted of surveys (online and telephone) with program participants and contractors, and a billing consumption analysis at the building level. The pilot was comprised of 97 participants that installed either a boiler and tankless water heater, boiler and an indirect tank or a hydronic fan coil and tankless water heating system.	**Results:** Approximately 68% of participants installed a Type 1 combined system. Contractors believed the driver is due to higher customer demand for Type 1 and suitability for homes with boilers. The customer survey results indicated a 94% of participants were satisfied with the installed combined space and water heating system and over 75% reported that their homes were more comfortable than their previous system. Energy savings were derived from conducting a billing consumption analysis and varied across different combination types ranging between 18 to 20 GJ/yr. **Outcome of Key Findings:** Results from the study will inform future program design.

Table 12-2: Summary of Key Findings and Methodology for 2017 Completed DSM Program Evaluation Studies and Pilot Program Reports (continued)

Evaluation Name	Program Area	Type of Evaluation	Methodology	Outcome from Key Findings
Heat Reflector Pilot (HRP)	Innovative Technologies	Evaluation Study & Measurement & Verification	**M&V Plan:** Complies with the International Performance Measurement & Verification Protocol. The selected IPMVP option and measurement boundary was Option B[21]. **M&V**: The M&V study was conducted over a one year period. 20 participant buildings (19 in Lower Mainland, 1 in Kamloops) with heat reflectors installed, boiler set point adjustments made, and baseboard convectors cleaned were monitored and reviewed using; thermal imaging, equipment recording, customer survey, and analysis of billing consumption data on a building level.	**Results:** Surveys conducted with building managers showed tenants felt value in the cleaning of the baseboard convectors but reported higher incidents of tenant complaints after the HRP installation, though this may have been due to the uncharacteristically cold winter. The results showed that there is a difference in energy savings compared to buildings with non-condensing boilers and ones with condensing boilers. Buildings with non-condensing boilers saved 79 GJ/yr while buildings with condensing boilers increase their consumption by 23 GJ/yr. **Outcome of Key Findings:** Results from the study will inform future program design.
Industrial Optimization Program	Industrial	Measurement & Verification	**M&V Plan:** Complies with the International Performance Measurement & Verification Protocol. The selected IPMVP option and measurement boundary was Option B[21] **M&V:** M&V was conducted on ITRP006 Agropur (Victoria Plant) for steam boiler upgrade in a dairy processing plant.	**Results:** Three year M&V completed with a total verified natural gas savings of 9,544 GJ. The plant reduced their natural gas consumption by 9,544 GJ by upgrading their main steam boiler along with upgrades of their steam and condensate distribution system. The achieved savings were well aligned with the expected target savings and exceed the minimum savings to achieve cost effectiveness of the project. **Outcome of Key Findings:** M&V project completed with the full incentive payment issued to the participant as the natural gas savings met target savings.

[21] IPMVP Option B - Measurement of all parameters governing energy use to assess consumption. www.evo-world.org

Table 12-2: Summary of Key Findings and Methodology for 2017 Completed DSM Program Evaluation Studies and Pilot Program Reports (continued)

Evaluation Name	Program Area	Type of Evaluation	Methodology	Outcome from Key Findings
Industrial Optimization Program	Industrial	Measurement & Verification	**M&V Plan:** Complies with the International Performance Measurement & Verification Protocol. The selected IPMVP option and measurement boundary was Option A[22] **M&V:** M&V was conducted on ITRP008 BA Blacktop for installation of stock feed covers	**Results:** Three year M&V completed with a total verified natural gas savings of 14,165 GJ. The plant reduced their natural gas consumption by 14,165 GJ by installing covers over their stock feed to reduce the moisture content of the feed going into the processing plant. The achieved savings were well aligned with the expected target savings and exceed the minimum savings to achieve cost effectiveness of the project. **Outcome of Key Findings**: M&V project completed with the full incentive payment issued to the participant as the natural gas savings met target savings.

[22] IPMVP Option A - Measurement of key parameters governing energy use to assess consumption. www.evo-world.org

12.2 Evaluation Collaboration

In 2017, FEI continued to seek opportunities to increase collaboration activities with FBC, BC Hydro, and other entities to conduct program evaluation for DSM programs. The number of collaboration activities depends on the timing of the activity, program participants, legal and privacy concerns, and available budget to conduct the study. Table 12-1 provides information on program evaluation activities conducted in partnership with other organizations. In keeping with the MOU on collaboration discussed in Section 2.5, FEI and BC Hydro held update meetings to review the evaluation plans and discuss future evaluation activities. FEI, FBC and BC Hydro continue to hold update meetings and explore opportunities for future collaboration on program evaluations.

13. DATA GATHERING, REPORTING AND INTERNAL CONTROLS PROCESSES

13.1 Overview

The following section outlines FEI's business practices to ensure DSM activities and associated spending are in compliance with the Company's internal control processes and Commission Decision and Order G-36-09, which directed the Company to include a discussion in the DSM Annual Report of the Company's internal data gathering, monitoring and reporting control practices.

13.2 Program Tracking, Evaluation and Reporting Functions

FEI staff responsible for tracking, evaluation and reporting of DSM activities continue to report to a different Director than staff responsible for program development and implementation in order to:

- conduct independent evaluation activities;
- maintain an independent library of inputs into cost effectiveness calculations; and
- centralize tracking and reporting processes.

13.3 Robust Business Case Process Applied to All Programs

Before a new DSM pilot or program can be implemented, a business case must first be developed. FEI is committed to putting each pilot or program through the appropriate level of internal scrutiny before moving ahead, and believes doing so ensures an increased chance of pilot or program effectiveness.

Business cases include information about program rationale and purpose, as well as a description of the target audience, assumptions, cost-benefit tests and proposed evaluation methods. Cost effectiveness analysis is performed using the California Standard Tests (CST) as outlined in the California Standard Practice Manual. FEI uses an in-house cost-benefit modeling tool developed in partnership with expert industry consultants[23] to apply the program costs and benefits in each of the four standard cost-effectiveness tests based on the California Standard Practice Manual (Rate Impact Measure ["RIM"], Utility, Participant, and TRC) and the MTRC in accordance with DSM Regulation. The results from this modelling are used as inputs for the business cases, which are approved in accordance with FEI's policy on financial authorization levels.

[23] Willis Energy Services Ltd. and The Cadmus Group Inc. provided input into this in-house cost-benefit modelling.

In addition to the internal business case process, the Decision directed FEI to submit a detailed plan for new programs for approval prior to the expenditure of any funds.[24] No new programs were submitted for approval to the Commission in 2017.

13.4 Incentive Applications Vetted for Compliance with Program Requirements

Ensuring that all customer applications are compliant with program eligibility requirements as laid out in program terms and conditions is also part of the internal control process. The Company has a number of mechanisms in place to ensure DSM incentive funding applications are in compliance with program requirements. The verification process is specific to each program and is dependent on the type of program, its complexity, the financial value of the incentive and other parameters. The general principles applied are as follows:

- Each application is reviewed for completeness and accuracy;
- Applications must meet the criteria outlined in the terms and conditions of the program put forward through the approval process;
- Once approved, incentives are distributed to participants; and
- Copies of application and supporting documents are filed and stored for seven years in case of an audit.

13.5 Internal Audit Services

FEI regularly engages its own Internal Audit Services (IAS) group to review the internal controls associated with the DSM activities. The IAS utilize the most recently completed year of operation on which to conduct their audit. The 2017 Internal Audit Report, thus covers 2016 DSM operations. The 2017 Internal Audit Report, included in Appendix A, concludes that key controls are in place and operating effectively to mitigate risk around program development, program administration including rebate payments, and program reporting and evaluation to an appropriately low level).

13.6 Summary

FEI is committed to strong internal controls in all aspects of the DSM programs. As demonstrated in this section, the Company's business practices related to program development, application processing and ongoing monitoring are all sound and subject to continuous improvement.

[24] Decision, page 278

14. 2017 DSM PROGRAMS ANNUAL REPORT SUMMARY

In 2017, FEI's DSM Portfolio expenditures reached 96 percent of Plan with 64 percent of actual DSM program spending going toward customer incentives. With almost 534,000 GJ of annual savings, DSM programming continued to contribute valuable options for customers to reduce their energy use. FEI cost effectively delivered these programs within the spending limits accepted by the Commission, and in accordance with the DSM Regulation. FEI works to ensure DSM programs are operating in compliance with the Company's DSM Guiding Principles and are meeting Provincial requirements for adequacy. FEI also continues to implement good internal data gathering, monitoring and reporting control practices.

Appendix A
2017 INTERNAL AUDIT REPORT

FortisBC Energy Inc.
Internal Audit Report

Date: October 10, 2017

To: **Roger Dall'Antonia**, EVP, Customer Service and Technology

CC: **Danielle Wensink**, Director, Conservation and Energy Management

From: **Katrina Craig**, Director, Internal Audit

Re: Conservation and Energy Management – Internal Control and Process Review

INTRODUCTION

The Conservation and Energy Management Program ("the Program" or "CEM") is designed to provide customers with tools and incentives to manage their natural gas consumption, reduce their energy costs, and lower their greenhouse gas emissions.

In September 2014, the British Columbia Utilities Commission ("BCUC") granted approval for the Program expenditure of $35.8 million for 2016 in order G-138-14. The Program includes rebates and incentives on a number of energy efficient appliances, equipment and systems as well as education and outreach initiatives to increase awareness of the energy efficiency and environmental benefits that can be achieved by using clean burning natural gas in high efficiency appliances.

SCOPE AND OBJECTIVES

The objective of the review was to evaluate the design and operating effectiveness of the key internal controls over the 2016 programs, namely those around program development, program administration including rebate payments, and program reporting and evaluation. This was accomplished by:

- Verifying program tracking, evaluation and reporting functions are separate from program development and implementation functions;
- Inspecting that a cost/benefit analysis is developed for each business case by Integrated Resource Planning (IRP);
- Understanding, documenting and obtaining evidence that controls are in place that help ensure program criteria are met for each application;
- Verifying the effectiveness of system-based application controls;
- Ensuring that program metrics and reports are produced and reviewed, on a regular basis, by Management for program monitoring and evaluation purposes; and
- Developing recommendations to address any control deficiencies or opportunities for improvement as identified.

OBSERVATIONS & CONCLUSION

Based on procedures performed, Internal Audit found that key controls are in place and operating effectively to mitigate risk around program development, program administration including rebate payments, and program reporting and evaluation to an appropriately low level.

Attachment 16.2

REFER TO LIVE SPREADSHEET MODEL

Provided in electronic format only

(accessible by opening the Attachments Tab in Adobe)

Attachment 23.3

1.4 Is a key purpose of a Resource Plan to "[assess] multiple objectives and the tradeoffs between alternative resource portfolios?" If not, please explain why not.

Response:

Generally speaking, yes, a key purpose of a utility resource plan is often to assess multiple objectives and the tradeoffs between alternative resource portfolios.

However, this aspect of a resource plan differs depending upon the nature of the utility. Key in this differentiation is how supply side resources are developed or acquired. A vertically integrated utility, such as many electrical utilities, must either acquire power and capacity from the market or produce their own power and capacity. In this regard, a resource plan examines the alternative resource portfolios to determine what might be the best mix of these resources. In other words, the resource plan reviews and assesses the trade-offs between various generation and electrical purchase options.

However, for a gas utility that does not own its own gas reserves and files for approval of its Annual Contracting Plan (in other words, acquires supply side resources from the market) and whose bill is disaggregated showing supply side resources (gas supply) costs separately, the purpose of the Resource Plan is not to assess resource portfolios. Rather, its purpose is primarily to assess energy delivery infrastructure requirements needed to deliver gas to end use customers on the natural gas utility system. To this extent, the Resource Plan examines forecasted load, the potential for demand side resources and the resulting options for adding additional pipe, storage and compression.

