Diane Roy
Vice President, Regulatory Affairs

Gas Regulatory Affairs Correspondence
Email: gas.regulatory.affairs@fortisbc.com

Electric Regulatory Affairs Correspondence
Email: electricity.regulatory.affairs@fortisbc.com

FortisBC
16705 Fraser Highway
Surrey, B.C. V4N 0E8
Tel: (604) 576-7349
Cell: (604) 908-2790
Fax: (604) 576-7074
www.fortisbc.com

May 16, 2022

BC Hydro
c/o Regulatory Group
16th Floor, 333 Dunsmuir Street
Vancouver, BC
V6B 5R3

Attention: Mr. Chris Sandve, Chief Regulatory Officer

Dear Mr. Sandve:

Re: FortisBC Energy Inc. (FEI)

Revised Renewable Gas Program Application – Stage 2 (Application)

Response to the British Columbia Hydro and Power Authority (BCH) Information Request (IR) No. 1

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-103-22, FEI respectfully submits the attached response to BCH IR No. 1.

For convenience and efficiency, FEI has occasionally provided an internet address for referenced reports instead of attaching lengthy documents to its IR responses. FEI intends for the referenced documents to form part of its IR responses and the evidentiary record in this proceeding.

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

1.0 In section 3.5.1 of the Application, FEI states:

"However, without changes to the Renewable Gas Program, only electricity can currently be implemented in a manner that meets the permanency criteria set by local governments. Local governments have yet to view Renewable Gas as a viable low carbon energy source because of perceived uncertainties around Renewable Gas supply and the voluntary structure of the existing Renewable Gas Program, which allows customers to leave the program at any time. As a voluntary opt-in only service, the program currently lacks permanency and therefore does not provide local governments with certainty regarding the GHGi of new construction projects. Therefore, FEI is proposing a Renewable Gas service offering for the life of a building, enabling long-term GHG emission reductions in alignment with the criteria set by local governments." (lines 3-12, page 33)

In section 4.2 of the Application, FEI states:

"FEI expects that energy efficiency and the increased use of Renewable Gas will be the largest contributor's to FEI's avoided GHG emissions. Moreover, FEI expects new and different low carbon solutions to become commercially feasible over the intervening period, including hydrogen injection, direct hydrogen delivery, electrical energy storage (battery or other forums of storage), discrete generation, and hydrogen fuel cells - a number of which could be delivered through existing gas infrastructure." (lines 9-14, page 44)

In section 6.3.2 of the Application, FEI states:

"Based on a 10-year forecast of Renewable Gas supply, FEI anticipates that by 2032 it will have surpassed the 15 percent (of approximately 30 PJs) target for Renewable Gas set through the CleanBC Plan." (lines 29-31, page 77)

Figure 6-3 in section 6.3.2 appears to indicate that approximately 18 PJ of the 2032 total is expected to be comprised of hydrogen, syngas and lignin.

In section 7.2.1 of the Application, FEI states:

"Provincial government policy seeks to transition the gas system away from delivering fossil natural gas to delivering Renewable Gas, and to cap emissions from gas used to heat homes and business at 47 percent below 2007 levels.

While other options such as energy efficiency will contribute towards this emissions cap, Renewable Gas is required to meet these policy goals. A revised Renewable Gas Program must contain mechanisms to ensure enough Renewable Gas can be delivered to a broad range of customers to support these provincial policy objectives." (lines 5-10, page 87)

1.1 Please confirm or explain otherwise that injecting Renewable Gas into the gas distribution network displaces conventional (fossil) gas in the network and reduces GHG emissions from gas consumption regardless of the end uses of such gas.

Response:

Confirmed.

1.2 Please confirm or explain otherwise that allocation of renewable gas to new customer connections will only reduce GHG emissions if the end use displaces consumption of other more carbon intensive fuels.

Response:

Confirmed. Renewable Gas will reduce GHG emissions if the end use displaces consumption of other more carbon intensive fuels, including oil, propane, conventional natural gas, and even electricity where lifecycle emissions from Renewable Gas are lower than electricity, as is shown in the response to BC Hydro IR1 1.6.

Please refer to the responses to the City of Richmond IR1 12 series and BC Hydro IR1 1.6 for further detail on the comparison between the GHG emissions of electricity, conventional natural gas, liquid fuels and RNG.

Please also refer to the response to CEC IR1 3.2 for a description of how RNG from organic sources can achieve negative GHG emissions.

1.3 Please confirm or explain otherwise with respect to FEI's proposal for renewable gas for new construction that "a Renewable Gas service offering for the life of a building, enabling long-term GHG emission reductions in alignment with the criteria set by local governments" will displace what would otherwise be electricity consuming equipment.

