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June 2, 2020

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

Attention: Ms. Marija Tresoglavic, Acting Commission Secretary

Dear Ms. Tresoglavic:

Re: FortisBC Energy Inc. (FEI)
Project No. 1599033
Revelstoke Propane Portfolio Cost Amalgamation Application (Application)
Response to the British Columbia Utilities Commission (BCUC) Information
Request (IR) No. 3 on Rebuttal Evidence

On July 18, 2019, FEI filed the Application referenced above. In accordance with the Regulatory Timetable established by BCUC Order G-105-20 for the review of the Application, FEI respectfully submits the attached response to BCUC IR No. 3 on Rebuttal Evidence.

If further information is required, please contact the undersigned.

Sincerely,

FORTISBC ENERGY INC.

Original signed:

Doug Slater

Attachments

cc (email only): Registered Parties

1 **23.0 Reference: CORRELATION BETWEEN RESIDENTIAL USE PER CUSTOMER (UPC)**
 2 **AND HEATING DEGREE DAYS (HDDs)**

3 **Exhibit B-15 (Rebuttal Evidence), pp. 1-3**

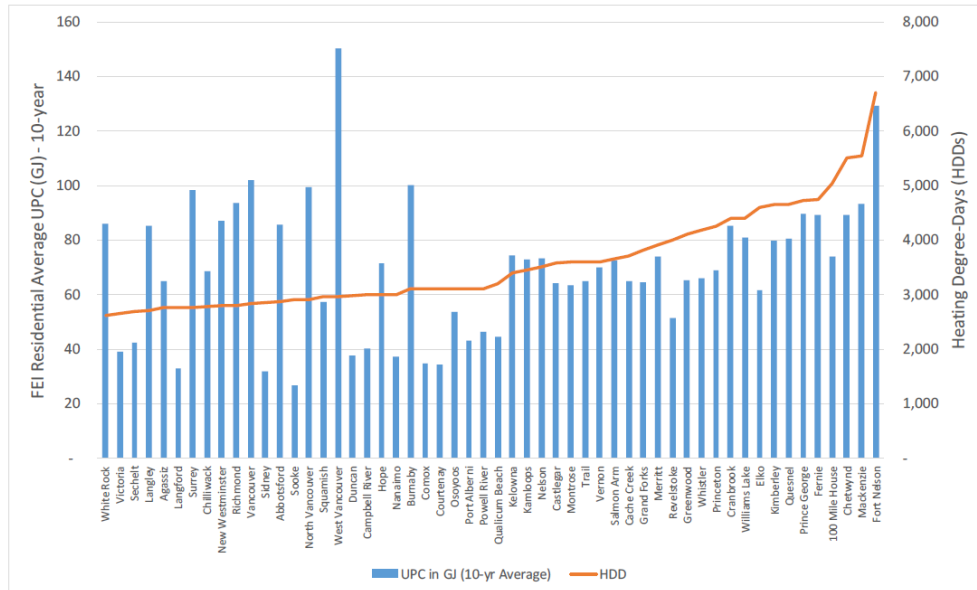
4 **Propane Consumption of Existing FEI Revelstoke Customers**

5 On page 1 of FEI’s rebuttal evidence submission, FEI states:

6 ...as defined in FEI’s response to BCUC IR1 5.1, the 90 GJ average consumption
 7 figure represents the 10-year average UPC for FEI’s residential customers in
 8 service areas that include Lower Mainland, Inland, Columbia, Vancouver Island,
 9 and Whistler. The HDDs in these service areas have ranged from 2,000 to 6,000.
 10 Therefore, Mr. Suchy is incorrect in using Vancouver’s HDD of 2,775 with FEI’s 10-
 11 year average residential UPC of 90 GJ in his estimation of Revelstoke’s UPC by
 12 directly proportioning between residential UPC and HDDs.

13 On page 2 of FEI’s rebuttal evidence submission, FEI provides Figure 1 as shown below:

Figure 1 – Average (10-year) Residential UPC and HDD over 54 Cities in FEI’s Service Areas



14
 15 23.1 Please confirm, or explain otherwise, that Figure 1 shows the average residential
 16 UPC in Vancouver was greater than the 90GJ estimate Mr. Suchy used in his
 17 estimation of Revelstoke’s UPC.
 18

19 **Response:**

20 Confirmed. The actual 10-year average UPC for FEI’s Vancouver residential customers is
 21 102 GJ.

1 Regardless of whether FEI uses the actual UPC figures for Revelstoke or a higher projection as
 2 suggested by Mr. Suchy, the impact of the portfolio amalgamation to FEI's natural gas customers
 3 does not materially change. As such, the final Revelstoke UPC or number of conversions that
 4 result from approval of FEI's proposals does not change FEI's recommendations. The intended
 5 rate relief and rate stability for FEI's Revelstoke customers discussed in the response to BCUC
 6 IR1 2.1 will be realized across a range of UPC figures.

7
 8
 9

10 23.2 Please confirm, or explain otherwise, that using FEI's actual UPC and HDD for
 11 residential customers in Vancouver with Mr. Suchy's estimation methodology
 12 would result in a higher estimated UPC in Revelstoke than Mr. Suchy's original
 13 estimate.