In summary, since there are no generation resources to include in alternative portfolios and since there are no alternative portfolios of energy efficiency measures that will have substantially different impacts on supply capacity resources, creating alternative portfolios and conducting portfolio analysis typical of vertically-integrated electric utilities does not make sense for the FEU.

[redacted]

2.0 Reference: RESOURCE PLAN OVERVIEW

Exhibit B-1, Application, Executive Summary, p. ES-7;

NW Natural 2013 IRP[1], pp. 4.1, 1.10; BC Hydro 2013 IRP[2], p. 3–13;

SEE Action Using Integrated Resource Planning to Encourage Investment in Cost-Effective Energy Efficiency 2011[3], pp. 6–7

Benchmarking

FEU states in the Application: "The LTRP's EEC analysis assumes that current funding levels of approximately $35 million annually … continue over the planning horizon" (Exhibit B-1, p. ES-7).

NW Natural's 2013 Integrated Resource Plan (IRP) states:

> "NW Natural worked with the Energy Trust of Oregon (Energy Trust) to forecast the 20-year demand-side management (DSM) potential … A 'high' DSM sensitivity case was run using targeted levels from the 2011 Modified IRP in order to determine the impact of the lower cost-effective potential identified in this IRP" (pp. 4.1, 1.10).

BC Hydro, in their 2013 Integrated Resource Plan (p. 3-13), considered three DSM funding options.

A SEE Action (State and Local Energy Efficiency Action Network, facilitated by the US Department of Energy and the US Environmental Protection Agency) 2011 report titled 'Using Integrated Resource Planning to Encourage Investment in Cost-Effective Energy Efficiency Measures' states: "… the best IRPs create levelized cost curves for demand side resources that are comparable to the levelized cost curves for supply side resources … the best IRPs are developed after considering a range of possible future [environmental] regulations" (pp. 6–7).

2.1 Does FEU consider that the development of a levelized cost curve for demand side resources represents 'best practice' in the development of Resource Plans? If no, please explain why not.

Response:

The FEU agree that the development of levelized cost curves for demand side resources, as described in the 2011 SEEA report, may be appropriate for the development of some resource

[1] https://www.nwnatural.com/uploadedFiles/NWN_2013_IRP_3-27-13.pdf
[2] http://www.bchydro.com/energy-in-bc/meeting_demand_growth/irp/document_centre/reports/november-2013-irp.html
[3] http://www1.eere.energy.gov/seeaction/pdfs/ratepayer_efficiency_irpportfoliomanagement.pdf

plans, and may even be considered a “best practice” under certain circumstances. For example, this may be an appropriate approach for a vertically integrated electric utility resource plan.

That said, the FEU do not believe that this is the appropriate approach for their resource plan. The FEU are not vertically integrated utilities that have a range of energy generation portfolios against which to compare demand side resources. Please also refer to the response to BCUC IR 1.1.4.

This is a fundamentally different situation than a vertically integrated electric utility such as BC Hydro. In the case of BC Hydro, the resource plan is truly integrated and must compare the costs of meeting demand with supply and demand-side resources as the rate-payer must cover the costs of building new supply sources. Investment in demand side resources can therefore reduce utility costs and customer rates if the demand side resources have lower levelized costs than building or acquiring new supply resources.

The planning process is inherently different for a non-vertically integrated utility. For the FEU, demand and supply side resources are not directly comparable as they are for an integrated electric utility. Levelized costs of natural gas DSM/EEC can be used as a planning tool for the natural gas utility. For example, when forecasting demand, assuming the customer will invest in the least-cost alternative, levelized costs can be used to estimate the conservation potential if all (or some) least-cost DSM/EEC measures were adopted. This conservation potential can then be used as an input in resource planning. In the 2014 LTRP, the FEU determined the uptake of economically efficient DSM/EEC measures while adhering to the Act and the BC Demand-side Measures Regulation in order to determine the impact of different DSM/EEC scenarios on future demand.

It should be noted that the BCUC resource planning guidelines do not distinguish between utilities that provide generation, transmission or distribution services; therefore, some items (such as portfolio analysis) apply more readily to vertically integrated electric utilities. Therefore, the BCUC reviews resource plans in context of the unique circumstances of the utility in question. (Please also refer to the response to BCUC IR 1.1.4).

[redacted]

10.0 Reference: PUBLIC INTEREST OBJECTIVES

Exhibit B-1, Application, Section 1, pp. 8–9; RP Guidelines, p. 3

Other

FEU describes its resource planning objectives on page 8 and 9 of the Application. The RP Guidelines include as objectives: equal consideration of DSM and supply resources; minimization of risks; and compliance with government regulations and stated policies (p. 3).

10.1 Please elaborate how FEU has included (i) equal consideration of DSM and supply resources and (ii) compliance with government regulations and stated policies in its 2014 LTRP objectives.

Response:

The 2014 LTRP objectives guide the FEU to develop a plan that follows the BCUC Resource Planning Guidelines where applicable, meet the requirements of *UCA* Section 44.1(2) (see Table 1-2 of the LTRP, Exhibit B-1, for information on each *UCA* requirement and where the requirement is addressed in the 2014 LTRP) and assist the province by contributing to provincial energy objectives and emission targets.

Please refer to the response to BCUC IR 1.2.1 for an explanation of why the FEU do not directly compare demand-side and supply-side resources. Instead, the FEU have included cost-effective demand-side measures in the analysis of different future demand scenarios for natural gas. Section 4 of the 2014 LTRP provides detail on how the FEU have included consideration of DSM resources and compliance with government regulations and stated policies in the 2014 LTRP.

Section 4.2 addresses the utility demand-side measures as defined by B.C. statute which are met through the FEU's Energy Efficiency and Conservation (EEC) activities, in addition to a plan for how the Utilities will move forward to try to achieve these demand reductions over the planning horizon. Section 4.2 thus addresses Sections 44.1(2)(b) and (c) of the *UCA*. Although there are no specific, government-mandated GHG targets for the FEU or the Companies' customers to meet, the emissions reduction estimates for each of the EEC scenarios are also presented.

Section 4.3 discusses demand-side management in the broader context of utility activities beyond B.C.'s limited definition of demand-side measure. The FEU's high carbon fuel switching, natural gas for transportation and exploration of new, large industrial customer demand are presented as examples of activities that, though they do not meet the provincial definition of demand-side measure and are therefore not eligible for EEC funding, are nevertheless important demand-side management activities for the Companies. These

activities assist the province by contributing to provincial energy objectives and emission targets.

In Section 5.1.1.2, the FEU provide an explanation of why the demand for energy to be served by supply resources are not planned to be replaced by demand-side measures. This section describes how EEC may or may not lead to changes in peak-demand. When the impacts of EEC on peak demand are taken into account, it becomes apparent that the effect of EEC and shifting end-use trends on peak demand cannot be predicted without knowing the specific details of equipment installations. The FEU believe that a reasonable approach to consider the effect of EEC and changing end-use trends assumes that these effects offset one another in the Reference Case peak demand forecast and otherwise should be captured within the expected potential range of peak demand variation using high and low demand sensitivities. This approach explains why the recommendations in this section for system capacity related resources are not replaced by demand-side measures, thus addressing Section 44.1(2)(f) of the *UCA*.

The FEU also note that the BCUC Resource Planning Guidelines also suggest that resource planning objectives should include compliance with government regulations and stated policies. The above discussion describes how the FEU adhered to these regulations and policies in the 2014 LTRP, and yet stating such an objective as a separate, explicit objective would not add value to the FEU's resource planning process.

Attachment 33.3

BRITISH COLUMBIA

July 18, 2017

Honourable George Heyman
Minister of Environment and Climate Change Strategy
Parliament Buildings
Victoria, British Columbia V8V 1X4

Dear Minister Heyman:

Congratulations on your new appointment as Minister of Environment and Climate Change Strategy.

It has never been more important for new leadership that works for ordinary people, not just those at the top.

It is your job to deliver that leadership in your ministry.

Our government made three key commitments to British Columbians.

Our first commitment is to make life more affordable. Too many families were left behind for too long by the previous government. They are counting on you to do your part to make their lives easier.

Our second commitment is to deliver the services that people count on. Together, we can ensure that children get access to the quality public education they need to succeed, that families can get timely medical attention, and that our senior citizens are able to live their final years with dignity.

These and other government services touch the lives of British Columbians every day. It is your job as minister to work within your budget to deliver quality services that are available and effective.

Our third key commitment is to build a strong, sustainable, innovative economy that works for everyone, not just the wealthy and the well-connected. Together, we are going to tackle poverty and inequality, create good-paying jobs in every corner of the province, and ensure people from every background have the opportunity to reach their full potential.

These three commitments along with your specific ministerial objectives should guide your work and shape your priorities from day to day. I expect you to work with the skilled professionals in the public service to deliver on this mandate.

…/2

As you are aware, we have set up a *Confidence and Supply Agreement* with the B.C. Green caucus. This agreement is critical to the success of our government. Accordingly, the principles of "good faith and no surprises" set out in that document should also guide your work going forward.

As minister, you are responsible for ensuring members of the B.C. Green caucus are appropriately consulted on major policy issues, budgets, legislation and other matters as outlined in our agreement. This consultation should be coordinated through the Confidence and Supply Agreement Secretariat in the Premier's Office. The secretariat is charged with ensuring that members of the B.C. Green caucus are provided access to key documents and officials as set out in the agreement. This consultation and information sharing will occur in accordance with protocols established jointly by government and the B.C. Green caucus, and in accordance with relevant legislation.

British Columbians expect our government to work together to advance the public good. That means seeking out, fostering, and advancing good ideas regardless of which side of the house they come from.

Our government put forward a progressive vision for a Better B.C. that has won broad support with all members of the legislature. There is consensus on the need to address many pressing issues such as reducing health-care wait times, addressing overcrowded and under-supported classrooms, taking action on climate change, tackling the opioid crisis, and delivering safe, quality, affordable child care for all. As one of my ministers, I expect you to build on and expand that consensus to help us better deliver new leadership for British Columbians.

As part of our commitment to true, lasting reconciliation with First Nations in British Columbia our government will be fully adopting and implementing the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP), and the Calls to Action of the Truth and Reconciliation Commission. As minister, you are responsible for moving forward on the calls to action and reviewing policies, programs, and legislation to determine how to bring the principles of the declaration into action in British Columbia.

In your role as Minister of Environment and Climate Change Strategy I expect that you will make substantive progress on the following priorities:

- Renew the Climate Leadership Team within the first 100 days of your mandate.

- Implement a comprehensive climate-action strategy that provides a pathway for B.C. to prosper economically while meeting carbon pollution reduction targets, including setting a new legislated 2030 reduction target and establishing separate sectoral reduction targets and plans.

- Work with the Minister of Finance to implement an increase of the carbon tax by $5 per tonne per year, beginning April 1, 2018 to meet the federal government's carbon-pricing mandate. Take measures to expand the carbon tax to fugitive emissions and to slash-pile burning.

- Revitalize the Environmental Assessment process and review the professional reliance model to ensure the legal rights of First Nations are respected, and the public's expectation of a strong, transparent process is met.

- Employ every tool available to defend B.C.'s interests in the face of the expansion of the Kinder Morgan pipeline, and the threat of a seven-fold increase in tanker traffic on our coast.

- Enact an endangered species law and harmonize other laws to ensure they are all working towards the goal of protecting our beautiful province.

All members of Cabinet are expected to review, understand and act according to the *Members Conflict of Interest Act* and to conduct themselves with the highest level of integrity. Remember, as a minister of the Crown, the way you conduct yourself will reflect not only on yourself, but on your Cabinet colleagues and our government as a whole.

I look forward to working with you in the coming weeks and months ahead.