Response:

Not confirmed. The majority of new residential buildings are located in municipalities that do not currently have a GHGi requirement and therefore will have natural gas heating. FEI's capture rate for residential new construction for the period 2018 to 2020 was between 78 and 82 percent[1], which represents a large proportion of this market. Assuming FEI's capture rates under the proposed Renewable Gas Connections service are comparable to these historical levels, Renewable Gas will largely displace natural gas and not electricity consuming equipment in those municipalities.

In municipalities that have implemented GHG emission requirements for new residential construction, customers currently only have one energy option (i.e., electricity). However, in some cases, electricity-only buildings are not possible (e.g., supply constraints), resulting in delays or impediments to new construction.

[1] Capture rate for residential properties within 200 meters of a natural gas main.

Please refer to the response to City of Vancouver IR1 4.3 where FEI explains the barriers to decarbonization with one energy option.

1.4 Please confirm or explain otherwise that the 15% target for Renewable Gas set through the CleanBC Plan is not impacted by the pricing associated with FEI's Renewable Gas Program.

Response:

Confirmed. At this time, FEI is securing Renewable Gas supply as a means of reducing GHG emissions to align its service offerings with federal, provincial and local government policy. The purpose of this Application, however, is to determine how the available Renewable Gas supply can best be used to serve FEI's customers in furtherance of governmental policy.

1.5 Please discuss whether, and to what extent, FEI's ability to surpass the 15% target for Renewable Gas set through the CleanBC Plan is impacted by the pricing associated with FEI's Renewable Gas Program.

Response:

FEI is confident in its ability to achieve or surpass the 15 percent target in the CleanBC Plan regardless of how pricing is set. FEI has secured a portion of its current supply (approximately 10 percent) at pricing below the maximum regulated acquisition cost and is in discussions with additional suppliers that would enable it to surpass the 15 percent target at the current acquisition price.

Please refer to the responses to BCUC IR1 13.2, 16.1, 16.2 and 30.1 regarding the pricing for the Renewable Gas Program.

1.6 Please compare the expected reduction in GHG emissions per GJ used in

- Renewable Gas for new construction if it displaces electricity;
- Renewable Gas for existing customers if it displaces conventional natural gas; and
- Renewable Gas for vehicles if it displaces (a) gasoline or (b) diesel.

Response:

FEI provides the current level of GHG emissions reductions per GJ for each displacement in the tables below.

In Table 1 below, FEI has updated the 2020 emissions factors that were used in the Application to also show 2021. FEI has used the lifecycle emissions for determining the carbon intensity of Renewable Gas (see footnote 2). As shown in the table, the emissions factors for both Renewable Gas and electricity can change depending upon the source of the energy.

Table 1: Renewable Gas for New Construction if it Displaces Electricity

Renewable Gas vs. Electricity	2020 kgCO2e/GJ (or gCO2e/MJ)	2021 kgCO2e/GJ (or gCO2e/MJ)
Renewable Gas - Lifecycle Intensity of FEI Supplied RNG[2]	**-10.3**	**-22.4**
Electricity - 2021 GGIRCA website (integrated grid) [3] [4]	**11.14**	**2.69**
Difference in emissions per GJ	**-20.3**	**-25.09**

For comparison with other fuels, the end use combustion value of Renewable Gas is presented in Tables 2 to 4 rather than the lifecycle emissions. This end use combustion value comparison is considered appropriate given the natural gas, diesel and gasoline emission factors provided by BC are end use emission values only (i.e., do not consider the associated upstream emissions from the fuel). The values for these tables have not yet been published for 2021 at the time of filing this response; therefore, FEI provides 2020 values only.

Table 2: Renewable Gas for Existing Customers if it Displaces Conventional Natural Gas (2020 versus 2020)

Renewable Gas (RG) vs. Natural Gas (NG)	kgCO2e/GJ (or gCO2e/MJ)
RG - 2020-BC Best Practice to Quantify GHG Emissions (page 13)	**0.2932**
NG - 2020-BC Best Practice to Quantify GHG Emissions (page 13)	**49.87**
Difference in emissions per GJ	**-49.58**

[2] Lifecycle intensity of supplied RNG (2020 and 2021) was calculated by using the weighted average of the supplied RNG lifecycle intensity as determined using GHGenius, consistent with the BC Low Carbon Fuels Standards requirements and are based on finalized lifecycle intensities assessed by a third party engineering consultant. This source specific RNG supply value differs from the generic value as published by the BC Best Practice to Quantify GHG Emissions value which only considers the end use combustion of the RNG. The 2021 value is subject to change and is accurate as of May 1, 2022.