14

15 **Response:**

16 Confirmed. Using FEI's actual 10-year average residential UPC for Vancouver of 102 GJ and Mr.
 17 Suchy's estimation methodology would result in an estimated residential UPC for Revelstoke of
 18 169 GJ (please refer to Table 1 below for the calculation). FEI notes that a residential UPC of
 19 169 GJ for Revelstoke is equivalent to an increase of approximately 239 percent from the current
 20 actual average UPC level of 50 GJ for Revelstoke residential customers. This level of residential
 21 UPC for Revelstoke would also be higher than the 10-year average UPC for West Vancouver of
 22 150 GJ and Fort Nelson of 129 GJ which are the two highest actual UPC figures shown in
 23 Figure 1 of FEI's Rebuttal Evidence. There is no reason to believe that Vancouver's UPC would
 24 be applicable to Revelstoke, even when adjusted for the impacts of weather.

25 **Table 1: Calculation of Revelstoke UPC Based on Mr. Suchy Estimation Methodology and**
 26 **Vancouver's Residential UPC of 102 GJ**

	UPC (GJ)	HDD
Vancouver	102	2,775
Revelstoke (Mr. Suchy Estimation Methodology)	169	4,611
FEI's Revelstoke 10-yr average	50	
% Increase from FEI's Revelstoke 10-yr Average	239%	

27

28 FEI considers this hypothetical scenario to be unrealistic as it would imply that customers would
 29 more than triple their UPC from 50 GJ to 169 GJ as a result of the proposed propane portfolio
 30 cost amalgamation (PPCA). In turn, the annual bills would increase by \$441, or approximately
 31 48 percent from the current level (i.e., separate commodity cost portfolio) for the average
 32 Revelstoke residential customer as shown in Table 2 below.

1 **Table 2: Total Annual Bill Impact if Revelstoke Residential UPC Increase from 50 GJ to 169 GJ**

Line	Particular	Reference	
1	Residential Basic Charge (\$)	Appendix D-1, Line 6	149
2	Residential Delivery Margin Related Charge (\$/GJ)	Appendix D-1, Line 11	4.349
3			
4	Residential Cost of Propane (\$/GJ) - Current	Table 5-2 of Application, Line 12	10.930
5	Residential Cost of Propane (\$/GJ) - PPCA	Table 5-2 of Application, Line 12	2.782
6			
7	FEI's Revelstoke Residential UPC (GJ)		50
8	Total Annual Bill (incl. Delivery and Commodity) (\$)	Line 1 + (Line 2 + Line 4) x Line 7	\$ 913
9			
10	Mr. Suchy's Hypothetical Scenario of Revelstoke Residential UPC (GJ)		169
11	Total Annual Bill (\$) - Mr Suchy's Hypothetical Scenario	Line 1 + (Line 2 + Line 5) x Line 10	\$ 1,354
12			
13	Increase in Total Annual Bill (\$)	Line 11 - Line 8	\$ 441
14	% Increase in Total Annual Bill	Line 13 / Line 8	48%

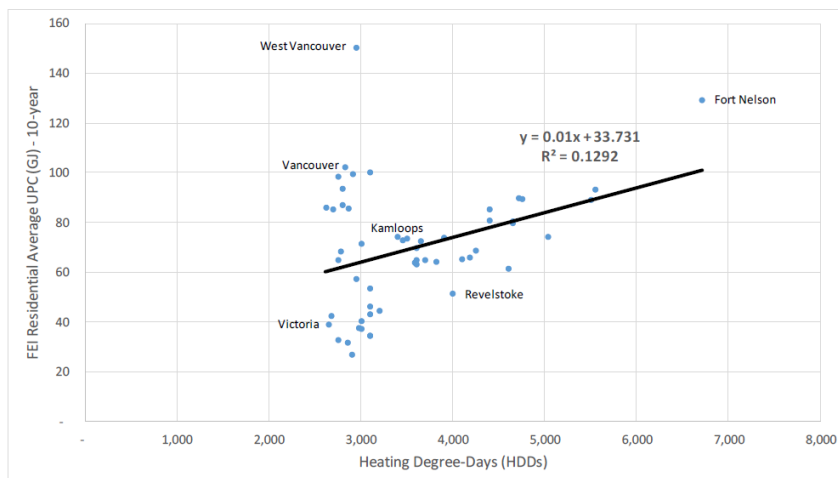
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On page 2 of FEI's rebuttal evidence submission, FEI states:

7 Figure 2 shows the linear regression between the 10-year average residential UPC
 8 and HDDs over these 54 cities. The regression demonstrates that only a small
 9 portion of the variance in UPC can be explained by differences in HDDs with the
 10 coefficient of determination (R²) between these two variables of approximately 13
 11 percent. This further indicates that the use of HDDs to calculate the residential
 12 UPC for Revelstoke is flawed.