It will take dedication, hard work, and a real commitment to working for people to make it happen, but I know you're up to the challenge.

Sincerely,

John Horgan
Premier

Attachment 37.1

B.C. Reg. 394/2008
O.C. 907/2008

Deposited December 9, 2008
effective January 1, 2010

This consolidation is current to January 30, 2018.

Link to Point in Time

Greenhouse Gas Reduction
(Renewable and Low Carbon Fuel Requirements) Act

RENEWABLE AND LOW CARBON FUEL REQUIREMENTS REGULATION

[includes amendments up to B.C. Reg. 287/2016, January 1, 2017]

Contents

Part 1 — Interpretation

Definitions

1 (1) In this regulation:

"Act" means the *Greenhouse Gas Reduction (Renewable and Low Carbon Fuel Requirements) Act*;

"affiliate" has the same meaning as in section 1 (1) of the *Business Corporations Act*;

"appeal" means an appeal under section 14 (2) *[what decisions may be appealed, who may appeal, process of appeal]* of the Act;

"carbon intensity record" means a record required under

(a) section 11.08 (4.1) *[Part 3 compliance reports]*, or

(b) section 11.031 (1) *[carbon intensity and fuel records in relation to exclusion agreements]*;

"CNG" means compressed natural gas;

"compliance report" means a Part 2 compliance report or a Part 3 compliance report;

"component" means a component under section 11.05 (2);

"exclusion agreement" means an agreement referred to in

(a) section 6.1 (b) or (c) *[exclusions from "supply" — Part 3 fuels]*, or

(b) section 7.1 (4) *[application to become Part 3 fuel supplier]* of the Act;

"exclusion report" means a report required under section 11.032 (1) in relation to an exclusion agreement;

"exemption report" means a report under

(a) section 7.2 (1) (b) *[exemption from renewable fuel content requirements]*, or

(b) section 11.022 (1) (b) *[exemption from low carbon fuel requirements]*;

"feedstock" means the raw material, including, without limitation, biological and geological sources, from which fuel is produced;

"GHGenius" means the spreadsheet model of that name designed for analyzing the components attributable to the stages of the life cycles of fuels for the purpose of determining all greenhouse gases resulting from the production and use of those fuels for transportation purposes;

"hydrogenation-derived renewable diesel fuel" means a fuel that is

(a) made from plant or animal matter using a hydrogenation process, and

(b) suitable for use in

(i) a diesel engine, as defined in section 1 (1) of Schedule 1 of the *Carbon Tax Act*, or

(ii) a furnace or boiler to produce heat;

"life cycle", in relation to a fuel, includes the stages under section 11.05 (3) that occur in the production of the fuel, including, without limitation, in the preparation of land for and the production of feedstock for that fuel;

"LNG" means liquefied natural gas;

"natural gas-based gasoline" means gasoline derived from natural gas but does not include renewable fuel;

"Part 2 compliance report" means a report required under section 3 of the Act;

"Part 3 compliance report" means a report required under section 7 of the Act;

"vehicle" means a vehicle, including one run on tracks or cables, whose propulsive power is derived from fuel and includes a carrier without propulsive power towed by such a vehicle.

(2) For the purposes of the definition of "carbon dioxide equivalent" in section 1 of the Act, the carbon dioxide equivalent of a given mass of another greenhouse gas is the product of that mass and the global warming potential for that gas that is

(a) set out in a report of the Intergovernmental Panel on Climate Change, and

(b) specified by the director by reference to the report.

[am. B.C. Regs. 320/2009, s. 2; 141/2015, s. 1; 287/2016, App. 1, s. 1 and App. 2, s. 1.]

Standard for biodiesel fuel

2 A fuel must meet one of the following standards, as amended from time to time, to qualify as biodiesel fuel for the purposes of the Act:

(a) the Canadian General Standards Board Standard CAN/CGSB-3.524-2011 Biodiesel (B100) for Blending in Middle Distillate Fuels;

(b) the ASTM International Standard ASTM D6751-15cel.

[en. B.C. Reg. 190/2016, App. 1, s. 1.]

Exclusion from "gasoline class fuel"

3 Gasoline class fuel does not include fuel that, at the time of sale, the fuel supplier reasonably expects will be used in an aircraft.

[am. B.C. Reg. 320/2009, s. 3.]

Inclusion in "gasoline class fuel"

3.01 Natural gas-based gasoline is prescribed as an energy source for the purposes of paragraph (b) (ii) of the definition of "gasoline class fuel" in section 1 of the Act.

[en. B.C. Reg. 141/2015, s. 2.]

Exclusion from "diesel class fuel"

3.1 (1) In this section, **"military operation"** means an operation undertaken to protect national security, support humanitarian relief efforts, participate in multilateral military or peace-keeping activities under the auspices of international

organizations or defend a member of the North Atlantic Treaty Organization.

(2) Diesel class fuel does not include fuel that is sold to the Department of National Defence (Canada) if at the time of sale the fuel supplier reasonably expects that the fuel will be used

(a) in an aircraft,

(b) by the Department of National Defence (Canada) in military vessels, vehicles, aircraft or equipment for military operations, or

(c) in military vessels, vehicles, aircraft or equipment of a foreign country.

[en. B.C. Reg. 320/2009, s. 4; am. B.C. Reg. 335/2012, Sch. 1, s. 2.]

Part 2 fuel supplier

4 (1) For the purposes of paragraph (b) of the definition of "Part 2 fuel supplier" in section 1 of the Act, the following are prescribed as Part 2 fuel suppliers:

(a) a person who, for the person's own use, manufactures Part 2 fuel in British Columbia;

(b) a person who, for the person's own use, brings Part 2 fuel into British Columbia;

(c) a person who, for the person's own use, receives Part 2 fuel brought into British Columbia on that person's behalf.

(2) Subsection (1) (b) does not apply to a person who brings Part 2 fuel into British Columbia in the fuel tank of the vehicle or vessel the person is operating or in a fuel tank for a device necessary for the intended use of that vehicle or vessel, if the fuel is used only to power that vehicle, vessel or device, as applicable.

[am. B.C. Reg. 190/2016, App. 1, s. 2.]

Part 3 fuel supplier

4.1 (1) For the purposes of paragraph (b) of the definition of "Part 3 fuel supplier" in section 1 of the Act, the following are prescribed as Part 3 fuel suppliers:

(a) a person who, for the person's own use, manufactures Part 3 fuel in British Columbia;

(b) a person who, for the person's own use, brings Part 3 fuel into British Columbia;

(c) a person who, for the person's own use, receives Part 3 fuel brought into British Columbia on that person's behalf.

(2) Subsection (1) (b) does not apply to a person who brings Part 3 fuel into British Columbia in the fuel tank of the vehicle or vessel the person is operating or in a fuel tank for a device necessary for the intended use of that vehicle or vessel, if the fuel is used only to power that vehicle, vessel or device, as applicable.

[en. B.C. Reg. 320/2009, s. 4; am. B.C. Reg. 190/2016, App.1, s. 3.]

Renewable fuel

5 (1) Gasoline produced from biomass is prescribed as renewable fuel in relation to gasoline class fuel.

(2) The following substances are prescribed as renewable fuel in relation to diesel class fuel:

(a) diesel fuel produced from biomass;

(b) hydrogenation-derived renewable diesel fuel.

[en. B.C. Reg. 335/2012, Sch. 1, s. 3.]

Repealed

5.1 Repealed. [B.C. Reg. 335/2012, Sch. 1, s. 3.]

Exclusions from "supply" — Part 2 fuels

6 (1) The definition of "supply" in section 1 of the Act does not apply in relation to Part 2 fuel in the following circumstances:

(a) the Part 2 fuel supplier, at the time of sale, reasonably expects that the Part 2 fuel will be exported from British Columbia;

(b) the Part 2 fuel is sold by one Part 2 fuel supplier to another Part 2 fuel supplier and the purchasing Part 2 fuel supplier agrees in writing with the selling Part 2 fuel supplier to include for the applicable compliance period that Part 2 fuel in its calculations for the purposes of section 2 of the Act;

(c) the Part 2 fuel is sold by its importer or manufacturer to a Part 2 fuel supplier and the Part 2 fuel supplier agrees in writing with the importer or manufacturer, as applicable, to include for the applicable compliance period that Part 2 fuel in its calculations for the purposes of section 2 of the Act.

(2) Repealed. [B.C. Reg. 338/2010, Sch. s. 1 (b).]

(3) The sale of Part 2 fuel by a Part 2 fuel supplier that purchased the Part 2 fuel in circumstances described in subsection (1) (b) or (c) is deemed to be the first sale of that fuel after it is manufactured or brought into British Columbia.

[am. B.C. Regs. 320/2009, s. 5; 338/2010, Sch. s. 1.]

Exclusions from "supply" — Part 3 fuels

6.1 (1) The definition of "supply" in section 1 of the Act does not apply in relation to a Part 3 fuel in the following circumstances:

(a) the Part 3 fuel supplier, at the time of sale, reasonably expects that the Part 3 fuel will be exported from British Columbia;

(b) the Part 3 fuel is sold by one Part 3 fuel supplier to another Part 3 fuel supplier and the purchasing Part 3 fuel supplier agrees in writing with the selling Part 3 fuel supplier to include for the applicable compliance period that Part 3 fuel in its calculations for the purposes of section 6 (1) of the Act;

(c) the Part 3 fuel is sold by its importer or manufacturer to a Part 3 fuel supplier and the Part 3 fuel supplier agrees in writing with the importer or manufacturer, as applicable, to include for the applicable compliance period that Part 3 fuel in its calculations for the purposes of section 6 (1) of the Act.

(2) Repealed. [B.C. Reg. 338/2010, Sch. s. 2 (b).]

(3) The sale of Part 3 fuel by a Part 3 fuel supplier that purchased the Part 3 fuel in circumstances described in subsection (1) (b) or (c) is deemed to be the first sale of that fuel after it is manufactured or brought into British Columbia.

[en. B.C. Reg. 320/2009, s. 6; am. B.C. Reg. 338/2010, Sch. s. 2.]

Part 1.1 — General Requirements

Requirement for complete and accurate reports and records

6.2 (1) Subject to subsection (3), a person who is required to

(a) submit a report referred to in subsection (2) to the director,

(b) provide a carbon intensity record under section 11.031 *[Part 3 fuel provided under an exclusion agreement]*, or

(c) include a carbon intensity record in a report referred to in subsection (2)

contravenes this section if the report or record, as applicable, does not completely and accurately disclose the information required to be included in that report or record.

(2) Subsection (1) applies to the following reports:

(a) a Part 2 compliance report;

(b) a Part 3 compliance report;

(c) a supplementary report under section 3 (2) *[Part 2 compliance reports]* or 7 (2) *[Part 3 compliance reports]* of the Act;

(d) an exemption report;

(e) an exclusion report under section 11.032 (1) *[exclusion reports in relation to exclusion agreements]*;

(f) a report under section 11.101 (1) (b) *[application for validation of credits]*;

(g) a report under section 29 *[transition — transferring debits and validated credits]*.

(3) Subsection (1) does not apply in relation to a carbon intensity record received by the person under section 11.031 (2) or (6) *[record provided by other party to exclusion agreement or by the director]*.

(4) A person who is required to provide additional information under any of the following contravenes this section if the additional information provided is incomplete or inaccurate:

(a) section 3 (4) (b) *[Part 2 compliance reports]* of the Act;

(b) section 7 (4) (b) *[Part 3 compliance reports]* of the Act;

(c) section 6.4 (1) or (2) *[additional information in support of reports and records]*.

[en. B.C. Reg. 287/2016, App. 1, s. 2.]

Fuel identification requirements

6.3 (1) Subject to subsection (2), if the director has published, on a publicly accessible website maintained by the ministry of the minister, a system for categorizing or describing fuels, the reports and records referred to in section 6.2 (1) *[requirement for complete and accurate reports and records]* must identify fuels in accordance with the system as it is published at the time that the report is submitted or the record provided.