[3] Greenhouse Gas Industrial Reporting and Control Act (GGIRCA) https://www2.gov.bc.ca/gov/content/environment/climate-change/industry/reporting/quantify/electricity; 2021: 9.7 tCO2e/GWh; * 1 GWh/3600 GJ = 0.00269 tCO2e/GJ; *1000 kgCO2e/tCO2e = 2.69 kgCO2e/GJ.

[4] Changes in carbon intensity of electricity are due to changes in sources of electric generation as well as changes to accounting for upstream emissions of gas fired electric generation.

Table 3: Renewable Gas for Vehicles if it Displaces Diesel (2020 versus 2020)

Renewable Gas vs. Diesel Fuel	kgCO2e/GJ (or gCO2e/MJ)
Renewable Gas - 2020-BC Best Practice to Quantify GHG Emissions (page 13)	**0.2932**
Diesel Fuel - 2020-BC Best Practice to Quantify GHG Emissions (page 12)	**70.62**
Difference in emissions per GJ	**-70.33**

Table 4: Renewable Gas for Vehicles if it Displaces Gasoline (2020 versus 2020)

Renewable Gas vs. Gasoline	kgCO2e/GJ (or gCO2e/MJ)
Renewable Gas - 2020-BC Best Practice to Quantify GHG Emissions (page 13)	**0.2932**
Gasoline - 2020-BC Best Practice to Quantify GHG Emissions (page 12)	**65.22**
Difference in emissions per GJ	**-64.93**

1.7 Has FEI assessed the barriers related to electrifying natural gas loads across various sectors and end uses? If so, please provide these assessments.

Response:

FEI has assessed the systemic challenges of electrifying a significant share of natural gas loads in BC. This is discussed in detail in FortisBC's *Clean Growth Pathways to 2050*[5] and in Guidehouse's *Pathways for British Columbia to Achieve its GHG Reduction Goals* (Pathways Report).[6] In particular, heating loads served by the gas system consist of periods of high peak demand during cold winter weather, meaning that large loads can occur during short periods of cold weather. The gas system is designed to address these peaks with its capability to affordably store and deliver large volumes of energy using existing infrastructure.

If a significant share of existing natural gas heating load was electrified, FEI believes significant investments in reserve generating capacity and/or electricity storage would be required. This outcome is also broadly reflected in the Accelerated Electrification Scenario of BC Hydro's 2021 Integrated Resource Plan. Under this scenario, BC Hydro projects peak load net of existing DSM measures will increase by approximately 5,000 MW to 2041 where significant building heat and vehicle electrification is accomplished (Table 8-2).[7] FEI expects that this scenario would result in

[5] https://www.cdn.fortisbc.com/libraries/docs/default-source/about-us-documents/clean-growth-pathway-brochure.pdf.
[6] https://www.cdn.fortisbc.com/libraries/docs/default-source/about-us-documents/guidehouse-report.pdf.
[7] bchydro.com/content/dam/BCHydro/customer-portal/documents/corporate/regulatory-planning-documents/integrated-resource-plans/current-plan/integrated-resource-plan-2021.pdf.

higher electricity rates while reducing gas load, thus increasing rates for remaining gas users and decreasing utilization of FEI's system.

1.8 Please discuss how the barriers to the electrification of the residential new construction sector / end-use compare to each of the other sectors and end uses for current and future natural gas loads.

Response:

Please refer to the responses to BC Hydro IR1 1.10 and City of Vancouver IR1 4 series.

1.9 Based on the assessments and discussion provided in response to information requests 1.7 and 1.8, please explain whether targeting the use of renewable gas at the residential new construction market represents the best use of renewable gas with respect to achievement of the province's greenhouse gas emission reduction targets.

Response:

Energy consumers across the Province should have a *choice* between different low-carbon energy systems that best meet their needs; therefore, Renewable Gas should not necessarily be used to "target" specific markets. The proposed Renewable Gas Connections service is designed to ensure this segment of the market continues to have access to the gas system and is not a "targeted" solution intended to drive Renewable Gas supply to these customers over others.

As described in Section 10.2.2.1 of the Application (page 145), a key takeaway from FEI's consultation with builders and developers was that they are seeking energy choice and options, including access to Renewable Gas, when designing mechanical systems to accommodate the variety of climate zones across the Province. For example:

> The South Okanagan climate zone can get annual temperature fluctuations of 80 degrees. That is why it is imperative for our Builders and Energy Advisors to have options when designing mechanical systems. (CHBA South Okanagan)

Please also refer to Section 4.3 of the Application (page 44) and the response to BC Hydro IR1 1.7 where FEI describes how the gas system is well-positioned to address the peak heating needs of the residential sector because of its ability to store, ramp up and deliver high volumes of energy on short notice.