13 On page 3 of FEI's rebuttal evidence submission, FEI provides Figure 2 as shown below:

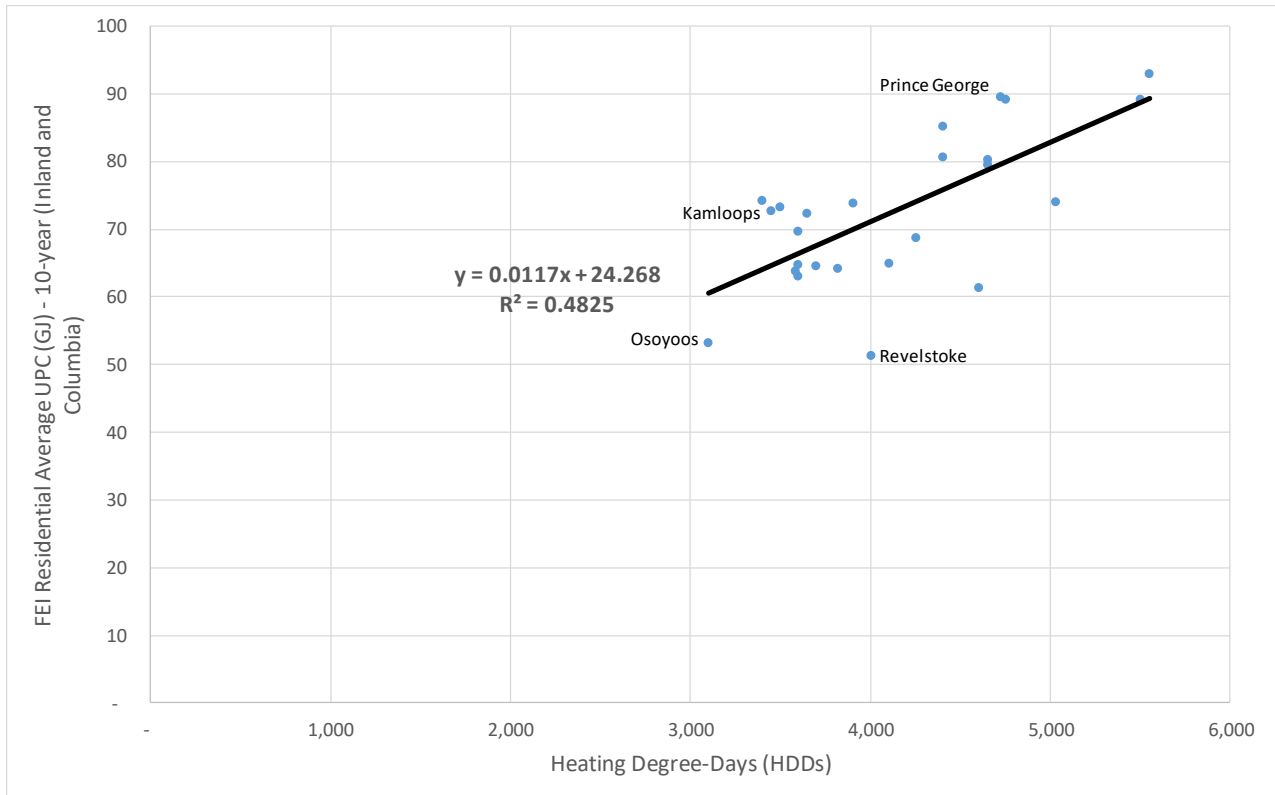
Figure 2 – Linear Regression between FEI's Residential UPC and HDD over 54 Cities in FEI's Service Areas



1 23.3 Please provide a linear regression analysis of UPC per HDD similar to Figure 2 for
 2 only the cities included in FEI’s dataset outside of the Vancouver Island, Lower
 3 Mainland, and Fort Nelson areas.
 4

5 **Response:**

6 Please see the figure below for the linear regression analysis of actual 10-year average UPC per
 7 HDD for municipalities within FEI’s Inland and Columbia region (outside of Vancouver Island,
 8 Lower Mainland, and Fort Nelson)¹ which shows a coefficient of determination (R²) of 48.25
 9 percent.



10

11

12 For greater clarity, FEI adds that, in a given geographical location, a correlation does exist
 13 between HDDs and natural gas demand. However, FEI’s analysis in its Rebuttal Evidence
 14 compares the UPC per HDD across different geographic locations and shows there is little
 15 correlation between UPC per HDD between different geographical locations. Further, FEI’s
 16 analysis demonstrates that Mr. Suchy’s model is flawed because actual historical UPC data from
 17 one city cannot be used to directly predict the UPC of another city. Please also refer to the
 18 response to BCUC IR3 23.7.

¹ Municipalities with HDDs data available from BC Building Code Appendix C.

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1 Further, the relationship between residential UPC and HDDs for Revelstoke does not provide any
2 insight into price elasticity.

3
4
5
6 23.3.1 Please discuss whether FEI considers that this dataset is more
7 representative of municipalities similar to Revelstoke than the dataset of
8 54 cities used in Figure 2.

9
10 **Response:**

11 FEI believes that municipalities from FEI's Inland and Columbia regions would be more
12 representative as these communities are, anecdotally, more similar to Revelstoke with respect to
13 weather and their access to wood heating than urban municipalities in the Lower Mainland such
14 as Vancouver. While this selection of municipalities may narrow some differences, the response
15 to BCUC IR3 23.3 demonstrates that, based on actual historical data, there is not a strong
16 correlation between UPC and HDD across different cities and/or regions with a coefficient of
17 determination (R^2) of 48.25 percent. The regression analysis demonstrates that less than half of
18 the variation in UPC within the Interior Region is explained by weather and that the majority of the
19 variation is explained by other factors.