(2) Subsection (1) does not apply in relation to a carbon intensity record received under section 11.031 (2) or (6) *[record provided by other party to exclusion agreement or by the director]* by the purchasing Part 3 fuel supplier.

[en. B.C. Reg. 287/2016, App. 1, s. 2.]

Additional information in support of reports and records

6.4 (1) The director may require a person who submits a report under any of the following to provide additional information in support of the report:

(a) section 7.2 (2) (b) *[exemption report for Part 2 fuel supplier]*;

(b) section 11.022 (2) (b) *[exemption report for Part 3 fuel supplier]*;

(c) section 11.032 (1) *[reports in relation to exclusion agreements]*;

(d) section 11.101 (1) (b) *[application for validation of credits]*;

(e) section 29 *[transition — transferring debits and validated credits]*.

(2) The director may require a person who

(a) provides a carbon intensity record under section 11.031 (5) *[director may require record]*, or

(b) includes a carbon intensity record in a Part 3 compliance report under section 11.08 (4.1) [record required for each Part 3 fuel reported]

to provide additional information in support of the record.

(3) A person who is required to provide additional information under subsection (1) or (2) of this section or section 3 (4) (b) *[Part 2 compliance reports]* or 7 (4) (b) *[Part 3 compliance reports]* of the Act must provide the additional information

(a) by the date specified by the director, and

(b) if applicable, in the manner and form specified by the director.

(4) If required by the director, a person required to provide additional information as referred to in subsection (3) must include with the additional information a signed statement of the officer or employee who is providing the additional information on behalf of the person

(a) confirming that a record evidencing the individual's authority to provide the additional information on behalf of the person is available on request, and

(b) containing the following statement:

I certify that the information provided is true and complete to the best of my knowledge and I understand that the director may require records evidencing the truth of the information to be provided.

(5) For the purposes of subsection (4),

(a) section 9 (6) *[records evidencing a matter]* applies in relation to additional information requested from a Part 2 fuel supplier or in relation to Part 2 fuel, and

(b) section 11.08 (9) *[records evidencing a matter]* applies in relation to additional information

requested from a Part 3 fuel supplier or in relation to Part 3 fuel.

(6) A person required to provide additional information under this section must retain records necessary for the person to demonstrate compliance with the requirement as follows:

(a) the records must be maintained at the person's principal place of business in British Columbia, if any, or the place of business of the person's attorney, otherwise;

(b) the records must be retained for the 7 years that apply under this regulation to retention of records in relation to the report or carbon intensity record to which the additional information requirement is related.

[en. B.C. Reg. 287/2016, App. 1, s. 2.]

Part 2 — Requirements in Relation to Renewable Fuels

Requirements for renewable fuel content

7 (1) A Part 2 fuel supplier must ensure that the volume of diesel class fuel it supplies in a compliance period contains at least 4% renewable fuel content by volume.

(2) A Part 2 fuel supplier must ensure that the volume of gasoline class fuel it supplies in a compliance period contains at least 5% renewable fuel content by volume.

(3) For the purposes of subsections (1) and (2), the percentage of renewable fuel by volume must be calculated using the following formula:

$$\frac{(RF_{supplied} - RF_{transferred\ out} + RF_{transferred\ in} - RF_{retained} + RF_{credit} + RF_{deferred} - RF_{added})}{F_{supplied}} \times 100$$

where

$RF_{supplied}$ = the volume of renewable fuel supplied by the Part 2 fuel supplier in the compliance period;

$RF_{transferred\ out}$ = the volume of renewable fuel notionally transferred by the fuel supplier under section 5 (1) (a) of the Act for the compliance period;

$RF_{transferred\ in}$ = the volume of renewable fuel notionally transferred to the fuel supplier under section 5 (1) (b) of the Act for the compliance period;

$RF_{retained}$ = the volume of renewable fuel retained by the fuel supplier under section 5 (3) (a) of the Act for the compliance period;

RF_{credit} = the volume of renewable fuel credited by the fuel supplier under section 5 (3) (b) of the Act for the compliance period;

$RF_{deferred}$ = the volume of renewable fuel deferred by the fuel supplier under section 5 (4) (a) of the Act for the compliance period;

RF_{added} = the volume of renewable fuel added by the fuel supplier under section 5 (4) (b) of the Act for the compliance period;

$F_{supplied}$ = the volume of Part 2 fuel supplied by the Part 2 fuel supplier in the compliance period.

[am. B.C. Regs. 320/2009, s. 7; 338/2010, Sch. s. 3; 379/2010; 232/2011, s. 1; 335/2012, Sch. 1, s. 4 and Sch. 2, s. 1.]

Retaining, deferring and transferring renewable fuel obligations

7.1 (1) Each Part 2 fuel supplier that is a party to a notional transfer of renewable fuel under section 5 (1) of the Act must ensure the transfer occurs in a manner that ensures accurate records are kept of the matters that must be reported under section 9 (4) of this regulation in respect of the transfer.

(2) For the purposes of section 5 (3) (a) of the Act, 5% of the Part 2 fuel supplier's renewable fuel obligation in respect of each of gasoline class fuel and diesel class fuel for the compliance period is prescribed as the amount that may be notionally retained and applied towards that Part 2 fuel supplier's renewable fuel obligation in respect of gasoline class fuel or diesel class fuel, as applicable, for the next compliance period.

(3) For the purposes of section 5 (4) (a) of the Act, 5% of the Part 2 fuel supplier's renewable fuel obligation in respect of each of gasoline class fuel or diesel class fuel for the compliance period is prescribed as the amount that may be deferred and added to that Part 2 fuel supplier's renewable fuel obligation in respect of gasoline class fuel or diesel class fuel, as applicable, for the next compliance period.

(4) Repealed. [B.C. Reg. 335/2012, Sch. 1, s. 5.]

[en. B.C. Reg. 338/2010, Sch. s. 4; am. B.C. Regs. 335/2012, Sch. 1, s. 5; 190/2016, App. 1, s. 4.]

Exemption from renewable fuel content requirements

7.2 (1) The director may, on application by a Part 2 fuel supplier, exempt the Part 2 fuel supplier from section 2 *[requirements for renewable fuel content]* of the Act for a compliance period if

(a) the Part 2 fuel supplier supplies not more than 75 million litres of Part 2 fuels in the compliance period, and

(b) the director is satisfied that

(i) the Part 2 fuel supplier has not been designated under section 4 (2) *[application to become a Part 2 fuel supplier]* of the Act as a Part 2 fuel supplier for the compliance period, and

(ii) the Part 2 fuel supplier has not notionally transferred fuel under section 5 (1) (a) *[transferring or retaining renewable fuel excess or deficiency]* of the Act,

(iii) the total of the Part 2 fuel supplied in the compliance period by the Part 2 fuel supplier and its affiliates is not more than the amount referred to in paragraph (a).

(2) An application under subsection (1) must

(a) be made in the manner and form specified by the director, and

(b) include an exemption report in the form specified by the director.

(3) Section 9 (3) *[identifying and contact information]*, as it applies to a compliance report, applies to an exemption report under this section.

(4) An exemption report under this section must set out the following information for the compliance period set out under paragraph (a):

(a) the compliance period to which the report relates;

(b) the volume of Part 2 fuel supplied by the Part 2 fuel supplier;

(c) if the Part 2 fuel supplier has affiliates who are also Part 2 fuel suppliers, the legal names and addresses of those affiliates and the volume of Part 2 fuel supplied by each of those affiliates in that compliance period.

(5) An exemption report under this section must be signed by the officer or employee referred to in section 9 (3) (c) and include a signed statement of that individual

(a) confirming that the Part 2 fuel supplier meets the criteria set out in subsection (1) (b),

(b) confirming

(i) that records evidencing the volume of Part 2 fuel supplied in the compliance period are available on request, and

(ii) that a record evidencing the individual's authority to submit the report on behalf of the Part 2 fuel supplier is available on request, and

(c) containing the following statement:

I certify that the information in this report is true and complete to the best of my knowledge and I understand that the director may require records evidencing the truth of that information to be provided.

(6) Section 9 (6) (a) *[records evidencing a matter]* applies for the purposes of evidencing the volume of Part 2 fuel reported under subsection (4) (b).

(7) If a Part 2 fuel supplier is granted an exemption under subsection (1) for a compliance period,

(a) the exemption report under this section is the Part 2 fuel supplier's Part 2 compliance report for the compliance period, and

(b) subject to subsection (6), section 9 (4) to (7) does not apply to the Part 2 fuel supplier for the compliance period.

(8) A Part 2 fuel supplier that is granted an exemption under subsection (1) for a compliance period must maintain, at the address referred to in section 9 (3) (d), books of accounts and the records referred to in subsection (5) (b) (i) of this section for a period of 7 years after the end of that compliance period.

[en. B.C. Reg. 287/2016, App. 1, s. 3; am. B.C. Reg. 287/2016, App. 2, s. 2.]

Application to be a Part 2 fuel supplier

7.21 An application for the purposes of section 4 (1) of the Act must include all the following:

(a) legal name and business addresses of the applicant;

(b) nature of the applicant's business;

(c) names of the owners or, if the applicant is a corporation, the names and addresses of the directors;

(d) a description of the business activities in respect of which the applicant wishes to be designated as a Part 2 fuel supplier;

(e) other information requested by the director.

[en. B.C. Reg. 335/2012, Sch. 1, s. 7.]

Renewable fuel labelling requirements

7.3 (1) A person that provides to a purchaser

(a) gasoline class fuel that contains more than 10% ethanol, or

(b) diesel class fuel that contains more than 5% biodiesel

must comply with subsection (2).

(2) In the circumstances described in subsection (1), the person must

(a) if fuel is provided from fuel dispensing equipment that displays the volume of fuel dispensed and the price of that fuel, post a label on the fuel dispensing equipment in accordance with subsection (3), and

(b) if fuel is provided from fuel dispensing equipment that does not display the volume or price of the fuel dispensed, give notice in accordance with subsection (4).

(3) A label for the purposes of subsection (2) (a) must

(a) be placed on the fuel dispensing equipment near where the fuel volume and price are displayed so that the label is visible to a person to whom the volume and price are visible,

(b) be in good condition and resistant to automotive fuel, oil, grease, solvents, detergents and water,

(c) be able to withstand extremes of weather for at least one year,

(d) measure not less than 7.5 cm in width and 6.5 cm in height,

(e) be divided horizontally into 2 bands,

(i) the top band of which must be not less than 2.5 cm in height and have a black background with coloured print that is

(A) not less than 18 point Helvetica bold or Arial bold font,

(B) not less than 0.3 cm from the edges, and

(C) centered horizontally and vertically within the band, and

(ii) the bottom band of which must be not less than 4 cm in height and have a coloured background with black print that is

(A) not less than 14 point Helvetica bold or Arial bold font,

(B) not less than 0.3 cm from the edges, and

(C) centered horizontally and vertically within the band,

(f) in the case of a label respecting biodiesel content, use non-fade Blue: PMS 277 ink for the print in the top band and the background in the bottom band,

(g) in the case of a label respecting ethanol content, use non-fade Orange: PMS 1495 ink for

the print in the top band and the background in the bottom band, and

(h) set out the range of biodiesel or ethanol, as applicable, contained in the fuel using words or phrases approved by the director.

(4) In the circumstances described in subsection (2) (b), the person must provide to the purchaser an invoice, bill of lading, shipping paper or other document that has clearly set out on it the type and range of renewable fuel contained in the fuel provided.

[en. B.C. Reg. 338/2010, Sch. s. 6; am. B.C. Reg. 335/2012, Sch. 1, s. 8.]

