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September 12, 2022

B.C. Sustainable Energy Association
c/o William J. Andrews, Barrister & Solicitor
70 Talbot Street
Guelph, ON N1G 2E9

Attention: Mr. William J. Andrews

Dear Mr. Andrews:

**Re: FortisBC Energy Inc. (FEI)
Revised Renewable Gas Program Application – Stage 2 (Application)
Response to the B.C. Sustainable Energy Association (BCSEA) Information
Request (IR) No. 2**

On December 17, 2021, FEI filed the Application referenced above. In accordance with the amended regulatory timetable established in British Columbia Utilities Commission Order G-165-22A, FEI respectfully submits the attached response to BCSEA IR No. 2.

FEI has not provided responses to BCSEA IR2 19.1 and 22.1 which were withdrawn by BCSEA in Exhibit C1-9.

If further information is required, please contact the undersigned.

Sincerely,

FORTISBC ENERGY INC.

Original signed:

Diane Roy

Attachments

cc (email only): Commission Secretary
Registered Parties



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1 **17.0 Topic: Renewable Gas Connections**

2 **Reference: Exhibit B-17, FEI Response to BCUC IR1 13.6, Table 1: Residential**
3 **Space and Water Heating Capital Cost Comparison, pdf p.124**

4 FEI provides a comparison of capital and operating costs for heat pumps and gas
5 furnaces. However, the workpapers are not provided.

6 17.1 Please provide the workpapers, documentation and assumptions that support
7 FEI's response to BCUC IR1 13.6, Table 1.

8
9 **Response:**

10 Please refer to Attachment 17.1 for the source spreadsheet used for the referenced table. FEI
11 relied on the following to support this response:

- 12 • Capital Costs were based on FEI's Stage 1 Generic Cost of Capital (GCOC) Evidence,
13 Appendix A, Table A6-2, page 74, and includes equipment and installation costs from
14 FortisBC's Home Energy Calculator. These costs were developed based on discussions
15 with contractors.
- 16 • Efficiency rates were also based on the same GCOC evidence, and results from a BC
17 heat pump water heater field study¹.
- 18 • At the time of filing this response, Clean BC Rebates were based on the following source
19 provided below.

¹ For the electric heat pump water heater, the efficiency was based on average COP values from multiple field test sites in BC - Tables 4 and 5 from "CO2 & Integrated Heat Pump Water Heater Performance Report", Energy350, September 27, 2018, PDF p 9. The average of the average COPs as found in the field (2.69 and 1.79) is 2.24, which was rounded up to 2.3 (230%) for the purposes of BCUC IR1 13.6.

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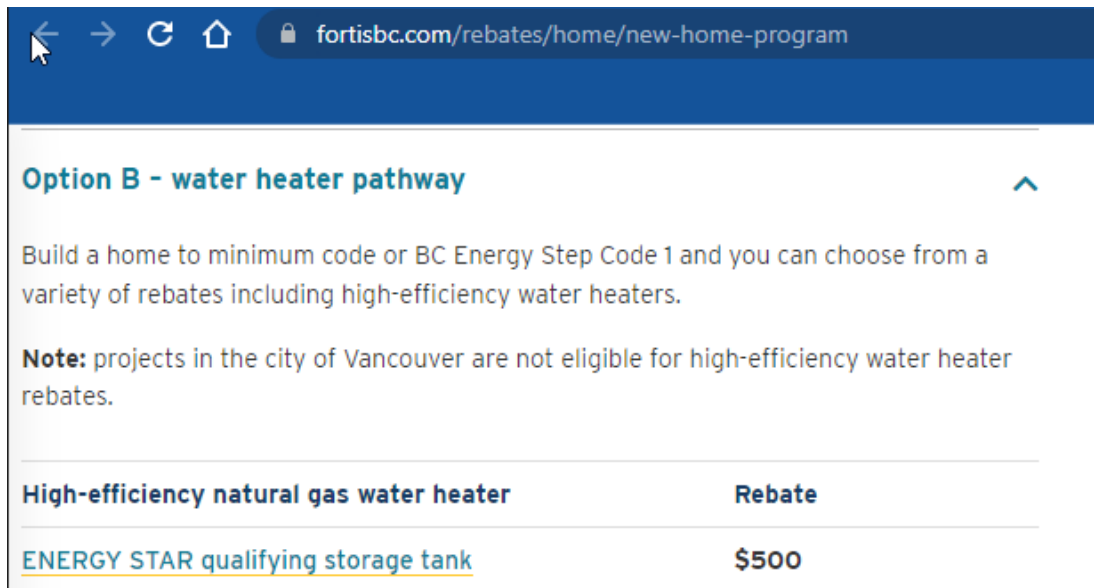
Heat Pump Pathway

Build a home that uses an electric heat pump for space heating and/or water heating, regardless of BC Energy Step Code level.