20
21
22
23 23.3.2 Please provide the coefficient of determination shown by this dataset and
24 explain what implications this has on Revelstoke's status as an outlier in
25 UPC per HDD.

26
27 **Response:**

28 As shown in the response to BCUC IR3 23.3, the coefficient of determination (R^2) is 48.25 percent
29 for a linear regression analysis of UPC per HDD for municipalities within the Inland and Columbia
30 regions only². FEI notes that R^2 has no implications on whether a certain data point is an outlier
31 or not. R^2 is a statistical measure of how much of the variance between the dependent variables
32 (e.g. UPC) can be predicted from the independent variable (e.g. HDD). As shown in the response
33 to BCUC IR3 23.3, the regression analysis of UPC per HDD for municipalities within Inland and
34 Columbia regions suggests that approximately 48.25 percent of the variation in UPC between
35 different municipalities could be explained by the difference in HDD (i.e., the majority of the
36 variance is explained by other factors).

² Municipalities within Inland and Columbia Region with HDDs data available from BC Building Code Appendix C.

1 Using the Grubbs' Test for outliers³, the UPC per HDD for Revelstoke, with 95 percent confidence
 2 level, is neither a statistical outlier across all 54 cities nor a statistical outlier across only cities
 3 within the Inland and Columbia regions. Please refer to Table 1 for the Grubbs' Test for outliers
 4 across all 54 cities and Table 2 below for Inland and Columbia only. West Vancouver is the only
 5 city that shows as an outlier. Please also refer to the live spreadsheet provided in
 6 Attachment 23.3.2 for the data set and calculations for the Grubbs' Test for outliers.

7 **Table 1: Grubbs' Test for Outliers across 54 Cities**

Region	Cities	UPC in GJ		Grubbs Test (G)	Outliers Y/N (If G > Critical G)	Region	Cities	UPC in GJ		Grubbs Test (G)	Outliers Y/N (If G > Critical G)		
		(10-yr Average)	HDD					(10-yr Average)	HDD				
LM	White Rock	86	2,620	0.033	1.553	No	VI	Qualicum Beach	44	3,200	0.014	0.755	No
VI	Victoria	39	2,650	0.015	0.656	No	INL	Kelowna	74	3,400	0.022	0.219	No
VI	Sechelt	42	2,680	0.016	0.517	No	INL	Kamloops	73	3,450	0.021	0.125	No
LM	Langley	85	2,700	0.032	1.408	No	INL	Nelson	73	3,500	0.021	0.109	No
LM	Agassiz	65	2,750	0.024	0.426	No	INL	Castlegar	64	3,580	0.018	0.269	No
VI	Langford	33	2,750	0.012	0.996	No	INL	Montrose	63	3,600	0.018	0.306	No
LM	Surrey	98	2,750	0.036	1.921	No	INL	Trail	65	3,600	0.018	0.253	No
LM	Chilliwack	68	2,780	0.025	0.555	No	INL	Vernon	70	3,600	0.019	0.083	No
LM	New Westminster	87	2,800	0.031	1.341	No	INL	Salmon Arm	72	3,650	0.020	0.027	No
LM	Richmond	93	2,800	0.033	1.625	No	INL	Cache Creek	65	3,700	0.017	0.314	No
LM	Vancouver	102	2,825	0.036	1.960	No	INL	Grand Forks	64	3,820	0.017	0.393	No
VI	Sidney	32	2,850	0.011	1.093	No	INL	Merritt	74	3,900	0.019	0.135	No
LM	Abbotsford	86	2,860	0.030	1.209	No	INL	Revelstoke	51	4,000	0.013	0.882	No
VI	Sooke	27	2,900	0.009	1.321	No	INL	Greenwood	65	4,100	0.016	0.511	No
LM	North Vancouver	99	2,910	0.034	1.721	No	W	Whistler	66	4,180	0.016	0.527	No
LM	Squamish	57	2,950	0.019	0.085	No	INL	Princeton	69	4,250	0.016	0.474	No
LM	West Vancouver	150	2,950	0.051	3.776	Yes	COL	Cranbrook	85	4,400	0.019	0.085	No
VI	Duncan	37	2,980	0.013	0.917	No	INL	Williams Lake	81	4,400	0.018	0.208	No
VI	Campbell River	40	3,000	0.013	0.817	No	COL	Elko	61	4,600	0.013	0.820	No
LM	Hope	71	3,000	0.024	0.455	No	COL	Kimberley	80	4,650	0.017	0.359	No
VI	Nanaimo	37	3,000	0.012	0.937	No	INL	Quesnel	80	4,650	0.017	0.337	No
LM	Burnaby	100	3,100	0.032	1.494	No	INL	Prince George	90	4,720	0.019	0.131	No
VI	Comox	35	3,100	0.011	1.089	No	COL	Fernie	89	4,750	0.019	0.153	No
VI	Courtenay	34	3,100	0.011	1.100	No	INL	100 Mile House	74	5,030	0.015	0.651	No
INL	Osoyoos	53	3,100	0.017	0.347	No	INL	Chetwynd	89	5,500	0.016	0.469	No
VI	Port Alberni	43	3,100	0.014	0.754	No	INL	Mackenzie	93	5,550	0.017	0.400	No
VI	Powell River	46	3,100	0.015	0.627	No	FN	Fort Nelson	129	6,710	0.019	0.099	No

Mean	0.0201
SD	0.0082
n	54
Alpha	0.05
T-distribution	3.5131
Critical G	3.1588

8

³ <https://www.itl.nist.gov/div898/handbook/eda/section3/eda35h1.htm>.