1.10 Please confirm or explain otherwise that there are fuel consumers (e.g., long life existing infrastructure, air travel, marine, heavy rail, heavy trucks, off grid use locations) that might not be practical to electrify at this time and could be encouraged to switch to renewable gas both attracting new customers for FEI and providing a greater GHG emission reduction benefit than FEI's Renewable Gas Connections proposal.

Response:

While many sectors of the BC economy will be difficult to decarbonize, including new construction, existing buildings, transportation, and the industrial sectors, at this stage of the decarbonization process, all options should be employed to rapidly reduce GHG emissions in all sectors. Therefore, limiting Renewable Gas use to specific sectors may impede a cost-effective and resilient energy transition which will be required to achieve the provincial government's policy goals.

FEI designed the revised Renewable Gas Program to balance the interests of ratepayers in all sectors and to account for the practical realities and challenges of decarbonization in BC, as outlined in the Pathways Report.[8] For example, delivering Renewable Gas through the existing gas system to new and existing buildings increases the abundance of affordable, low carbon energy choices for customers, leverages existing gas infrastructure, which contributes to lowering overall energy costs, and supports the achievement of BC's climate targets. These benefits have been considered in developing FEI's proposals; namely, recognizing the key role for the gas system to deliver low carbon energy to customers in the building sector who are required to reduce their GHG emissions while also managing significant cost-drivers of decarbonization, such as managing peak loads brought on by heating demand. As outlined in the Pathways Report (page 24), employing the gas system to manage these peaks with low-carbon fuels could save up to $100 billion in GHG mitigation costs by 2050, as compared to a pathway reliant on electrification as the primary decarbonization strategy.

Further, as outlined in the BC Renewable and Low-Carbon Gas Potential Study,[9] a significant supply of Renewable Gas will need to be delivered by FEI's gas system to achieve the Province's long-term GHG reduction goals. While developing this supply will take significant investment, partnerships, and effort among key institutions, it does not surpass the effort and investment that would otherwise be required to build-out the Province's clean electricity generating supply or storage capacity which would be required to handle electrified building heating and vehicle loads currently addressed by other energy types.

[8] https://www.cdn.fortisbc.com/libraries/docs/default-source/about-us-documents/guidehouse-report.pdf.
[9] https://www.cdn.fortisbc.com/libraries/docs/default-source/news-events/bc-renewable-and-low-carbon-gas-supply-potential-study-2022-03-11.pdf.

1.11 Please provide the share of hydrogen sourced from electrolysis in FEI's 2032 Renewable Gas portfolio.

Response:

FEI's total forecast volumes of hydrogen, syngas, and lignin by 2032 is approximately 18.5 PJ, of which hydrogen could comprise approximately 50 percent. At this time, it is not possible to confirm the quantity of hydrogen sourced from electrolysis that FEI will acquire in 2032, as other hydrogen production methods may become more cost competitive with lower carbon intensity as technology develops.

FEI expects to acquire hydrogen produced from a range of resources using a number of different methods, including electrolysis, by 2032. FEI also expects to acquire hydrogen from suppliers within BC and import hydrogen from outside of BC. For FEI to import hydrogen, the hydrogen would be delivered in a similar manner as existing out-of-province RNG supply agreements, whereby hydrogen would be injected into the natural gas system at the upstream seller's facility and delivered by displacement to FEI at a delivery point in BC.

1.12 Please confirm or explain otherwise that supplying hydrogen from electrolysis for residential space heating would require 4-5 times as much electricity as would be needed for a high-efficiency heat pump to provide the same space heating.

Response:

Depending upon assumptions (heat pump efficiency, availability of clean electricity, etc.) there are scenarios where producing hydrogen from electrolysis can take up to 4-5 times the amount of electricity as heating a home with a high efficiency heat pump. There are a number of methods of producing hydrogen and, as such, it should not be assumed that all hydrogen will be from electrolysis. For example, FEI is also authorized under the GGRR to produce or purchase waste hydrogen, as defined in the *Clean or Renewable Resource Regulation*, in addition to hydrogen from electrolysis.

As hydrogen can be stored and transported, there are opportunities to produce hydrogen from electric resources that would not otherwise be used to provide power to the electric grid and be used for heating buildings. For example, hydrogen from electrolysis could be produced with electricity supplied from intermittent wind and solar resources in off-peak hours and the hydrogen then stored in the gas system for when it is required. Hydrogen could also be produced with electric resources that are not connected to the grid at all. Therefore, it is not necessarily relevant

to compare the amount of electricity to heat a home directly with the amount of electricity to produce hydrogen from electrolysis to then heat a home.