Heat Pump Type	Requirements	Rebate	Northern Top-Up*	Energy Advisor Support Rebate
Air source heat pump	Ductless mini-split heat pump, ductless multi-split heat pump, or central ducted heat pump (Tier 2) HSPF ≥10, SEER ≥16 Variable speed compressor Must be on the Qualifying Product List	\$3,000	+\$3,000	\$1,000 per individually modelled home or unit • \$800 to the builder • \$200 to the Energy Advisor OR \$2,000 per individually modelled home or unit if northern top-up eligible*
Air-to-water heat pump	Must be on the Qualifying Product List	\$3,000	+\$3,000	• \$1,600 to the builder • \$400 to the Energy Advisor
Combined space and hot water heat pump	Must be on the Qualifying Product List	\$4,000	+\$3,000	• \$1,600 to the builder • \$400 to the Energy Advisor
Heat pump water heater	Must be on the Qualifying Product List	\$1,000	No top-up	

• Note (*): To qualify for the northern top-up, eligible homes must be located north of and including the District of 100 Mile House (latitude 51.628°N) and have a building permit issues on or after April 1, 2022.

- 1
- 2 • At the time of filing this response, FortisBC Rebates were based on the following source:
- 3 <https://www.fortisbc.com/rebates/home/new-home-program>, a screenshot of which is
- 4 provided below.



- 5
- 6 • At the time of filing this response, Provincial Sales Tax was based on the following source:
- 7 [https://www2.gov.bc.ca/assets/gov/taxes/sales-taxes/publications/notice-2022-003-](https://www2.gov.bc.ca/assets/gov/taxes/sales-taxes/publications/notice-2022-003-provincial-sales-tax-on-fossil-fuel-combustion-systems-and-heat-pumps.pdf)
- 8 [provincial-sales-tax-on-fossil-fuel-combustion-systems-and-heat-pumps.pdf](https://www2.gov.bc.ca/assets/gov/taxes/sales-taxes/publications/notice-2022-003-provincial-sales-tax-on-fossil-fuel-combustion-systems-and-heat-pumps.pdf).

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1 **18.0 Topic: Cost of New Residential Gas Heating**

2 **Reference: Exhibit B-19, FEI Response to BCSEA IR1 16.12, pdf p.61**

3 In IR1 16.12, BCSEA asked FEI to provide gas consumption data separated into detailed
4 categories. FEI said it was unable to provide gas consumption data for new homes
5 separated into the categories requested.

6 “FEI derives consumption values for various end-uses and building types from data
7 collected in its Residential End Use Survey (REUS). The REUS collects
8 information on the building envelope, equipment installed, number of residents and
9 energy use behaviours. That data is then matched with 24 consecutive months of
10 consumption data to determine average consumption per appliance. The REUS
11 was last undertaken in 2017 and all but a small number of dwellings surveyed were
12 built prior to 2015.

13 An updated REUS will be issued for customer participation in May 2022. However,
14 as the end-use calculations are also dependent on the sample size, when the data
15 gathering is complete it is unlikely that FEI would have a sufficient number of
16 responses to provide the detail requested.” [underline added]

17 18.1 If the results of the May 2022 REUS are available, please provide a copy with the
18 attachments. Alternatively, please provide copy of the 2017 REUS with the
19 attachments.

20
21 **Response:**

22 The results of the 2022 REUS will not be available until later in 2022.

23 FEI has therefore provided data from the 2017 REUS in the tables below. The REUS studies do
24 not provide consumption data separated precisely into categories as requested in BCSEA IR1
25 16.12 for new homes. They do, however, provide an estimated Unit Energy Consumption per
26 end use for newer homes² throughout all FEI’s service areas. The consumption per end uses
27 requested in BCSEA IR1 16.12 are shown in the table below:

² Homes built in 2006 or later.