1 **Table 2: Grubbs' Test for Outliers across 25 Cities within Inland and Columbia Region Only**

Region	Cities	UPC in GJ			Grubbs Test (G)	Outliers Y/N (If G > Critical G)
		(10-yr Average)	HDD	UPC/HDD		
INL	Osoyoos	53	3,100	0.017	0.227	No
INL	Kelowna	74	3,400	0.022	1.880	No
INL	Kamloops	73	3,450	0.021	1.531	No
INL	Nelson	73	3,500	0.021	1.473	No
INL	Castlegar	64	3,580	0.018	0.065	No
INL	Montrose	63	3,600	0.018	0.073	No
INL	Trail	65	3,600	0.018	0.123	No
INL	Vernon	70	3,600	0.019	0.758	No
INL	Salmon Arm	72	3,650	0.020	0.964	No
INL	Cache Creek	65	3,700	0.017	0.104	No
INL	Grand Forks	64	3,820	0.017	0.399	No
INL	Merritt	74	3,900	0.019	0.562	No
INL	Revelstoke	51	4,000	0.013	2.219	No
INL	Greenwood	65	4,100	0.016	0.836	No
INL	Princeton	69	4,250	0.016	0.700	No
COL	Cranbrook	85	4,400	0.019	0.750	No
INL	Williams Lake	81	4,400	0.018	0.292	No
COL	Elko	61	4,600	0.013	1.987	No
COL	Kimberley	80	4,650	0.017	0.272	No
INL	Quesnel	80	4,650	0.017	0.190	No
INL	Prince George	90	4,720	0.019	0.577	No
COL	Fernie	89	4,750	0.019	0.496	No
INL	100 Mile House	74	5,030	0.015	1.359	No
INL	Chetwynd	89	5,500	0.016	0.679	No
INL	Mackenzie	93	5,550	0.017	0.426	No

Mean	0.0177
SD	0.0022
n	25
Alpha	0.05
T-distribution	3.4850
Critical G	2.8217

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6 23.4 Please discuss whether FEI expects that Revelstoke's relatively low UPC per HDD

7 is due in part or in whole to its historically higher price of heating energy.

8

9 **Response:**

10 Please refer to the response to BCUC IR1 5.2.1 where FEI notes that there are many factors

11 contributing to a customer's energy use, including price, such that FEI cannot definitively explain

12 and does not have quantitative evidence as to why Revelstoke propane residential customers

13 historically use, on average, less than FEI's natural gas residential customers.

14 FEI has reproduced the factors listed in the response to BCUC IR1 5.2.1 that may contribute to a

15 customer's energy use below:



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- 1 • Number and age of occupants;
- 2 • Customer behavior;
- 3 • Dwelling size;
- 4 • Housing formations;
- 5 • Possible secondary heating sources such as wood fireplaces or electric heating;
- 6 • Number of appliances per dwelling;
- 7 • Seasonal homes;
- 8 • Local government conservation policies and activities; and
- 9 • Economic activities.

10
11

12

13 23.4.1 Please discuss any other factors that may account for this variance.

14

15 **Response:**

16 Please refer to the response to BCUC IR3 23.4.

17

18

19

20 23.5 Does FEI expect that Revelstoke's UPC per HDD would tend toward the line of
21 best fit over time if the propane portfolio cost amalgamation (PPCA) were
22 approved? Please elaborate.

23

24 **Response:**

25 FEI is not able to predict if Revelstoke's average UPC per HDD would or would not tend toward
26 the line of best fit over time if the PPCA were approved. As discussed in the response to BCUC
27 IR1 6.1, FEI believes the UPC for existing customers will remain relatively constant and might
28 increase or decrease over time for various factors not related to the cost of commodity. Based on
29 the historical data shown in BCUC IR1 6.1, there is little correlation between rates and energy
30 demand even for those years (i.e., 2010 and 2016) in which the rates were reduced significantly
31 from the previous years.

32 Finally, FEI notes that, even if Revelstoke UPC per HDD moved towards the line of best fit as
33 shown in Figure 2 of FEI's rebuttal evidence (i.e., approximately 72 GJ), the bill impact to FEI's
34 natural gas customers, as already demonstrated in Table 1 of FEI's rebuttal evidence, would

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1 remain small at less than \$2 per year for an average FEI natural gas customer consuming 90 GJ
2 per year under the PPCA.

3
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5
6 23.6 Please discuss whether FEI maintains data or has access to estimated heating
7 area per customer in Revelstoke and its other service territories.

8
9 **Response:**

10 FEI does not have or maintain estimated heating area per customer for any region or service
11 territory, including Revelstoke.

12
13
14
15 23.6.1 If confirmed, please provide a plot similar to Figure 2 showing HDDs vs
16 Usage Per Customer per square meter.

17
18 **Response:**

19 Please refer to the response to BCUC IR3 23.6.

20
21
22
23 23.7 Please discuss whether FEI is able to propose a more accurate method than Mr.
24 Suchy's model to illustrate the effects that historically higher gas prices have had
25 on gas usage per customer in Revelstoke compared to other FEI service areas.