More generally, there are a number of business and economic models for how to use electricity to manufacture hydrogen. Whether any particular hydrogen project proceeds will depend on its business case, which will be informed by many factors, including government policy, and not simply whether it would take less electricity to heat a home directly.

2.0 In section 3.5.1 of the Application, FEI states:

"However, without changes to the Renewable Gas Program, only electricity can currently be implemented in a manner that meets the permanency criteria set by local governments. Local governments have yet to view Renewable Gas as a viable low carbon energy source because of perceived uncertainties around Renewable Gas supply and the voluntary structure of the existing Renewable Gas Program, which allows customers to leave the program at any time. As a voluntary opt-in only service, the program currently lacks permanency and therefore does not provide local governments with certainty regarding the GHGi of new construction projects. Therefore, FEI is proposing a Renewable Gas service offering for the life of a building, enabling long-term GHG emission reductions in alignment with the criteria set by local governments." (lines 3-12, page 33)

In section 7.4.2.1 of the Application, FEI states:

"FEI's Renewable Gas Connections service maintains access to the natural gas system for the new residential construction sector by providing a gas service for New Residential Connections in alignment with GHG reduction requirements in this sector." (lines 4-6, page 101)

"FEI's Renewable Gas Connections service provides an option for the builder/developer/HVAC contractor to adhere to applicable GHG regulations, using high efficiency gas equipment to which they are accustomed, avoiding imposing additional burden or costs on the end-use customer. Local governments will be able to meet their GHGi objectives for new residential construction and the customers will be able to use gas as they would have been able to prior to any GHGi regulation being in place." (lines 18-23, page 101)

In Appendix D-2, FEI provides proposed tariff revisions to enable Renewable Gas Connections and Voluntary Renewable Gas Services, including this addition:

"Permanent Connection Low Carbon Gas Service - Means firm Gas Service consisting 100 percent Renewable Gas that is exclusive to and mandatory for Permanent Connection Low Carbon Gas Service Customers under Rate Schedules." (page 321 of 559 in the PDF)

2.1 Under its proposal to establish a Permanent Connection Low Carbon Gas Service, how would FEI demonstrate and verify that new buildings are provided with Renewable Gas for the lifetime of the building?

Response:

Please refer to the response to BCUC IR1 20.1.

2.2 If FEI's proposal is approved, and subsequently, at a future date, FEI's Tariff is changed to remove the "Permanent Connection Low Carbon Gas Service", how could that impact buildings' supply of Renewable Gas? Would new construction credited with 100% Renewable Gas at time of construction be guaranteed to receive Renewable Gas in perpetuity, or could changes to the Tariff impact Renewable Gas supply to the building?

Response:

Please refer to the responses to BCUC IR1 20.1 and City of Richmond IR1 3.2.

2.3 If FEI's Permanent Connection Low Carbon Gas service is approved, would any associated changes to the BC Building Code; the Vancouver Building By-Law; or other local government new construction by-law and zoning requirements be needed before builder/developer/HVAC contractors could install gas equipment in their new building projects? If so, please describe the necessary changes. If not, why not?

Response:

Please refer to City of Richmond IR1 6.1.

2.4 How does FEI intend to guarantee the carbon intensity of Renewable Gas sourced in the future? Please describe the anticipated contract terms, standards, protocols, and monitoring regimes required for zero carbon Renewable Gas.

Response:

The carbon intensity of the Renewable Gas is a key factor that FEI considers when evaluating any potential new supply. FEI ensures that the carbon intensity of the Renewable Gas it sources does not exceed certain thresholds through contractual assurances. Suppliers must meet the carbon intensity requirements in their offtake agreements or risk penalties and/or termination of their agreement.

Pursuant to FEI's supply contracts, a third party performs a "cradle to grave" analyses for each supplier using GHGenius as a life cycle carbon intensity model. GHGenius is the prescribed life

cycle analysis model from the *Renewable and Low Carbon Fuel Requirements Regulation*, which therefore aligns with the standard set by the BC provincial government.

FEI undertakes audits of all of its supplier facilities to verify that the facility is injecting RNG into the system, and to confirm its inputs and emissions, so that the RNG's carbon intensity can be calculated and verified. The first step of verification can be done remotely when a supplier provides evidence of installed equipment or on-site if accessible or in-person. FEI has verified all the physical connections of operating projects either directly (in-province facilities) or remotely. FEI audits the carbon intensity of facilities once they are operational for enough time to generate the ongoing data necessary for the carbon intensity calculation. FEI has visited each in-province facility and verified data for use by a third party consultant to calculate a carbon intensity. Out-of-province suppliers have provided data to FEI remotely. FEI has used both S&T Squared and Brightspot as consultants to develop carbon intensity reports. Over the next year, FEI will visit each facility to verify inputs at each operating RNG facility to ensure that the data is accurate.