Compliance period

8 The compliance period for the purposes of section 2 of the Act is the calendar year.

Part 2 compliance reports

9 (1) In this section, **"attorney"** and **"head office"** have the same meanings as in the *Business Corporations Act*.

(2) A Part 2 compliance report must be provided to the director on or before March 31 of the calendar year following the compliance period.

(3) A Part 2 compliance report must set out, as applicable, all the following identifying and contact information respecting the Part 2 fuel supplier:

(a) legal name;

(b) operating name;

(c) name of the officer or employee submitting the report on behalf of the Part 2 fuel supplier;

(d) address of the head office in British Columbia, if applicable, and otherwise, the name and address

of the corporation's attorney in British Columbia, including, as applicable, street address, postal address, city and postal code;

(e) telephone and fax numbers;

(f) email address.

(4) A Part 2 compliance report must set out, as applicable, all the following information in relation to the Part 2 fuel supplier for the compliance period set out under paragraph (a):

(a) the compliance period to which the report relates;

(b) the volume of renewable fuel supplied;

(c) the volume of renewable fuel notionally transferred to the Part 2 fuel supplier under section 5 (1) of the Act;

(d) for each Part 2 fuel supplier from which the Part 2 fuel supplier received a notional transfer of renewable fuel,

(i) the legal name and address of that Part 2 fuel supplier, and

(ii) the volume of renewable fuel notionally transferred;

(e) the volume of renewable fuel notionally transferred by the Part 2 fuel supplier under section 5 (1) of the Act;

(f) for each Part 2 fuel supplier to which the Part 2 fuel supplier notionally transferred Part 2 fuel,

(i) the legal name and address of that Part 2 fuel supplier, and

(ii) the volume of renewable fuel notionally transferred;

(g) the volume of Part 2 fuel supplied in the compliance period;

(h) a record and the result of the calculation under section 7 (3) *[requirements for renewable fuel content]*;

(i) the volume of the Part 2 fuel supplier's renewable fuel obligation the Part 2 fuel supplier is deferring for the compliance period under section 7.1 (3);

(j) the volume of renewable fuel the Part 2 fuel supplier is adding to its renewable fuel obligation for the compliance period from deferrals under section 7.1 (3) in previous compliance periods;

(k) the volume of renewable fuel the Part 2 fuel supplier supplied in the compliance period the Part 2 fuel supplier is retaining under section 7.1 (2) for credit in the next compliance period;

(l) the volume of renewable fuel the Part 2 fuel supplier is applying to its renewable fuel obligation for the compliance period from the previous compliance period.

(5) A Part 2 compliance report must be signed by the officer or employee referred to in subsection (3) (c) and include a signed statement of that individual

(a) confirming

(i) that records evidencing the renewable nature of all of the renewable fuel supplied in the compliance period are available on request,

(ii) that records evidencing each matter reported under subsection (4) (b) to (g) are available on request, and

(iii) that a record evidencing the individual's authority to submit the report on behalf of

the Part 2 fuel supplier is available on request, and

(b) containing the following statement:

I certify that the information in this report is true and complete to the best of my knowledge and I understand that the director may require records evidencing the truth of that information to be provided.

(6) For the purposes of subsection (5), records evidencing a matter include, but are not limited to, the following types of records:

(a) dated bills of lading, invoices, sales receipts, records of payments, records of metered values and records of transactions for the volume of each class of Part 2 fuels reported under subsection (4) as supplied in a compliance period;

(b) dated contracts, records of transfer, invoices and records of payments for volumes of renewable fuel notionally transferred to or by the Part 2 fuel supplier in the compliance period.

(7) A Part 2 compliance report must be submitted in the manner and form specified by the director.

[am. B.C. Regs. 338/2010, Sch. s. 7; 335/2012, Sch. 1, s. 9 and Sch. 2, s. 2; 50/2016, s. 13; 287/2016, App. 1, s. 4.]

Supplementary Part 2 compliance report

10 A supplementary compliance report referred to in section 3 (3) of the Act must

(a) comply with section 9 *[Part 2 compliance reports]* of this regulation, and

(b) indicate which information is different from the information provided in the Part 2 compliance report it supplements.

Records

11 (1) A Part 2 fuel supplier must retain at its principal place of business in British Columbia, if any, or the place of business of its attorney, otherwise, books of accounts and the records necessary for the fuel supplier to demonstrate compliance with section 2 of the Act for a compliance period.

(2) Records referred to in subsection (1) must be retained for 7 years after the end of the compliance period to which they relate.

Part 2.1 — Requirements in Relation to Carbon Intensity of Fuels

Compliance periods

11.01 (1) The compliance period for the purposes of section 6 of the Act is the calendar year.

(2) Repealed. [B.C. Reg. 190/2016, App. 1, s. 5 (b).]

[en. B.C. Reg. 232/2011, s. 3; am. B.C. Reg. 190/2016, App. 1, s. 5.]

Low carbon fuel requirement

11.02 (1) For the purposes of the formula set out in section 6 (4) *[Part 3 fuels: calculation of credits or debits]* of the Act, for a compliance period set out in Column 1 of Table 1,

(a) the carbon intensity limit for gasoline class fuel is the limit set out in Column 3 opposite the compliance period, and

(b) the carbon intensity limit for diesel class fuel is the limit set out in Column 2 opposite the compliance period.

Table 1

COLUMN 1 Compliance Period	COLUMN 2 Carbon Intensity Limit for Diesel Class Fuel	COLUMN 3 Carbon Intensity Limit for Gasoline Class Fuel
	(g CO_2e/MJ)	(g CO_2e/MJ)
2017	90.02	83.74
2018	88.60	82.41
2019	87.18	81.09
2020 and subsequent compliance periods	85.28	79.33

(2) For the purposes of the formula set out in section 6 (4) of the Act,

(a) the energy effectiveness ratio for a diesel class fuel set out in Column 1 of Table 2 is the ratio set out in Column 2 opposite the fuel, and

(b) the energy effectiveness ratio for a gasoline class fuel set out in Column 1 of Table 2 is the ratio set out in Column 3 opposite the fuel.

Table 2

COLUMN 1 Fuel	COLUMN 2 Diesel Class Fuel Energy Effectiveness Ratio	COLUMN 3 Gasoline Class Fuel Energy Effectiveness Ratio
Petroleum-based diesel fuel or renewable fuel in relation to diesel class fuel	1.0	Not applicable
Petroleum-based gasoline, natural gas-based gasoline or renewable fuel in relation to gasoline class fuel	Not applicable	1.0
Hydrogen	1.9	2.5
LNG	1.0	Not applicable
CNG	0.9	1.0
Propane	1.0	1.0

Electricity	2.7	3.4

(3) For the purposes of the formula in section 6 (4) of the Act, for a fuel set out in Column 1 of Table 3, the energy content of the fuel is the energy density, set out in Column 2 opposite that fuel, multiplied by the quantity of that fuel supplied by the Part 3 fuel supplier in the applicable compliance period.

Table 3

COLUMN 1 **Fuel**	**COLUMN 2** **Energy Density/Unit**
Petroleum-based diesel fuel or diesel fuel produced from biomass	38.65 MJ/L
Hydrogenation-derived renewable diesel fuel	36.51 MJ/L
Biodiesel	35.40 MJ/L
Petroleum-based gasoline, natural gas-based gasoline or gasoline produced from biomass	34.69 MJ/L
Ethanol	23.58 MJ/L
Hydrogen	141.24 MJ/kg
LNG	52.46 MJ/kg
CNG	37.85 MJ/m^3
Propane	25.47 MJ/L
Electricity	3.60 MJ/kWh

(4) For the purposes of the formula in section 6 (4) of the Act,

(a) the carbon intensity for petroleum-based diesel fuel is 94.76 g CO_2e/MJ,

(b) the carbon intensity for petroleum-based gasoline is 88.14 g CO_2e/MJ,

(c) default carbon intensities referred to in section 6 (5) (d) (i) of the Act are set out in section 11.04 of this regulation,

(d) the calculation referred to in section 6 (5) (d) (ii) (A) of the Act is described in section 11.06 of

this regulation, and

(e) the procedure for proposing an alternative method referred to in section 6 (5) (d) (ii) (B) of the Act is set out in section 11.07 of this regulation.

[en. B.C. Reg. 335/2012, Sch. 1, s. 10; am. B.C. Regs. 141/2015, ss. 3 and 4; 190/2016, App. 1, s. 6; 287/2016, App. 2, ss. 3 to 5.]

Repealed

11.021 Repealed. [B.C. Reg. 335/2012, Sch. 1, s. 11.]

Exemption from low carbon fuel requirements

11.022 (1) The director may, on application by a Part 3 fuel supplier, exempt the Part 3 fuel supplier from section 6 (1) *[low carbon fuel requirement]* of the Act for a compliance period if

(a) the Part 3 fuel supplier supplies Part 2 fuels, but not more than 75 million litres of Part 2 fuels, in the compliance period, and

(b) the director is satisfied that the following criteria are met:

(i) the Part 3 fuel supplier has not been designated under section 7.1 (2) *[application to become a Part 3 fuel supplier]* of the Act as a Part 3 fuel supplier for the compliance period;

(ii) the Part 3 fuel supplier has not transferred or acquired debits under section 8 (2) *[transferring credits and debits]* of the Act in the compliance period;

(iii) the Part 3 fuel supplier has not had credits validated under section 8 (4) *[validation required before credit transferred]*

of the Act as credits generated in the compliance period;

(iv) the Part 3 fuel supplier has not entered into an agreement under section 8.01 *[agreement with director]* of the Act in relation to the compliance period;

(v) the total of the Part 2 fuel supplied in the compliance period by the Part 3 fuel supplier and its affiliates, if any, is not more than the amount referred to in paragraph (a).

(2) An application under this section must

(a) be made in the manner and form specified by the director, and

(b) include an exemption report in the form specified by the director.

(3) Section 11.08 (3) *[identifying and contact information]*, as it applies to a compliance report, applies to an exemption report under this section.

(4) An exemption report under this section must set out the following information for the compliance period set out under paragraph (a):

(a) the compliance period to which the report relates;

(b) the volume of Part 2 fuel supplied by the Part 3 fuel supplier;

(c) if the Part 3 fuel supplier has affiliates who are also Part 3 fuel suppliers, the legal names and addresses of those affiliates and the volume of Part 2 fuel supplied by each of those affiliates in that compliance period.

(5) An exemption report under this section must be signed by the officer or employee referred to in section 11.08 (3) (c) and

include a signed statement of that individual

(a) confirming that the Part 3 fuel supplier meets the criteria set out under subsection (1) (b),

(b) confirming

(i) that the records evidencing the volume of Part 2 fuel supplied in the compliance period are available on request, and

(ii) that a record evidencing the individual's authority to submit the report on behalf of the Part 3 fuel supplier is available on request, and

(c) containing the following statement:

I certify that the information in this report is true and complete to the best of my knowledge and I understand that the director may require records evidencing the truth of that information to be provided.

(6) Section 9 (6) (a) *[records evidencing a matter]* applies for the purposes of evidencing the volume of Part 2 fuel reported under subsection (4) (b).

(7) If a Part 3 fuel supplier is granted an exemption under subsection (1) for a compliance period,

(a) the exemption report under this section is the Part 3 fuel supplier's Part 3 compliance report for the compliance period, and

(b) section 11.08 (4) to (10) does not apply to the Part 3 fuel supplier for the compliance period.

(8) A Part 3 fuel supplier that is granted an exemption under subsection (1) for a compliance period must maintain, at the address referred to in section 11.08 (3) (d), books of accounts and the records referred to in subsection (5) (b) (i) of this

section for a period of 7 years after the end of that compliance period.

[en. B.C. Reg. 287/2016, App. 1, s. 5; am. B.C. Reg. 287/2016, App. 2, s. 6.]