26
27 23.7.1 If yes, please provide such methodology and explain how the results of
28 this model compare to Mr. Suchy's model.

29
30 23.7.2 If no, please explain why not.

31
32 **Response:**

33 FEI's rebuttal evidence demonstrates that, based on actual historical data, there is low correlation
34 of UPC per HDD between different cities and regions. Therefore, Mr. Suchy's model is flawed in
35 assuming that UPC of one city can be accurately predicted using only the difference of HDD
36 between different cities. The results in the response to BCUC IR3 23.2 exemplify this point.
37 There, the analysis using Mr. Suchy's assumption suggests that a customer's UPC will increase
38 nearly 3.4 times with amalgamated rates, which is unrealistic.



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1 Rather, FEI believes the correlation analysis provided in response to BCUC IR1 6.1 more
2 accurately depicts the impact of changes in pricing on UPC. A more precise method would be to
3 perform a price elasticity study; however, the costs of performing this study outweigh its benefits
4 given the minimal impact that UPC variances in Revelstoke would have on FEI's natural gas rates
5 under the proposal in this Application. Further, as discussed in response to BCUC IR2 19.5 and
6 19.6, third-party elasticity studies have shown a similar inelasticity of demand in response to
7 changes in price. Therefore, FEI believes a price elasticity study would be of limited value.

8

1 **24.0 Reference: POTENTIAL IMPACT TO GREENHOUSE GAS EMISSIONS**

2 **Exhibit B-15, pp. 6-7; Exhibit C1-4, p. 4**

3 **Economic Analysis and Alternative Fuels**

4 On page 6 of FEI's rebuttal evidence submission, FEI states:

5 Mr. Suchy assumes that all residential buildings currently using heating sources
 6 other than propane will be converted to propane as a result of FEI's proposed cost
 7 amalgamation. This assumption is flawed as it ignores the financial and technical
 8 challenges associated with conversions, as well as customers' individual
 9 preferences and circumstances.

10 On page 7 of FEI's rebuttal evidence submission, FEI provides Table 3 and states:

Table 3 – Annual Cost Savings and Simple Payback Period of each Conversion Type

Line	Particulars	Reference	Conversion to Propane Furnace from:					
			Oil Furnace	Air-source Heat pump	Electric heat resistance	Cordwood	Wood Pellets	RCEC
1	Equipment Cost	Mr. Suchy Evidence, Table 2, Propane Furnace	\$ 4,400	\$ 4,400	\$ 4,400	\$ 4,400	\$ 4,400	\$ 4,400
2	Installation Cost	Mr. Suchy Evidence, Table 2, Propane Furnace	1,000	1,000	1,000	1,000	1,000	1,000
3	Oil Tank Removal	Mr. Suchy Evidence, Table 2, Propane Furnace	1,475	-	-	-	-	-
4	Other Conversion Costs	Mr. Suchy Evidence, Table 2, Propane Furnace	1,150	1,150	1,150	1,150	1,150	1,150
5	Service Line Costs	\$15; Assuming less than 30 meters of FEI's Main	15	15	15	15	15	15
6	Total Capital	Sum of Line 1 to Line 5	\$ 8,040	\$ 6,565	\$ 6,565	\$ 6,565	\$ 6,565	\$ 6,565
7								
8	Annual Energy Consumption (GJ)	FEI's Revelstoke RS 1 UPC	50	50	50	50	50	50
9	Assumed Propane Appliance Efficiency		80%	80%	80%	80%	80%	80%
10	Annual Heating Demand (GJ)	Line 8 x Line 9	40	40	40	40	40	40
11								
12	Original Fuel - \$ per GJ of Heating Load	Mr. Suchy Evidence, Table 1	41.50	14.70	37.80	16.20	24.80	17.60
13	Original Fuel - Annual Heating Bill	Line 10 x Line 12	\$ 1,660	\$ 588	\$ 1,512	\$ 648	\$ 992	\$ 704
14								
15	Effective Propane Residential Rate - \$ per GJ of Heating Load	Mr. Suchy Evidence, Table 1	\$ 18.30	\$ 18.30	\$ 18.30	\$ 18.30	\$ 18.30	\$ 18.30
16	Propane - Annual Heating Bill	Line 10 x Line 15	732	732	732	732	732	732
17								
18	Annual Savings (\$)	Line 13 - Line 16	\$ 928	\$ (144)	\$ 780	\$ (84)	\$ 260	\$ (28)
19	Simple Payback (yrs)	Line 6 / Line 18	9	(46)	8	(78)	25	(234)

11

12 From a technical perspective, Mr. Suchy's analysis ignores the capital cost and difficulty
 13 associated with conversion from electric resistance heat where it is necessary to retrofit
 14 ductwork for a new forced-air propane furnace. As such, FEI believes the likelihood that
 15 reduced propane prices will encourage customers to switch from electric to propane
 16 heating is low given the renovation work required to install the necessary ductwork of a
 17 new forced-air propane heating system. As discussed in response to BCUC IR2 17.4, the
 18 price of the commodity is only one of the many factors that influence a customer's decision
 19 to convert from electric to propane end uses.

20 24.1 Please confirm that, in FEI's view, the capital cost estimates provided in Table 3 do
 21 not accurately capture all capital costs associated with switching from other heat
 22 sources to propane heating.