In the unlikely event that a supplier is found in breach of its contractual commitments, FEI has the right to terminate the agreement.

FEI submits carbon intensity reports from any facilities providing vehicle fuel to the provincial administrators of the BC-LCFS for approval. RNG that is used in the transportation sector must have their supply accepted by the provincial government in order to generate credits under the BC-LCFS.

FEI's acquisitions of Renewable Gas are prescribed undertakings pursuant to section 18 of the *Clean Energy Act*. Therefore, FEI also reports to the Ministry, and the BCUC, regarding its acquisitions of Renewable Gas under the *Clean Energy Act*.

2.5 If it is not possible to guarantee the carbon intensity of Renewable Gas sourced in the future, please explain how the Renewable Gas service offering, as proposed, meets the permanency criteria set by local governments.

Response:

Please refer to the response to BC Hydro IR1 2.4, where FEI describes how it ensures the carbon intensity of the Renewable Gas it sources through contractual assurances for the life of the contract.

Please also refer to Section 1.5 of Appendix A to the Application where FEI describes how the proposed service offering meets the criteria set out by local governments.

3.0 In section 7.4 of the Application, FEI states:

"FEI is proposing to begin providing a Renewable Gas Blend whereby all customers who purchase their natural gas from FEI (i.e. sales customers) will receive a percentage of their gas supply as Renewable Gas. Subject to available supply, FEI expects to begin with a one percent blend beginning January 1, 2024. When implemented, FEI will recover the costs of the Renewable Gas from all sales customers through a new Storage and Transport Low Carbon (S&T LC) rider. This rider will be a storage and transport charge reflecting the fact that the cost of Renewable Gas will now be part of the overall costs of the commodity received by sales customers." (lines 6-12, page 97)

"New Residential Connections will be charged an overall rate designed to mimic "regular" gas service rates that all other sales customers pay for under the equivalent rate schedule, including consideration of the S&T LC rider they will already be paying. As the driver of the need for 100 percent Renewable Gas for New Residential Connections is government policy, the cost of the incremental Renewable Gas needed above "regular" gas costs should be recovered from all sales customers. This will also preserve energy choice by providing a service that is economically feasible for these customers." (lines 1-7, page 98)

3.1 Please provide a 10-year forecast of the incremental cost to provide 100% Renewable Gas for New Residential Connections compared to the conventional gas costs recovered from all sales customers.

Response:

The table below sets out the incremental cost to acquire Renewable Gas for the Renewable Gas Connections service and the cost to acquire conventional natural gas for all other sales customers. Please refer to the response to BCSEA IR1 11.1 for a correction to the required Renewable Gas volume for the Renewable Gas Connections service. The 2032 forecast demand from Renewable Gas Connections service is now 14.6 PJ, assuming that service is approved by the BCUC and commences in 2023. As discussed in the Application, FEI held the cost of conventional natural gas and demand level through the analysis period.

Table 1: Incremental Cost of Renewable Gas

		2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
RG Connections Demand	TJ	1,567	3,064	4,553	6,015	7,469	8,915	10,354	11,785	13,209	14,625
RG	$/GJ	23.52	24.27	24.84	25.33	25.76	23.85	24.06	24.31	23.74	23.38
Conventional Gas Cost	$/GJ	3.84	3.84	3.84	3.84	3.84	3.84	3.84	3.84	3.84	3.84
Net incremental	$/GJ	19.68	20.42	21.00	21.48	21.92	20.00	20.22	20.47	19.89	19.53
Incremental Cost to supply RG to RG Connections		**30,829**	**62,574**	**95,615**	**129,226**	**163,703**	**178,329**	**209,348**	**241,196**	**262,752**	**285,663**
Demand All Sales Customers	TJ	148,673	148,673	148,673	148,673	148,673	148,673	148,673	148,673	148,673	148,673
Conventional Gas Cost	$/GJ	3.844	3.844	3.844	3.844	3.844	3.844	3.844	3.844	3.844	3.844
Cost to provide conventional gas for all other Sales customers		**571,500**	**571,500**	**571,500**	**571,500**	**571,500**	**571,500**	**571,500**	**571,500**	**571,500**	**571,500**