1 **Table 1: Energy Consumption by End Use – Newer Homes**

End Use	Service Area	Unit Energy Consumption (GJ/Yr)	Data Source
Space Heating	All FEI	42.9	2017 REUS
Water Heating	All FEI	22.9	2017 REUS
Drying Clothes	All FEI	**	2017 REUS
Cooking	All FEI	**	2017 REUS
** The REUS study produced an estimated Unit Energy Consumption that was negative			

2
3 An overall average household consumption value for newer homes is derived by combining the
4 penetration rates of different end uses in newer homes with the Unit Energy Consumption per
5 end use values. This reflects the reality that the whole home average consumption is derived
6 from a range of homes with a mix of different appliance end uses. Not all homes will use gas for
7 space heating for example. The whole home consumption value accounts for the penetration
8 rates of different gas fired appliances in newer homes in FEI's service area. The overall average
9 household consumption value is presented in the table below:

10 **Table 2: Average Household Consumption – Newer Homes**

End Use	Service Area	Average Consumption per Household (GJ/Yr)	Data Source
Whole Home (all types)	All FEI	63.9	2017 REUS

11
12 The REUS studies also provide some more granular insight into the consumption of both the
13 water heating and space heating end uses in newer homes. The consumption of these end uses
14 is provided for different home types located in various parts of FEI's service territory. These
15 values are shown in the two tables below:

16 **Table 3: Primary Gas Space Heating Unit End Use Consumption (GJ/year) – Newer Homes**

Home Type	Lower Mainland ¹	Vancouver Island ¹	Interior ¹	Fort Nelson ¹	Overall (weighted)
Single Family Dwelling	52.3	42.4	48.6	**	50.4
Multi Family Dwelling	22.4	17.3	21.0*	**	21.6
Apartments	**	**	**	**	**
Overall	60.0	38.6	48.1	**	42.9
* Small sample size (less than 30 households with end-use present). These results should be interpreted with caution.					
** Insufficient Sample to produce meaningful estimates.					
1. UEC's estimated from conditional demand model for newer homes.					



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1 **Table 4: Water Heating Unit End Use Consumption (GJ/year) – Newer Homes**

Home Type	Lower Mainland ¹	Vancouver Island ¹	Interior ¹	Fort Nelson ¹	Overall (weighted)
Single Family Dwelling	24.1	18.5	24.3	**	23.1
Multi Family Dwelling	22.5*	16.4*	24.8*	**	22.4
Apartments	**	**	**	**	**
Overall	23.7	18.3	24.4	**	22.9
* Small sample size (less than 30 households with end-use present). These results should be interpreted with caution. ** Insufficient Sample to produce meaningful estimates. 1. UEC's estimated from conditional demand model for newer homes.					

2

3

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1 **19.0 Topic: Heat Pump Costs**

2 **Reference: FEI 2017 Long-Term Gas Resource Plan proceeding, Exhibit B1,**
3 **Appendix C-1, 2017 Navigant Conservation Potential Review for FEI,**
4 **pdf p.347 et seq.**

5 The 2017 CPR for FEI refers to the following spreadsheets that are not included with the
6 document:

- 7 • Appendix A1: Detailed Model Results, FortisGas_Appendix_A1_2017-01-23.xlsx;
- 8 • Appendix A2: Measure List and Characterization Assumptions,
9 FortisGas_Appendix_A2_2017-01-23.xlsx; and
- 10 • Appendix A3: Other Key Input Assumptions, FortisGas_Appendix_A3_2017-01-
11 23.xlsx.

12 19.1 Please provide copies of the spreadsheets referred to above.