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1 **Response:**

2 Confirmed. For example, in the response to CEC IR1 9.2, FEI identified two additional cost items
3 that were not included in the capital costs in Table 3 provided by Mr. Suchy, which are required to
4 convert from an alternate heating source to piped propane. These include:

- 5 • the potential removal and disposal costs for existing appliances; and
- 6 • any modifications to the building envelope that might be required.

7
8 FEI notes that modifications to building envelope, including internal building renovations, can add
9 substantial costs to a conversion. In that regard, each conversion is unique so there is variability
10 in conversion cost for each customer. As a result, FEI provided an approximate average and
11 range of conversion costs in the response to BCUC IR1 7.3.1 based on historical conversion
12 costs for residential energy users in Revelstoke.

13 FEI notes that including additional capital costs in the analysis will serve to lengthen the payback
14 periods.

15
16
17
18 24.1.1 If confirmed, please provide FEI's estimates for the entire capital costs of
19 conversion to a propane furnace from other heating sources, if such
20 estimates are available.

21
22 **Response:**

23 Please refer to the response to BCUC IR3 24.1.

24
25
26
27 24.2 Please discuss the availability and capital costs of propane stove/fireplace inserts
28 and space heaters and explain whether these heating technologies could allow
29 Revelstoke residents to increase their usage of propane for heating with lower
30 capital costs than those indicated in Table 3.

31
32 **Response:**

33 FEI acknowledges other propane heating technologies such as propane stove/fireplace inserts
34 and space heaters are commercially available and anecdotally are less expensive (i.e., lower
35 capital cost) than propane furnaces; however, FEI does not have capital cost data for these
36 technologies for the Revelstoke area.

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1 FEI notes that propane stove/fireplace inserts and space heaters are typically used as secondary
2 heating or in rooms where the primary heating is not available. Over time, FEI might see an
3 increase in conversion of secondary heating to propane; however, it would likely be caused by
4 existing equipment failures or as part of a larger renovation project; not because of a one-time
5 change in the price of propane.

6 FEI notes that if the residents were not already connected to or located within 30 metres of the
7 distribution system, their conversion would include the capital costs associated with the service
8 line and meter to connect to the distribution system. Therefore, FEI believes that the lower capital
9 costs associated with propane stove/fireplace inserts and space heaters are unlikely to impact the
10 decision to convert for those customers located more than 30 metres from FEI's distribution
11 system.

12
13
14
15 24.3 Please discuss what heating sources are most commonly selected for new
16 residential and commercial construction in Revelstoke and why these heating
17 sources are selected.

18
19
20 **Response:**

21 FEI does not have information on new residential or commercial construction projects in
22 Revelstoke that are not using FEI's services.

23 FEI does not track the types of gas equipment installed in new homes. FEI has anecdotal
24 information suggesting that in Revelstoke, for approximately 90 percent of new homes, where
25 piped propane gas is available, builders are choosing propane gas as the primary source of
26 heating. There are several factors that contribute to this decision, such as overall comfort,
27 reliability, operating cost, etc.

28 In new commercial construction, propane gas may be required as part of the process, and not
29 necessarily for space heat. FEI does not have any information related to the reasons why a
30 business in Revelstoke selects certain heating sources, but FEI believes that cost and reliability
31 would be important considerations.

32
33
34
35 24.4 Please discuss whether FEI expects that new construction projects in Revelstoke
36 will be more likely to select propane as their primary heating fuel under FEI's
37 proposed PPCA as compared to the status quo.

38

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1 **Response:**

2 As discussed in the response to BCUC IR3 24.3, FEI's anecdotal information suggests that
3 approximately 90 percent of new homes in Revelstoke, where piped propane is available, use
4 propane as their primary heating fuel under the current separate gas cost portfolio. Therefore, in
5 the short term FEI does not believe there will be a significant increase in the proportion of new
6 homes choosing propane instead of other fuel types as a result of FEI's proposed PPCA since the
7 vast majority of homes already choose propane.

8 FEI expects that, where available, the proportion of new construction projects in Revelstoke
9 choosing propane as their primary heating fuel will remain relatively constant under FEI's
10 proposed PPCA as compared to the status quo. FEI may see a small increase in the number of
11 attachments from customers who are not yet on main but would like to switch to propane from
12 other fuels.

13 Similar to the rest of its service territory, FEI will face some challenges attaching new customers
14 in the long-term due to the increasing push, and incentives provided, for electric heat pump
15 adoption as a result of provincial/local government GHG policies.

16
17

18
19 24.4.1 If yes, please identify which alternative heating sources FEI expects
20 would be most impacted by the selection of propane as a main heating
21 fuel in new construction.
22

23 **Response:**

24 Please refer to the response to BCUC IR3 24.4 where FEI confirms that it does not expect that
25 new construction will be more likely to select propane as the primary heating fuel.

26
27

28
29 24.5 Please discuss whether FEI is able to model how the number of propane
30 customers in Revelstoke would be expected to change over time under the
31 proposed PPCA as compared to the status quo.

32 24.5.1 If yes, please explain the basis for FEI's model(s) and provide a summary
33 of expected results.