4.0 In section 8.6 of the Application, FEI states:

"In this section FEI provides an estimate of the customer bill impact of the Renewable Gas service based on the Renewable Gas supply forecasts provided in Section 6.3.2 of the Application and a forecast of anticipated uptake of Renewable Gas in the Voluntary Renewable Gas offering for Sales Customers, the Renewable Gas Connections and the percentage of gas provided customers via the Renewable Gas Blend for sales customers." (lines 22-26, page 121)

"The following three figures display the annual bills of customers in each of RS 1, 2 and 3, by service type (Renewable Gas Connections, Voluntary Renewable Gas for Sales Customers and remaining sales customers). Each figure includes years 2024, 2028 and 2032 on the x axis with the annual dollar amount on the y axis. At the top of each set of columns, in a text box, is the percent of Renewable Gas delivered and costs recovered through 1 the S&T LC rider. Each column represents one of the Renewable Gas Program offerings:

- Renewable Gas Blend for sales customers (that are not Renewable Gas Connections customers or Voluntary Renewable Gas customers);
- Renewable Gas Connections; and
- Voluntary Renewable Gas for sales and T-Service customers." (lines 21-24, page 122 and lines 1-6, page 123).

4.1 Please provide the methodology and assumptions used to determine the forecast volume of 18 PJ to "Renewable Gas Connections" to new construction in 2032 shown in Figure 8-3 on page 122.

Response:

Please refer to the response to BCSEA IR1 11.1 for a correction to the required Renewable Gas volume for the New Residential Connections service. The 2032 forecast demand from Renewable Gas Connections service is now 14.6 PJ, assuming that service is approved by the BCUC and commences in 2023.

The methodology and assumptions used to produce the forecast are set out below.

Methodology:

- Begin with the anticipated rate of new residential[10] customer attachments in 2021. This is the start of the forecasting period.

[10] New residential connections are all residential dwellings served by a service line installed on or after a designated date, including new construction activity, conversions and retrofits. FEI serves a range of residential dwellings, including detached homes, semi-detached homes, row houses, duplexes and quadruplexes, townhouses and multifamily condominiums under RS 1, RS 2, RS 3, or RS 5 depending on the volume of the gas service.

- Using anticipated 2021 new attachments, project new attachments forward through the forecast period making adjustments based on feedback from FEI's Energy Solutions Managers who assist homeowners with connecting to the gas system.
- Distribute the new residential attachments between Rate Schedules (RS) 1, 2 and 3.
- Apply the average use per customer (UPC) for new residential customers for each of RS 1, 2 and 3 to each attachment, where UPC is adjusted for annual incremental gains in efficiency, across the forecast period.
- Beginning in 2023, the anticipated program start date, sum the resulting consumption associated with the Renewable Gas Connections service for each forecast year.
- The required Renewable Gas Connections service volume in any year is the sum of the incremental Renewable Gas Connections service volume requirement in that year, plus the cumulative Renewable Gas Connections service volume requirement from new attachments in all of the preceding years.

Assumptions:

1. Annual new residential connections:
    - Start of period (2021): 16,900
    - End of period (2032): 14,500
2. Approximate rate schedule distribution of new attachments:
    - RS 1: 98 percent
    - RS 2: 1 percent
    - RS 3: 1 percent
3. Use per Customer:
    - RS 1:
        - Start of period (2021): 66.4 GJ/year
        - End of period (2032): 61.7 GJ/year
    - RS 2:
        - Start of period (2021): 320.0 GJ/year
        - End of period (2032): 312.4 GJ/year
    - RS 3:
        - Start of period (2021): 3,500.0 GJ/year
        - End of period (2032): 3,393.0 GJ/year

FEI has provided the table below demonstrating how it forecast the total Renewable Gas Connections service demand to 2032.