13

14 **Response:**

15 FEI has not provided a response to this question as it was withdrawn by BCSEA in Exhibit C1-9.

16

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1 **20.0 Topic: Gas equipment costs and assumptions**

2 **Reference: Exhibit B-19, FEI Responses to BCSEA IR1 16.2, 16.3, 16.6, 16.7, 16.9**
3 **and 16.11**

4 BCSEA intends to file expert evidence on the competitiveness between natural gas
5 equipment and electric heat pumps with specific regard for the RG Connections service.
6 [Transcript Volume 2, p. 102; Exhibit A-20-1, Appendix A to Order G-165-22A, p.5 of 9]

7 In its March 3, 2022 information requests to FEI [Exhibit C1-4], BCSEA asked various
8 questions aimed at eliciting information for BCSEA’s experts to use in preparing BCSEA’s
9 proposed evidence. FEI responded to many of these IRs. However, FEI declined to
10 respond to BCSEA IR1 16.2, 16.3, 16.6, 16.7, 16.9 and 16.11 on the grounds that they
11 are more relevant to FEI’s future DSM expenditures application or FEI’s recently-filed
12 LTGRP.

13 In the June 2, 2022 procedural conference, BCSEA argued that its proposed evidence
14 would be relevant to the proceeding. “FEI object[ed] to BCSEA’s request to file evidence
15 on the competitiveness between natural gas equipment and electric heat pumps stating
16 that the feasibility and cost effectiveness of specific equipment is not within the scope of
17 this proceeding.” [Transcript Volume 2, p. 92; Exhibit A-20-1, Appendix A to Order G-165-
18 22A, p.5 of 9]

19 The Panel determined that BCSEA’s proposed evidence would be relevant to the
20 proceeding. The Panel states:

21 “The Panel agrees with BCSEA that evidence pertaining to the relative
22 competitiveness of natural gas equipment and electric heat pumps is relevant to
23 this proceeding. FEI’s proposed RG Connections Service provides customers with
24 a choice between gas and electricity and any potential cross subsidization of costs
25 for the RG Connections Service may impact customers’ energy choices. Thus, the
26 Panel finds BCSEA’s intention to pursue evidence related to the energy choice of
27 ratepayers, or potential ratepayers, are within the scope for the review of this
28 Application.” [Exhibit A-20-1, Appendix A to Order G-165-22A, pp.5-6 of 9]

29 BCSEA respectfully requests FEI’s responses to BCSEA IR1 16.2, 16.3, 16.6, 16.7, 16.9
30 and 16.11 as set out below.

31 20.1 [16.2] Please indicate the main source or sources of information on the costs and
32 efficiencies of residential natural gas equipment for new construction that FEI uses
33 to inform its analyses for its DSM planning.
34

35 **Response:**

36 FEI’s primary source of information for DSM planning is the 2021 Conservation Potential Review
37 (CPR), prepared by the Posterity Group and submitted as an appendix to FEI’s 2023 DSM



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1 Expenditure Plan. In the 2021 CPR, four measures were identified for residential new
2 construction:

- 3 • New Construction Step 2 – Residential
- 4 • New Construction Step 3 – Residential
- 5 • New Construction Step 4 – Residential
- 6 • New Construction Step 5 – Residential

7 Each of the measures are whole-building measures aligned with the BC Energy Step Code (Step
8 2 through 5). No equipment-specific measures for new construction were included. Therefore,
9 FEI is unable to provide the requested information as it pertains to DSM planning.

10
11

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13 20.2 [16.3] Please provide the assumptions regarding installed equipment cost, internal
14 piping, energy efficiency rating, operating efficiency and average useful lifetime
15 that FEI uses in its analyses for: gas furnaces, gas tankless and storage water
16 heaters, gas oven/cooktops, and gas dryers used in typical new construction of the
17 kind FEI anticipates would be included in the Renewable Gas Connections
18 program.

19

20 **Response:**

21 As described in the response to BCSEA IR2 20.1, FEI's DSM analysis and planning for residential
22 new construction is based primarily around whole-building measures, with the measure
23 performance being defined by the requirements of the BC Energy Step Code. FEI does not
24 develop and therefore cannot provide DSM input assumptions for all the appliances requested in
25 the question for new construction.

26 DSM input assumptions are most often based on the incremental difference between high
27 efficiency appliances and otherwise equivalent lower efficiency models mandated by current
28 building codes and regulations. For example, DSM input assumptions do not focus on the total
29 installed cost of appliances, but rather the incremental cost difference between high and low
30 efficiency models. Moreover, in new construction installation costs are often considered to be
31 similar, and thus not accounted for, unless there are known, material differences between the
32 installation cost of the high and low efficiency appliances.

33 However, in order to be responsive, FEI has compiled information from various sources which is
34 presented in the table below. While this information is not necessarily used in DSM analysis and
35 planning, FEI believes that it is relevant to this information request.