34 24.5.2 If not, please explain why not.
35

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1 **Response:**

2 FEI is not able to model how the number of propane customers in Revelstoke would be expected
3 to change over time under the proposed PPCA, nor has FEI attempted to do so. Rather, FEI has
4 provided an expected Upper Bound scenario in Section 4.1 of the Application for the increase in
5 Revelstoke propane customers under the proposed PPCA as compared to the status quo. FEI's
6 Upper Bound scenario identified a total of 1,063 residential dwellings that are within 30 metres of
7 an existing main, but are not currently customers. As discussed in the response to BCUC IR1
8 7.2, FEI did not attempt to assign a probability to the Upper Bound scenario.

9 In the Upper Bound scenario, FEI conservatively assumed that all of the 1,063 dwellings will
10 convert to propane in year 1 (based upon FEI's Service Line Cost Allowance it is likely that a
11 customer within 30 metres of a main would receive a service line at no additional cost to the
12 customer). The Upper Bound scenario was simply used to illustrate that the rate impact to FEI's
13 natural gas customers is small for an average FEI residential natural gas customer consuming
14 90 GJ per year at:

- 15 • Approximately \$1.26 annually for midstream rate impact as shown in BCUC IR2 19.4; and
- 16 • Approximately 4 cents for delivery rate impact as shown in Table 4-2 of the Application.

17
18 FEI believes actual conversion will occur over time rather than immediately after FEI's proposed
19 PPCA is approved. Therefore, the rate impact to FEI's natural gas customers should be lower
20 than the Upper Bound scenario.

21 Finally, as discussed in the response to BCUC IR1 7.4, FEI believes that commercial customers
22 would most likely have already converted from more expensive fuels to propane. If individual
23 commercial customers continue to use alternative fuel, such as heating oil, it is for reasons
24 unrelated to the price of propane.

25
26

27

28 On page 7 of FEI's rebuttal evidence submission, FEI states:

29 Based on Table 3 of this rebuttal evidence and the discussion above related to
30 electric resistance heating, FEI believes the only likely fuel source that will convert
31 to propane is heating oil given the savings in annual operating costs as well as
32 other non-economic factors related to heating oil as discussed in FEI's response to
33 BCUC IR2 16.5.

34 On page 4 of Mr. Suchy's intervenor evidence submission on behalf of Canadian Biomass
35 Energy Research Ltd. (CBER), Mr. Suchy states:

36 With respect to the lower amalgamated cost of propane inducing residents with oil heating
37 to convert to FEI propane, heating oil is already significantly more expensive than

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1 propane, see Figure 1. Rational consumers using heating oil would have switched already
2 to lower cost propane to save money, unless installation costs are too high or the propane
3 network too far away.

4 A further reduction in price of propane is unlikely to induce many heating oil dwellings to
5 convert to propane, since it is already rational for consumers to make that choice based on
6 fuel costs alone... To the extent that there are heating oil customers who could be induced
7 to fuel switch to save money, the amalgamated propane rate would make it more likely for
8 heating oil customers to switch to propane rather than to a low-GHG emitting wood stove,
9 whereas at current rates wood stoves are cost competitive with propane. Propane would
10 also become more cost-competitive with low-GHG emitting heat pumps, increasing the
11 likelihood of heating oil users to switch to a propane furnace rather than a heat pump.

12 24.6 Please explain why or why not, in FEI's view, most rational consumers of heating
13 oil in Revelstoke would have already switched to propane as their primary heating
14 source with existing propane prices and incentives.

15
16 **Response:**

17 In FEI's view, a consumer's decision to convert from heating oil to propane is not based on fuel
18 costs alone, as Mr. Suchy has suggested. As discussed in the response to BCUC IR2 17.4, FEI
19 believes the price of the commodity is only one of the many factors that affect a consumer's
20 decision to convert to propane as their primary heating source. Further, FEI believes that a
21 'rational consumer' of heating oil is more likely to have already switched to propane given the
22 historical price differential between heating oil and propane.

23
24
25
26 24.7 Please discuss how the likelihood of heating oil customers switching to propane
27 heating instead of electric heat pumps, wood stoves, or electric baseboard heating
28 will change under the proposed PPCA.

29
30 **Response:**

31 As discussed in the response to BCUC IR2 17.4, FEI believes there are many factors, not just fuel
32 costs alone, that could influence the decision to convert to propane. Accordingly, FEI is not able
33 to determine the likelihood of customers switching to propane from electric heat pumps, wood
34 stoves or electric baseboards.

35 However, if fuel costs were the only factor considered, FEI believes customers would choose their
36 least expensive feasible alternative. While FEI does not have data to verify the \$ per GJ of
37 heating load presented by Mr. Suchy for the alternative fuels in Revelstoke, the data in the table
38 below suggests that heating oil customers would select electric heat pumps or cordwood before



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- 1 propane, both before and after the PPCA, if feasible. Further, based on this assumption, heating
- 2 oil customers would prefer propane before electric baseboards, if feasible.

Energy Source/Appliance Type	\$ per GJ of Heat (Mr. Suchy's Evidence, Table 1)
Electric Heat Pump	14.7
Cordwood	16.2
Propane (PPCA)	18.3
Pellets	24.8
Propane (Current)	28.3
Electric Baseboard	37.8
Heating Oil	41.5

3

4

Attachment 23.3.2

REFER TO LIVE SPREADSHEET MODEL

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