Table 1: Forecast Method for Renewable Gas Connections

		2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
New Residential Attachments	#	15,300	14,700	14,700	14,500	14,500	14,500	14,500	14,500	14,500	14,500
Rate Schedule 1											
Estimated Proportion	%	98%	98%	98%	98%	98%	98%	98%	98%	98%	98%
Customer Additions	#	15,000	14,411	14,411	14,215	14,215	14,215	14,215	14,215	14,215	14,215
Use Per Customer	GJ/Year	65.5	65.1	64.6	64.2	63.8	63.3	62.9	62.5	62.1	61.7
Annual Demand	TJ	983	938	931	913	906	900	894	888	882	876
Cumulative Annual Demand	TJ	983	1,920	2,852	3,764	4,671	5,571	6,466	7,354	8,236	9,113
Rate Schedule 2											
Estimated Proportion	%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Customer Additions	#	162	155	155	153	153	153	153	153	153	153
Use Per Customer	GJ/Year	318.6	317.9	317.2	316.5	315.9	315.2	314.5	313.8	313.1	312.4
Annual Demand	TJ	52	49	49	49	48	48	48	48	48	48
Cumulative Annual Demand	TJ	52	101	150	199	247	295	344	392	440	487
Rate Schedule 3											
Estimated Proportion	%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Customer Additions	#	153	147	147	145	145	145	145	145	145	145
Use Per Customer	GJ/Year	3,480.3	3,470.5	3,460.7	3,450.9	3,441.2	3,431.5	3,421.8	3,412.2	3,402.6	3,393.0
Annual Demand	TJ	532	510	509	500	499	498	496	495	493	492
Cumulative Annual Demand	TJ	532	1,043	1,551	2,052	2,551	3,048	3,544	4,039	4,533	5,025
Total Cumulative Annual Demand	**TJ**	**1,567**	**3,064**	**4,553**	**6,015**	**7,469**	**8,915**	**10,354**	**11,785**	**13,209**	**14,625**

4.2 Please provide FEI's expected take-up of Renewable Gas Connections if the program is structured as 100% Renewable Gas and permanent, under the following two scenarios:

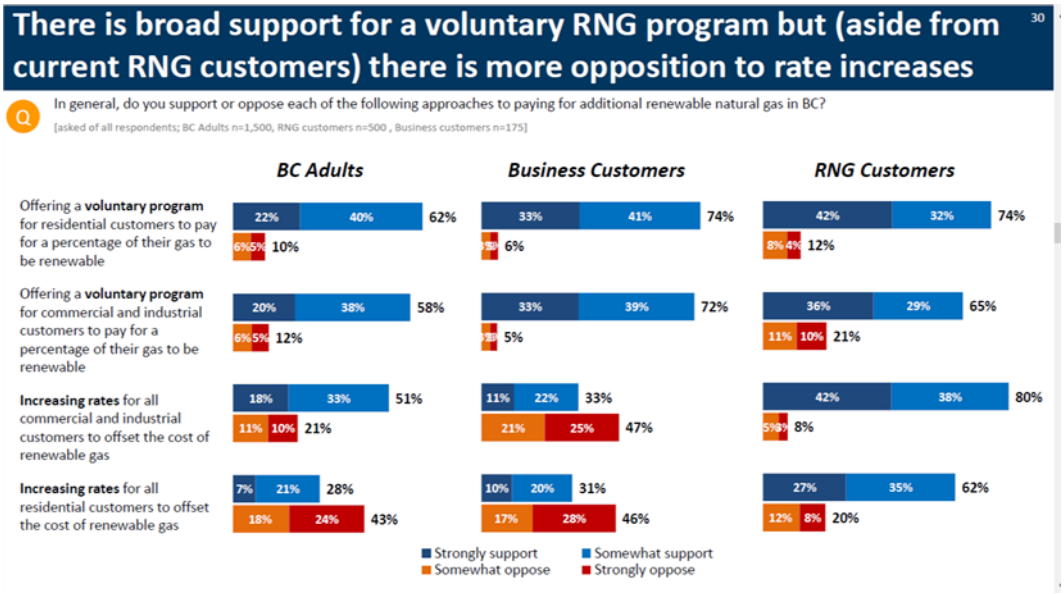
- the rate is set at $15.593/GJ as currently in the Voluntary Renewable Gas program provided on line 17 of Table 8-4
- the rate is set at the $30/GJ renewable gas price cap

Please provide the calculations and assumptions and the resulting annual bill impacts of these two scenarios on each of the Renewal Gas Program offerings in the same format as Figures 8-4, 8-5 and 8-6.

Response:

Please refer to the responses to BCUC IR1 14.1 and 14.2 where FEI describes that increasing the rate above that proposed in the Application will result in zero new connections. Please refer to the response to BCUC IR1 12.3.2 for the bill impacts if there are no new connections.

5.0 In Appendix B-1 of the Application, FEI provides the following Residential and Small Business Survey results from its 2021 RNG Program Design Survey Results:



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5.1 When developing the Renewable Gas Connections proposal how did FEI consider its 2021 RNG Program Design Survey Results that show broad support for a voluntary program but more limited support for increasing rates for all customers to offset the cost of renewable gas?

Response:

Please refer to page 1 of the Application which notes that FEI's proposed revisions to the Renewable Gas Program are primarily in response to evolving climate policies at all levels of government to reduce GHG emission in the energy sector. While customers may prefer a voluntary program, this approach alone would not enable FEI to effectively respond to these climate policies and achieve the objectives described in the Application. Please refer to Section 7 of the Application (page 86) for a description of the three objectives of the revised Renewable Gas Program.