36



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	Installed Equipment Cost	Internal Piping	Energy/Operating Efficiency Rating	Average Useful Lifetime
Gas furnace ^{1,2}	\$ 18,000	\$375 - gas piping from meter to furnace including isolation valve and regulator. If more gas appliances are in the home the cost of gas piping would be split. Regulators would not be needed in 7" (1.75 Kpa) system.	95-98% (96%)	18
Gas tankless	\$ 5,200		0.87 UEF	20
Storage water heater ²	\$ 2,800		>0.62 EF (0.67 EF)	13
Gas Dryers ³	\$ 800		2.84 lbs/kwh	14

- 1
- 2
- 3 1. Gas furnace installed equipment costs include the cost of ductwork.
- 4 2. Costs and efficiencies are from the responses to BCUC IR1 13.6, which reflect ranges of efficiencies
- 5 not necessarily used in DSM planning.
- 6 3. The cost includes equipment cost only.

7

8

9 20.3 [16.6] Please provide FEI's 20- or 30-year forecast of avoided costs used in its

10 DSM planning, with each component and associated value identified by year.

11

12 **Response:**

13 FEI's forecast values for various inputs to its cost effectiveness calculations are updated with

14 each new long-term planning exercise. FEI provides the values used for calculating the Total

15 Resource Cost Test and Modified Total Resource Cost Test in FEI's most recent Conservation

16 Potential Review (2021) below.

Forecast Year	Avoided Commodity/Midstream Cost (\$/GJ)	Avoided Distribution Adder (\$/GJ)	Zero Emission Energy Alternative* (\$/GJ)
2021	4.17	0.09	29.45
2022	4.06	0.09	29.45
2023	4.01	0.09	29.45
2024	4.08	0.09	29.45
2025	4.15	0.09	29.45
2026	4.24	0.09	29.45
2027	4.32	0.09	29.45
2028	4.41	0.09	29.45
2029	4.49	0.09	29.45

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Forecast Year	Avoided Commodity/Midstream Cost (\$/GJ)	Avoided Distribution Adder (\$/GJ)	Zero Emission Energy Alternative* (\$/GJ)
2030	4.59	0.09	29.45
2031	4.68	0.09	29.45
2032	4.78	0.09	29.45
2033	4.87	0.09	29.45
2034	4.97	0.09	29.45
2035	5.08	0.09	29.45
2036	5.18	0.09	29.45
2037	5.28	0.09	29.45
2038	5.39	0.09	29.45
2039	5.50	0.09	29.45
2040	5.62	0.09	29.45

1 * The ZEEA is used as the avoided cost for calculating the Modified Total Resource Cost Test (MTRC). For
 2 the MTRC, the ZEEA replaces the other avoided costs listed here used to calculate the TRC, as well as the
 3 carbon tax.

4 The 2021 Conservation Potential Review is Appended to FEI’s 2022 Long Term Gas Resource
 5 Plan (LTGRP), which can be viewed on FortisBC’s web site at: [https://www.fortisbc.com/about-
 6 us/corporate-information/regulatory-affairs/our-gas-utility/gas-bcuc-submissions/fortisbc-energy-
 7 inc.-gas-submissions/LTGRP/2022-long-term-gas-resource-plan](https://www.fortisbc.com/about-us/corporate-information/regulatory-affairs/our-gas-utility/gas-bcuc-submissions/fortisbc-energy-inc.-gas-submissions/LTGRP/2022-long-term-gas-resource-plan).

8
 9

10

11 20.4 [16.7] Please provide the values FEI uses in its DSM planning for a long term
 12 forecast of carbon taxation.

13

14 **Response:**

15 The forecast annual value for carbon tax used to calculate the Total Resource Cost Test in FEI’s
 16 2021 CPR is \$1.99/GJ in 2021 and \$2.56/GJ thereafter.

17 Please also note the following clarification from page 146 of FEI’s 2021 Conservation Potential
 18 Review prepared by Posterity Group:

- This CPR does not consider announcements related to the federal carbon tax made in 2021, which were made after modelling was complete for this project. Increases in the federal carbon tax are expected to positively impact the savings potential presented in this CPR: as natural gas costs rise, more measures will become cost-effective and pass the benefit/cost tests, and all measures will become more attractive financially to end users.