Application to be a Part 3 fuel supplier

11.023 An application for the purposes of section 7.1 (1) of the Act must include all the following:

(a) legal name and business addresses of the applicant;

(b) nature of the applicant's business;

(c) names of the owners or, if the applicant is a corporation, the names and addresses of the directors;

(d) a description of the business activities in respect of which the applicant wishes to be designated as a Part 3 fuel supplier;

(e) other information requested by the director.

[en. B.C. Reg. 335/2012, Sch. 1, s. 11.]

Repealed

11.03 Repealed. [B.C. Reg. 335/2012, Sch. 1, s. 11.]

Carbon intensity and fuel records required in relation to exclusion agreements

11.031 (1) This section applies to a person who, in a compliance period, sells Part 3 fuel under an exclusion agreement to a Part 3 fuel supplier.

(2) Subject to subsection (3), the person must provide the following information to the purchasing Part 3 fuel supplier in relation to each transfer of Part 3 fuel under the exclusion agreement:

(a) a carbon intensity record in accordance with section 11.071 *[carbon intensity records — content requirements]* for each Part 3 fuel transferred;

(b) identification and quantity of the fuel to which the carbon intensity record relates.

(3) Subsection (2) does not apply in relation to petroleum-based gasoline or petroleum-based diesel fuel.

(4) The information required under subsection (2) must be provided to the purchaser by the earlier of the following dates:

(a) the date that is 30 days after the person receives a written request from the purchaser for the information;

(b) January 31 of the calendar year following the compliance period.

(5) On request of the director, the person must provide to the director the information referred to in subsection (2) by the date specified by the director.

(6) The director may provide information provided under subsection (5) to the purchaser entitled to receive it under subsection (2).

[en. B.C. Reg. 287/2016, App. 1, s. 6.]

Exclusion reports required in relation to exclusion agreements

11.032 (1) A person who sells or purchases Part 3 fuel under an exclusion agreement in a compliance period must submit to the director an exclusion report in accordance with this section for the compliance period.

(2) An exclusion report must be submitted to the director on or before March 31 of the calendar year following the compliance period.

(3) An exclusion report must set out, as applicable, all the following identifying and contact information respecting the

person:

(a) legal name;

(b) operating name;

(c) name of the officer or employee submitting the report on behalf of the person;

(d) the address of the head office in British Columbia, if applicable, and otherwise, the name and address of the corporation's attorney in British Columbia, including, as applicable, street address, postal address, city and postal code;

(e) telephone and fax numbers;

(f) email address.

(4) An exclusion report must set out all the following information in relation to the person for the compliance period set out under paragraph (a):

(a) the compliance period to which the report relates;

(b) for each type of Part 3 fuel that the person purchased under exclusion agreements,

(i) the legal names and addresses of the sellers,

(ii) the quantity of that type of Part 3 fuel that the person purchased under the exclusion agreements, and

(iii) the quantity of that type of Part 3 fuel that the person purchased under the exclusion agreements and did not sell under exclusion agreements or supply;

(c) for each type of Part 3 fuel that the person sold under exclusion agreements,

(i) the legal names and addresses of the purchasers, and

(ii) the quantity of that type of Part 3 fuel that the person sold under exclusion agreements.

(5) An exclusion report must be signed by the officer or employee referred to in subsection (3) (c) and include a signed statement of that individual

(a) confirming

(i) that records evidencing each matter reported under subsection (4) (b) or (c) are available on request, and

(ii) that a record evidencing the individual's authority to submit the report on behalf of the person is available on request, and

(b) containing the following statement:

I certify that the information in this report is true and complete to the best of my knowledge and I understand that the director may require records evidencing the truth of that information to be provided.

(6) For the purposes of subsection (5), section 11.08 (9) applies to an exclusion report.

(7) An exclusion report must be submitted in the manner and form specified by the director.

(8) A person who is required to submit an exclusion report for a compliance period must maintain at its principal place of business in British Columbia, if any, or the place of business of its attorney, otherwise, books of accounts and the records referred to in subsection (5) (a) (i) for a period of 7 years after the end of that compliance period.

[en. B.C. Reg. 287/2016, App. 1, s. 6.]

Default carbon intensity

11.04 For the purposes of section 6 (5) (d) (i) of the Act, the carbon intensity for a Part 3 fuel set out in Column 1 of the Table to this section is deemed to be the carbon intensity set out in Column 2 opposite the fuel.

Table

COLUMN 1 **Fuel**	**COLUMN 2** **Carbon Intensity**
	(g CO_2e/MJ)
Renewable fuel in relation to diesel class fuel	98.96
Propane	75.35
Renewable fuel in relation to gasoline class fuel	88.14
Natural gas-based gasoline	90.07
LNG	112.65
CNG	63.64
Electricity	19.73
Hydrogen	96.82

[en. B.C. Reg. 335/2012, Sch. 1, s. 11; am. B.C. Regs. 141/2015, s. 5; 287/2016, App. 2, s. 7.]

Carbon intensity components attributable to fuel

11.05 (1) In this section:

"fuel production facility" means a facility that manufactures or produces fuel from feedstock or using natural resources;

"fuelling station" means a facility equipped to dispense fuel into fuel tanks or batteries of vehicles or vessels and includes a retail service station, a card lock, or a facility used primarily to fuel a fleet of vehicles or vessels;

"net greenhouse gas emissions", used in relation to a stage in the life cycle of a fuel, includes all greenhouse gases emitted or absorbed in any process or activity that is part of that stage, whether or not the process or

activity is specifically mentioned in the description of the stage in subsection (3), unless those greenhouse gases are specifically taken into account in another stage.

(2) For the purpose of determining the carbon intensity of a fuel, the net greenhouse gas emissions from each stage, as described in subsection (3), that occurs in the life cycle of the fuel, is established as a component deemed attributable to that fuel.

(3) For the purposes of subsection (2), the following stages of the life cycle of a fuel are established:

"carbon dioxide and hydrogen sulphide removed from natural gas" means the activities and processes associated with removing carbon dioxide and hydrogen sulphide from natural gas;

"carbon from air incorporated in fuel" means the processes by which carbon is incorporated in biological feedstock in the feedstock production process;

"co-products production" means the production of usable products, other than the fuel being analyzed, in a fuel production process, whether the co-product is produced at the point of feedstock recovery or at the fuel production facility;

"direct land use change" means the activities and processes associated with changing the use of land from another use to

(a) feedstock production and recovery,

(b) fuel production,

(c) roads for access to feedstock or an energy source,

(d) feedstock exploration activities, or

(e) pipelines, transmission lines or other means of transporting feedstock or fuel;

"feedstock production and recovery" means activities and processes associated with producing and recovering feedstock, including, without limitation, processing, handling and storage that occurs before transporting the feedstock to a fuel production facility;

"feedstock transport" means activities and processes associated with transporting feedstock from the location of production or recovery to a fuel production facility, including, without limitation, the manufacture and maintenance of vehicles, vessels and pipelines used for transporting and leaks and spills that occur in the process of transferring the feedstock to a means of transportation;

"fertilizer and pesticide manufacture" means activities and processes associated with the use of fertilizers and pesticides for agricultural feedstock, including, without limitation, recovering and transporting raw materials and manufacturing, transporting and using fertilizers and pesticides;

"fuel dispensing" means activities and processes associated with the transfer of fuel from storage at a fuelling station into a vehicle or vessel for use in the engine of that vehicle or vessel or a device necessary for the intended use of the vehicle or vessel, including, without limitation, leaks and spills that occur in the transfer process;

"fuel production" means activities and processes associated with manufacturing or producing fuel at a fuel production facility, including, without limitation, fugitive emissions, flaring and leaks of substances during the fuel production process;

"fuel storage and distribution" means activities and processes associated with storing, handling and transporting fuel from the fuel production facility to and at the fuelling station;

"leaks and flaring" means fugitive emissions, leaks and flaring of substances during feedstock production and recovery;

"vehicle or vessel operation" means the consumption of fuel in the operation of vehicles and vessels, including, without limitation, in the operation of any device necessary to the intended operation or use of the vehicle or vessel.

[en. B.C. Reg. 320/2009, s. 8.]

Carbon intensity by component — calculation

11.06 (1) In this section, **"approved GHGenius"** means a version of GHGenius approved by the director for the applicable compliance period.

(2) For the purposes of section 6 (5) (d) (ii) (A) of the Act, the carbon intensities for the components must be calculated using an approved GHGenius.

[en. B.C. Reg. 320/2009, s. 8; am. B.C. Reg. 335/2012, Sch. 1, s. 12.]

Carbon intensity by component — alternative method

11.07 (1) For the purposes of section 6 (5) (d) (ii) (B) of the Act, a person may apply to the director for approval of an alternative method by submitting a proposal in writing so that it is received by the director on or before the end of the compliance period for which approval of the alternative method is requested.

(2) A proposal under subsection (1) must include the following information:

(a) legal name;

(b) operating name;

(c) name of the person submitting the proposal on behalf of the applicant;

(d) the address of the applicant, including, as applicable, street address, postal address, city and postal code;

(e) telephone and fax numbers;

(f) name and contact information for a person who can be contacted for additional information;

(g) the alternative method proposed for determining the carbon intensity of a component and an explanation of the basis on which the applicant asserts that the alternative method results in a more accurate determination of the carbon intensity for the component than is determined under section 11.06 for that component;

(h) any other information the applicant considers relevant to the application.

(3) An applicant must provide further information in respect of an application under this section on request of the director.

(4) A proposal under subsection (1) and further information provided under subsection (3) must be signed by the officer or employee referred to in subsection (2) (c) and include the following statement:

I certify that the information in this proposal is true and complete to the best of my knowledge and I understand that the director may require records evidencing the truth of that information to be provided.

(5) For the purposes of subsection (4), records evidencing a matter include, but are not limited to, scientifically defensible materials, including refereed journals.

(6) The director must provide an applicant under subsection (1) with an opportunity to be heard before deciding to refuse to accept the alternative method.

(7) An opportunity to be heard for the purposes of subsection (6) may be provided, as the director considers appropriate in the circumstances,

(a) in person,

(b) in writing, including by facsimile transmission or electronic mail, or

(c) by video conference, audio conference, telephone or other electronic means, if available.

(8) The director must include written reasons with a decision referred to in section 6 (7) of the Act.

[en. B.C. Reg. 320/2009, s. 8; am. B.C. Regs. 232/2011, s. 6; 335/2012, Sch. 1, s. 13; 287/2016, App. 1, s. 7.]

Carbon intensity records — content requirements

11.071 (1) A carbon intensity record must set out the following for each Part 3 fuel to which it relates:

(a) the carbon intensity of the Part 3 fuel;

(b) which of the provisions of the Act was relied on to determine the carbon intensity of the Part 3 fuel:

(i) section 6 (5) (a);

(ii) section 6 (5) (b);

(iii) section 6 (5) (c);

(iv) section 6 (5) (d) (i);

(v) section 6 (5) (d) (ii) (A);

(vi) section 6 (5) (d) (ii) (B);

(c) the following information, as applicable:

(i) if the person required to provide the carbon intensity record determined the carbon intensity of the Part 3 fuel using a carbon intensity published in accordance with section 6 (5) (c) of the Act, the fuel code shown for the Part 3 fuel in that publication;

(ii) if the person required to provide the carbon intensity record determined the carbon intensity of the Part 3 fuel using the method referred to in section 6 (5) (d) (ii) (A) of the Act, a record of inputs to an approved GHGenius, as defined in section 11.06 (1) of this regulation, and any additional information necessary to reproduce, using the approved GHGenius, the result submitted;

(iii) if the person required to provide the carbon intensity record determined the carbon intensity of the Part 3 fuel using the method referred to in section 6 (5) (d) (ii) (B) of the Act, a copy of the director's approval of an alternative method and, if the alternative method uses a spreadsheet model designed for the same purposes as GHGenius or uses another electronic method of calculating carbon intensity, a record of inputs to the spreadsheets for that alternative method or to the electronic calculation, as applicable.

(2) A carbon intensity record for a blend of Part 3 fuels must

(a) set out the proportion of each Part 3 fuel in the blend, and

(b) include carbon intensity records that conform to subsection (1) for each Part 3 fuel in the blend.

(3) A carbon intensity record must be in the form specified by the director.

[en. B.C. Reg. 287/2016, App. 1, s. 8.]

Part 3 compliance reports

11.08 (1) In this section, **"attorney"** and **"head office"** have the same meanings as in the *Business Corporations Act*.

(2) A Part 3 compliance report must be provided to the director on or before March 31 of the calendar year following the compliance period.

(2.1) Repealed. [B.C. Reg. 190/2016, App. 1, s. 7 (b).]

(3) A Part 3 compliance report must set out, as applicable, all the following identifying and contact information respecting the Part 3 fuel supplier:

(a) legal name;

(b) operating name;

(c) name of the officer or employee submitting the report on behalf of the Part 3 fuel supplier;

(d) the address of the head office in British Columbia, if applicable, and otherwise, the name and address of the corporation's attorney in British Columbia, including, as applicable, street address, postal address, city and postal code;

(e) telephone and fax numbers;

(f) email address.

(4) A Part 3 compliance report must set out, as applicable, all the following information in relation to the Part 3 fuel supplier for the compliance period set out under paragraph (a):

(a) the compliance period to which the report relates;

(b) the quantity of each Part 3 fuel supplied in the compliance period and included in the calculation under section 6 (4) of the Act;

(c) to (c.2) Repealed. [B.C. Reg. 287/2016, App. 1, s. 9 (a).]

(d) the quantity and expected use of each Part 3 fuel that

(i) was supplied by the Part 3 fuel supplier in the compliance period, and

(ii) is excluded under section 6 (3) of the Act from the calculation under section 6 (4) of the Act;

(e) for each Part 3 fuel supplier, in this paragraph called the "transferring Part 3 fuel supplier", from which the Part 3 fuel supplier acquired debits or validated credits,

(i) the legal name and address of the transferring Part 3 fuel supplier, and

(ii) the number of debits or validated credits acquired from the transferring Part 3 fuel supplier;

(f) for each Part 3 fuel supplier, in this paragraph called the "acquiring Part 3 fuel supplier" to which the Part 3 fuel supplier transferred debits or validated credits,

(i) the legal name and address of the acquiring Part 3 fuel supplier, and

(ii) the number of debits or validated credits transferred to the acquiring Part 3 fuel supplier.

(g) to (i) Repealed. [B.C. Reg. 335/2012, Sch. 1, s. 14 (b).]

(4.1) A Part 3 compliance report must include a carbon intensity record for each Part 3 fuel reported under subsection (4) (b).

(5) Repealed. [B.C. Reg. 287/2016, App. 1, s. 9 (c).]

(6) Repealed. [B.C. Reg. 335/2012, Sch. 1, s. 15.]

(7) A Part 3 compliance report must be signed by the officer or employee referred to in subsection (3) (c) and include a signed statement of that individual

(a) confirming, as applicable,

(i) that records evidencing the carbon intensity of all Part 3 fuel reported under subsection (4) (b) are available on request,

(ii) that records evidencing each matter reported under subsection (4) (b) to (f) are available on request, and

(iii) that a record evidencing the individual's authority to submit the report on behalf of the Part 3 fuel supplier is available on request, and

(b) containing the following statement:

I certify that the information in this report is true and complete to the best of my knowledge and I understand that the director may require records evidencing the truth of that information be provided.

(8) Repealed. [B.C. Reg. 287/2016, App. 1, s. 9 (e).]

(9) For the purposes of subsections (7) and (8), records evidencing a matter include, but are not limited to, the following types of records:

(a) dated metered-values, bills of lading, invoices, sales receipts, records of payments and records of transactions for the quantity of each Part 3 fuel reported under subsection (4) as supplied in a compliance period;

(b) dated contracts, including, without limitation, Part 3 agreements, records of transfer, invoices and records of payments for the debits and validated credits transferred to or by the Part 3 fuel supplier in the compliance period;

(c) carbon intensity records.

(10) A Part 3 compliance report must be submitted in the manner and form specified by the director.

[en. B.C. Reg. 320/2009, s. 8; am. B.C. Regs. 338/2010, Sch. s. 12; 232/2011, s. 7; 335/2012, Sch. 1, ss. 14 to 16; 50/2016, s. 15; 190/2016, App. 1, s. 7; 287/2016, App. 1, s. 9.]

Supplementary Part 3 compliance report

11.09 A supplementary compliance report referred to in section 7 (3) of the Act must

(a) comply with section 11.08 *[compliance reports]*, and

(b) indicate which information is different from the information provided in the Part 3 compliance report it supplements.

[en. B.C. Reg. 320/2009, s. 8.]

Records

11.10 (1) A Part 3 fuel supplier must retain at its principal place of business in British Columbia, if any, or the place of business of its attorney, otherwise, books of accounts and the records necessary for the fuel supplier to demonstrate compliance with section 6 of the Act for a compliance period.

(2) Records referred to in subsection (1) must be retained for 7 years after the end of the compliance period to which they relate.

[en. B.C. Reg. 320/2009, s. 8.]

Application for validation of credits

11.101 (1) An application under section 8 (4) of the Act must

(a) be made in the manner and form specified by the director, and

(b) include a report in the form specified by the director.

(2) Section 11.08 (3) *[identifying and contact information]*, as it applies to a compliance report, applies to a report under this section.

(3) A report under this section must set out

(a) the 3 month period to which the application relates, and

(b) the quantity of each Part 3 fuel supplied in that period.

(4) A report under this section must include the carbon intensity record for each Part 3 fuel reported under subsection (3) (b).

(5) A report under this section must be signed by the officer or employee referred to in section 11.08 (3) (c) and include a signed statement of that individual

(a) confirming

(i) that records evidencing the carbon intensity of all Part 3 fuel reported under subsection (3) (b) are available on request, and

(ii) that a record evidencing the individual's authority to submit the report on behalf of

the Part 3 fuel supplier is available on request, and

(b) containing the following statement:

I certify that the information in this report is true and complete to the best of my knowledge and I understand that the director may require records evidencing the truth of that information be provided.

(6) For the purposes of subsection (5), section 11.08 (9) applies to a report under this section.

(7) A person that applies under this section in a compliance period must maintain at its principal place of business in British Columbia, if any, or the place of business of its attorney, otherwise, books of accounts and the records referred to in subsection (5) (a) (i) for a period of 7 years after the end of that compliance period.

[en. B.C. Reg. 287/2016, App. 1, s. 10.]

Transferring debits and validated credits

11.11 (1) A transfer of debits or validated credits under section 8 (2) of the Act

(a) is not effective unless the transfer is proposed in accordance with subsection (2) of this section and approved by the director, and

(b) takes effect on the later of the following dates:

(i) the date on which the transfer is approved by the director;

(ii) a date specified in the proposal.

(2) A proposal under this section must

(a) be submitted to the director in the form and manner specified by the director,

(b) include evidence satisfactory to the director that the transferor and the transferee both consent to the transfer, and

(c) include the following information:

(i) the legal name and address of the transferor;

(ii) the legal name and address of the transferee;

(iii) the number of debits or validated credits to be transferred;

(iv) whether the transfer is for consideration and, if so, the fair market value of the consideration in Canadian dollars per debit or validated credit to be transferred;

(v) any other information required by the director.

(3) Without limiting subsection (1) (a), the director may decline to approve a proposed transfer if

(a) the director considers that the intent of the transfer is to avoid compliance with the Act or this regulation, or

(b) the director is not satisfied that the transferor or transferee will be able to comply with section 6 of the Act.

(4) A person who is required under section 8 (10) of the Act to maintain records must maintain the records at its principal place of business in British Columbia, if any, or the place of business of its attorney, otherwise, for a period of 7 years after the end of the compliance period in which the transfer occurred.

(5) The director may disclose statistical information about transfers of debits and validated credits including, without limitation, information respecting

(a) the numbers of debits or validated credits traded, and

(b) the average price per debit or validated credit traded.

[en. B.C. Reg. 190/2016, App. 2, s. 1; am. B.C. Reg. 287/2016, App. 1, s. 11.]

Part 3 — Administrative Penalties

Prescribed contraventions

12 (1) The following contraventions of the Act are prescribed for the purposes of section 12 (1) *[administrative penalties in relation to other matters]* of the Act:

(a) a failure to provide a Part 2 fuel compliance report by the date it is due;

(b) a failure to provide a Part 3 fuel compliance report by the date it is due;

(c) a failure to provide a supplementary report under section 3 (2) *[Part 2 compliance reports]* or 7 (2) *[Part 3 compliance reports]* of the Act;

(d) a failure to give written notice required by section 6 (9) *[change in carbon intensity]* of the Act;

(e) a failure to retain records as required under section 8 (10) *[transfers of credits and debits]* of the Act.

(2) The following contraventions of this regulation are prescribed for the purposes of section 12 (1) of the Act:

(a) a contravention of section 6.2 *[requirement for complete and accurate reports and records]*;

(b) a failure to comply with the requirements of section 6.3 *[fuel identification requirements]*;

(c) a failure to provide additional information in accordance with section 6.4 *[additional information in support of reports and records]*;

(d) any of the following in relation to section 7.3 *[renewable fuel labelling requirements]*:

(i) a failure to post a label in the circumstances required under subsection (1) of that section;

(ii) a failure to give notice in the circumstances required under subsection (1) of that section;

(iii) a failure to give notice in accordance with subsection (2) (b) of that section;

(iv) posting a label that does not meet the requirements of subsection (3) of that section;

(e) a failure to provide a carbon intensity record or other information required under section 11.031 (5) *[director requirement for information related to exclusion agreement]*;

(f) a failure to provide a report required under section 11.032 (1) *[exclusion reports in relation to exclusion agreements]*;

(g) a failure to retain books of accounts or records as required under any of the following:

(i) section 6.4 (6) *[additional information in support of reports and records]*;

(ii) section 7.1 (1) *[notional renewable fuel transfers]*;

(iii) section 7.2 (8) *[exemption from renewable fuel requirements]*;

(iv) section 11 (1) or (2) *[records for Part 2 fuel supplier]*;

(v) section 11.022 (8) *[exemption from low carbon fuel requirements]*;

(vi) section 11.032 (8) *[reports in relation to exclusion agreements]*;

(vii) section 11.10 (1) or (2) *[records for Part 3 fuel supplier]*;

(viii) section 11.11 (4) *[transferring debits and validated credits]*;

(ix) section 29 (6) *[transition — transferring debits and validated credits]*.

(3) A failure to pay an administrative penalty when it is due under

(a) section 9 (2), 10 (2) or 11 (5) of the Act, or

(b) section 18 (2) of this regulation,

as applicable, is prescribed as a contravention for the purposes of section 12 (1) of the Act.

[en. B.C. Reg. 287/2016, App. 1, s. 12.]

Amount of administrative penalties

13 (1) For the purposes of sections 9 (1) *[automatic administrative penalties]* and 11 (2) *[imposed administrative penalties: fuel requirements]* of the Act, the penalty rate is

(a) $0.30/litre for gasoline class fuel, and

(b) $0.45/litre for diesel class fuel.

(1.1) For the purposes of sections 10 (1) and 11 (4) of the Act, the penalty rate is $200.