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20.5 [16.9] Please provide the discount rate used by FEI in its DSM planning.

Response:

The utility discount rate used to calculate the Total Resource Cost Test for FEI’s 2021 Conservation Potential Review is 4.01 percent (real).

20.6 [16.11] Please provide the inflation rate assumed by FEI in its DSM analyses.

Response:

The inflation rate used by FEI in its DSM analysis was 1.1 percent. Note that this inflation rate is embedded in the calculation of the inflation adjusted discount rate provided in the response to BCSEA IR2 20.5.

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1 **21.0 Topic: Concentric Evidence**

2 **Reference: Exhibit B-17, FEI Response to BCUC IR1 13.2**

3 21.1 What is Concentric’s response to the following suggestions:

4
5
6
7

21.1.1 Average cost ratemaking does not apply to the decision whether or not
to approve the proposed Renewable Gas Connections program.

8 **Response:**

9 **The following response is provided by Concentric.**

10 Ratemaking is an integral part of the BCUC’s decision-making regarding the Renewable Gas
11 Connections service. Average cost ratemaking is the basis for most of FEI’s other service
12 offerings, so the issue of just or unjust discrimination makes average cost ratemaking an issue
13 for the approval of the Renewable Gas Connections service as well.

14
15

16

21.1.2 Given that customer additions is FEI’s rationale for the proposed
Renewable Gas Connections program, the financial evaluation of the
proposed program should be akin to an extension test.

21 **Response:**

22 **The following response is provided by Concentric.**

23 The premise of this question is incorrect. Customer additions is not FEI’s rationale for the
24 proposed Renewable Gas Connections service. FEI’s rationale for the proposed service is to
25 meet governmental requirements for new connections, help to meet Provincial objectives for
26 decarbonization, and produce just and reasonable rates for all customers.

27
28

29

21.1.3 A 100% Renewable Gas service is a different service than the service
received by customers who don’t voluntarily choose to pay extra for an
increased proportion of Renewable Gas.

34 **Response:**

35 **The following response is provided by Concentric.**

36 Please refer to the response to RCIA IR2 46.1.



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21.1.4 Rolled-in cost ratemaking applies to new customers receiving existing service in existing rate classes, not to the creation of a new category of customers who would receive free of charge a premium service (100% Renewable Gas) that customers ineligible for the new category have to pay extra for.

Response:

The following response is provided by Concentric.

Please refer to the response to RCIA IR2 46.1.

21.1.5 Only a small fraction of the customers in the proposed Renewable Gas Connections program actually require 100% Renewable Gas to meet local government building standards. For these customers, the proper comparator is the Voluntary Renewable Gas program. RG Connection customers who don't require 100% Renewable Gas to meet local government building standards would be free-riders getting a premium service at no extra cost to them but at considerable extra cost to ineligible customers who would receive no benefit in the form of incremental customer additions.

Response:

The following response is provided by Concentric.

Please refer to the response to RCIA IR2 46.1, and also the responses to BCUC IR1 13.2 and 16.2.

The following response is provided by FEI.

Please also refer to the response to BCUC IR1 18.1 where FEI describes how the structure of the Renewable Gas Connections service enables compliance with a patchwork of building regulations in order to maintain energy choice for new residential customers.



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1 **22.0 Topic: Notional delivery of Renewable Gas**
2 **Reference: Exhibit B-17, FEI Response to BCUC IR1 13.2, pdf p.115**

3 Concentric states in part:

4 “Under the incremental cost theory, a customer who built a house and initiated
5 service last year would pay much less for gas supply than a customer who built a
6 house next year even where the two customers had identical usage
7 characteristics. This, despite the fact that both houses are served by the same gas
8 system, use the same amount of gas, and physically receive the same blend of
9 natural gas containing Renewable Gas.” [pdf p.115, underline added]

10 22.1 Would Concentric agree that the blend of gas physically received by a customer is
11 irrelevant because Renewable Gas is delivered notionally?

12
13 **Response:**

14 FEI has not provided a response to this question as it was withdrawn by BCSEA in Exhibit C1-9.

15

Attachment 17.1

REFER TO LIVE SPREADSHEET MODEL

Provided in electronic format only

(accessible by opening the Attachments Tab in Adobe)