(2) The maximum amount of an administrative penalty that may be imposed for a contravention described in any of the following is $100 000:

(a) section 12 (1) (a) *[Part 2 fuel compliance report]*;

(b) section 12 (1) (b) *[Part 3 fuel compliance report]*;

(c) section 12 (1) (c) *[supplementary reports]*;

(d) section 12 (2) (a) *[complete and accurate reports and records]*;

(e) section 12 (2) (b) *[fuel identification requirements]*;

(f) section 12 (2) (c) *[information in support of reports and records]*;

(g) section 12 (2) (e) *[carbon intensity records]*;

(h) section 12 (2) (f) *[exclusion reports]*.

(2.1) The maximum amount of an administrative penalty that may be imposed for a contravention described in any of the following is $10 000:

(a) section 12 (1) (d) *[notice of change in carbon intensity]*;

(b) section 12 (1) (e) *[transfer records for credits and debits]*;

(c) section 12 (2) (g) *[record retention requirements]*.

(2.2) The maximum amount of an administrative penalty that may be imposed for a contravention described in section 12 (2) (d) *[renewable fuel labelling requirements]* is $500.

(3) If all or a portion of an administrative penalty is not paid when it is due, an additional penalty of up to 10% of the outstanding balance may be imposed for each 14-day period it remains unpaid.

[am. B.C. Regs. 320/2009, s. 10; 338/2010, Sch. ss. 16 to 18; 335/2012, Sch. 1, s. 17; 287/2016, App. 1, s. 13.]

Notice of intention to impose administrative penalty

14 (1) Before sending an administrative penalty notice to a fuel supplier under section 11 (2) or (4) or 12 (2) of the Act, the director must

(a) serve the person with a notice of intent to impose an administrative penalty, and

(b) provide the fuel supplier with an opportunity to be heard.

(2) An opportunity to be heard for the purposes of this section may be provided, as the director considers appropriate in the circumstances,

(a) in person,

(b) in writing, including by facsimile transmission or electronic mail, or

(c) by video conference, audio conference, telephone or other electronic means, if available.

(3) A notice of intent to impose an administrative penalty must set out

(a) the alleged non-compliance, including the provision of the Act or regulations the person is alleged to have contravened and the circumstances of that non-compliance, and

(b) the time, date, place and manner of hearing or the due date for written submissions.

(4) A notice of intent to impose an administrative penalty must be served on the person not less than 21 days before the date of a hearing under subsection (2) (a) or (c) or the due date of a submission under subsection (2) (b).

(5) On application, the director may change a time, date or manner of hearing specified under subsection (3) (b).

[am. B.C. Regs. 320/2009, s. 11; 338/2010, Sch. s. 19; 141/2015, s. 6.]

Consequences of failing to appear or provide submissions

15 If a person who is served with notice under section 14 (1) of this regulation fails to appear or provide submissions when required by the notice or under section 14 (5) of this regulation, as applicable, the director may proceed without further notice to serve the person with an administrative penalty notice under section 11 (2) or (4) or 12 (2) of the Act.

[am. B.C. Regs. 338/2010, Sch. s. 20; 141/2015, s. 6.]

Determining the amount of an administrative penalty

16 (1) In determining the amount of an administrative penalty for a failure to submit a compliance report by the date it was due, the director must consider

(a) whether the fuel supplier has previously submitted compliance reports late and how often, and

(b) Repealed. [B.C. Reg. 338/2010, Sch. s. 21.]

(c) any other matter the director considers relevant.

(2) In determining the amount of an administrative penalty for a failure to retain records as required under section 11 (1) or (2) or 11.10 (1) or (2) *[records]*, the director must consider

(a) whether the fuel supplier has previously failed to retain the proper records or has failed to retain those records for 7 years, and how often, and

(b) any other matter the director considers relevant.

(3) The director must not serve an administrative penalty notice on a person who has satisfied the director that the person exercised due diligence to prevent the contravention or failure in respect of which an administrative penalty may be imposed.

[am. B.C. Regs. 320/2009, Sch. s. 12; 338/2010, Sch. s. 21.]

Notice of administrative penalty

17 A notice of administrative penalty for the purposes of section 11 (2) or (4) or 12 (2) of the Act must include all the following information:

(a) the date by which the administrative penalty must be paid;

(b) acceptable methods of payment;

(c) the address to which the payment must be sent;

(d) that the determination of non-compliance, the extent of the non-compliance or, in the case of an administrative penalty under section 12 of the Act, the amount of the administrative penalty, may be appealed to the Environmental Appeal Board in accordance with Part 5 of the Act and Part 4 of this regulation.

[am. B.C. Regs. 338/2010, Sch. s. 22; 141/2015, s. 6.]

Payment of administrative monetary penalty

18 (1) An administrative penalty must be made payable to the Minister of Finance.

(2) An administrative penalty under section 12 *[administrative penalties in relation to other matters]* of the Act must be paid within 30 days after the date the fuel supplier is subject to the administrative penalty in accordance with section 11 (5) or 12 (3) of the Act, as applicable.

[am. B.C. Regs. 320/2009, s. 13; 338/2010, Sch. s. 23.]

Time limit for imposing administrative penalties

19 (1) A notice under section 14 *[notice of intention to impose administrative penalty]* must not be sent

(a) more than 3 years after the date of the non-compliance to which it relates, or

(b) if the minister issues a certificate described in subsection (2), 18 months after the date on which the minister learned of that non-compliance.

(2) A certificate purporting to have been issued by the minister certifying the date referred to in subsection (1) (b) is proof of that date.

Publication of names

20 (1) The minister may publish, including by electronic means, all the following information in respect of a fuel supplier on whom an administrative penalty has been imposed under section 9, 11 or 12 of the Act:

(a) legal name;

(b) amount of the penalty;

(c) the provision of the Act or regulations with which the fuel supplier failed to comply.

(2) Publication under subsection (1) in relation to an administrative penalty under section 11 or 12 of the Act may not occur until the fuel supplier is subject to the administrative penalty in accordance with section 11 (5) or 12 (3) of the Act, as applicable.

[am. B.C. Reg. 320/2009, s. 14.]

Part 4 — Appeals

Time limit for commencing appeal

21 The time limit for commencing an appeal is 30 days after the notice of administrative penalty to which it relates is served.

Procedures on appeal

22 An appeal must be

(a) commenced by notice of appeal in accordance with the Environmental Appeal Board Procedure Regulation, and

(b) conducted in accordance with Part 5 *[Appeals to Environmental Appeal Board]* of the Act and the Environmental Appeal Board Procedure Regulation.

Powers of appeal board on appeal

23 (1) On an appeal, the appeal board may

(a) send the matter back to the person who made the decision with directions,

(b) confirm, reverse or vary the decision being appealed, or

(c) make any decision that the person whose decision is appealed could have made, and that the appeal board considers appropriate in the circumstances.

(2) The appeal board may conduct an appeal by way of a new hearing.

Part 5 — Administration and Enforcement

Inspectors

24 (1) The director may

(a) designate a person as an inspector or a class of persons as inspectors, and

(b) issue identification to a person, or a person in a class, designated under paragraph (a), identifying the person as an inspector.

Inspection and seizure powers

25 (1) For the purposes of ensuring compliance with this Act or the regulations, an inspector, at any reasonable time, may enter land or premises, other than premises or a part of premises used solely as a private residence, and inspect any place, process, thing or activity that is the business premises or operations of a fuel supplier.

(2) An inspector who enters on land or premises under this section may do any of the following for the purposes referred to in subsection (1):

(a) inspect, analyze, measure, sample or test anything;

(b) use or operate anything or require the use or operation of anything, under conditions specified by the inspector;

(c) take away samples;

(d) make or take away copies of records.

(3) An inspector who enters land or premises in accordance with this section

(a) may take along the persons and equipment that the inspector considers may be necessary for the purposes of the inspection, and

(b) on request, must provide proof of identity to a person present on the land or premises entered.

(4) Section 112 of the *Environmental Management Act* is adopted for the purposes of the Act and for that purpose

(a) a reference in section 112 to "this Act" or to "this Act or the regulations" must be read as a reference to the Act or the Act and this regulation,

(b) a reference in section 112 to a director must be read as a reference to the director under the Act, and

(c) a reference in section 112 to an officer is to be read as a reference to an inspector.

(5) A person who is the subject of an inspection under this section, or who is or was a director, receiver, receiver manager, officer, employee, banker, auditor or agent of a person who is the subject of an inspection under this section, on request of an inspector, must

(a) produce, without charge or unreasonable delay, for examination by the inspector, any record relating to requirements under this Act, and

(b) provide the inspector with information relevant to the purposes of the inspection.

Disclosure of information

25.1 For the purposes of section 22 (4) (b) *[confidentiality]* of the Act, the following enactments are prescribed:

(a) the *Carbon Tax Act*;

(b) the *Motor Fuel Tax Act*.

[en. B.C. Reg. 190/2016, App. 1, s. 8 (b).]

Part 6 — Transition

Repealed

26 Repealed. [B.C. Reg. 335/2012, Sch. 2, s. 3.]

Repealed

27 Repealed. [B.C. Reg. 335/2012, Sch. 1, s. 18.]

Repealed

28 Repealed. [B.C. Reg. 190/2016, App. 1, s. 9.]

Transition — transferring debits and validated credits

29 (1) In this section, **"transition period"** means the part of the 2016 compliance period before September 1, 2016.

(2) A Part 3 fuel supplier that is or was a Part 3 fuel supplier in the 2016 compliance period may not transfer debits or validated credits under section 8 (2) of the Act unless the Part 3 fuel supplier has submitted to the director

(a) a Part 3 compliance report for the 2016 compliance period, or

(b) a report under this section.

(3) Section 11.08 (3) applies to a report under this section.

(4) A report under this section must set out, as applicable, all the following information in relation to the Part 3 fuel supplier for the transition period:

(a) whether the Part 3 fuel supplier transferred or acquired debits or validated credits under section 8 (2) of the Act;

(b) for each Part 3 fuel supplier, in this paragraph called the "transferring Part 3 fuel supplier", from which the Part 3 fuel supplier acquired debits or validated credits,

(i) the legal name and address of the transferring Part 3 fuel supplier, and

(ii) for each transfer from the transferring Part 3 fuel supplier,

(A) the date of the transfer,

(B) the number of debits or validated credits transferred, and

(C) whether the transfer was for consideration and, if so, the fair market value of the consideration in Canadian dollars per debit or validated credit transferred;

(c) for each Part 3 fuel supplier, in this paragraph called the "acquiring Part 3 fuel supplier", to which the Part 3 fuel supplier transferred debits or validated credits,

(i) the legal name and address of the acquiring Part 3 fuel supplier, and

(ii) for each transfer to the acquiring Part 3 fuel supplier,

(A) the date of the transfer,

(B) the number of debits or validated credits transferred, and

(C) whether the transfer was for consideration and, if so, the fair market value of the consideration in Canadian dollars per debit or validated credit transferred.

(5) A report under this section must be signed by the officer or employee referred to in section 11.08 (3) (c) and include a signed statement of that individual

(a) confirming, as applicable, all the following:

(i) that records evidencing each matter reported under subsection (4) (b) and (c), if applicable, are available on request;

(ii) that a record evidencing the individual's authority to submit the report on behalf of the Part 3 fuel supplier is available on request, and

(b) containing the following statement:

I certify that the information in this report is true and complete to the best of my knowledge and I understand that the director may require records evidencing the truth of that information to be provided.

(6) A person that submits a report under this section must maintain at its principal place of business in British Columbia, if any, or the place of business of its attorney, otherwise, books of accounts and the records referred to in subsection (5) (a) (i) for a period of 7 years after the end of the 2016 compliance period.

[en. B.C. Reg. 190/2016, App. 2, s. 2; am. B.C. Reg. 287/2016, App. 1, s. 14.]

[Provisions relevant to the enactment of this regulation: *Greenhouse Gas Reduction (Renewable and Low Carbon Fuel Requirements) Act*, S.B.C. 2008, c. 16, sections 24 to 29]
