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May 16, 2022

British Columbia Public Interest Advocacy Centre
Suite 803 470 Granville Street
Vancouver, B.C.
V6C 1V5

Attention: Ms. Leigha Worth, Executive Director

Dear Ms. Worth:

Re: FortisBC Energy Inc. (FEI)

Revised Renewable Gas Program Application – Stage 2 (Application)

Response to the British Columbia Public Interest Advocacy Centre representing the British Columbia Old Age Pensioners' Organization, Active Support Against Poverty, Disability Alliance BC, Council of Senior Citizens' Organizations of BC, and the Tenant Resource and Advisory Centre *et al.* (BCOAPO) 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 (BCUC) Order G-103-22, FEI respectfully submits the attached response to BCOAPO IR No. 1.

FEI has retained John J. Reed, Chairman and Chief Executive Officer of Concentric Energy Advisors, Inc. (Concentric), to provide his independent, expert opinion in response to a number of IRs related to ratemaking principles and FEI's proposed pricing of Renewable Gas services in the Application. Please refer to the attachment to the cover letter to FEI's response to BCUC IR No. 1 for a copy of the resume and testimony list of John J. Reed. In accordance with Section 14.02(e) of the BCUC's *Rules of Practice and Procedure*, FEI has identified the responses provided by Concentric.

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

A. INTRODUCTION AND APPROVALS SOUGHT

1.0 Reference: FEI RNG Program Application
Section 1.1, page 1
Section 3.6.1, page 38
Section 6.3, pages 75-77 Topic: Approvals Sought

Preamble: FEI states:

> "In this Application, FEI provides its comprehensive review and assessment of the Renewable Gas Program and requests approval of a revised Renewable Gas Program including necessary tariff changes, cost recovery methods, and regulatory treatment for new and revised Renewable Gas services. FEI uses the term Renewable Gas throughout this Application to refer collectively to the low carbon gases or fuels that the utility can acquire under the Greenhouse Gas Reduction (Clean Energy) Regulation (GGRR), which are: Renewable Natural Gas (RNG or biomethane), hydrogen, synthesis gas and lignin." **(Application, page 1)**

> Hydrogen is a new and viable option for decarbonizing the gaseous fuel stream. While the potential for hydrogen has been around for many decades, the price advantage and robust natural gas supply chain has made if difficult for hydrogen to make inroads in the energy sphere. However, with increasing GHG reduction mandates, hydrogen is now seen as a viable option for decarbonizing the gas system, as recognized in the amendments to the GGGR permitting the acquisition of hydrogen..." **(Application, page 39)**

> FEI's current Renewable Gas portfolio consists solely of RNG. However, as permitted under the GGRR, FEI is also working with suppliers to acquire hydrogen, synthesis gas and lignin. FEI expects that it will be able to meet the target in the CleanBC Plan with the inclusion of these additional Renewable Gases." **(Application, page 75)**

> "FEI is involved with multiple national and international joint initiatives that aim to rapidly develop a hydrogen ecosystem capable of producing and distributing hydrogen affordably as part of a lower carbon energy supply. Through its involvement, FEI intends to learn best practices from pioneering hydrogen projects that may be applied in BC. As FEI's understanding of hydrogen production, distribution and end-use applications develops, FEI will pilot projects that will test the use of hydrogen in closed systems. FEI is currently progressing to pre-feasibility planning and technical analyses for introducing hydrogen into the gas distribution network before 2025 and is evaluating large-scale projects for the centralized production and distribution of hydrogen." **(Application, pages 75-76)**

"While synthesis gas is not suitable for direct injection into the natural gas system, it can displace conventional natural gas at a point of use or be used as a feedstock for upgrading via a methanization process step to create RNG (which can then be injected into the existing natural gas system)." **(Application, page 77)**

"Lignin is not a gas, and therefore cannot be injected into the gas system. Rather, if an industrial customer is able to use lignin instead of natural gas, it can provide an option to reduce emissions." **(Application, page 77)**

1.1 Given that potential for hydrogen injection appears to be in the infancy stage of its assessment, please explain what specific approvals of the BCUC FEI is seeking related to this alternative.

Response:

As part of the Application, FEI is seeking BCUC approval to revise its General Terms and Conditions and Rate Schedules to permit the sale of hydrogen to its customers as part of its Renewable Gas Program. For example, FEI's General Terms and Conditions include the following definitions:

Hydrogen: Means the gas composed of molecules consisting of two hydrogen atoms.

Low Carbon Gas: Means Biomethane, Hydrogen, Lignin or Synthesis Gas.

These and related amendments align FEI's tariffs with its ability to acquire hydrogen pursuant to the GGRR.

FEI expects to apply for the BCUC's acceptance of its hydrogen acquisitions in future applications.

1.2 Given that neither synthesis gas nor lignin can be injected into the natural gas system, please discuss specifically what BCUC approvals FEI is seeking related to these alternatives.

Response:

As part of the Application, FEI is seeking BCUC approval to revise its General Terms and Conditions and Rate Schedules to permit the sale of synthesis gas and lignin to its customers as part of its Renewable Gas Program. For example, FEI's General Terms and Conditions include the following definitions:

Lignin: Means the class of organic polymers that form the structural support of plants, especially trees.

Synthesis Gas: Means a mixture of gases produced from the gasification or pyrolysis of biomass.

Low Carbon Gas: Means Biomethane, Hydrogen, Lignin or Synthesis Gas.

These and related amendments align FEI's tariffs with its ability under the GGRR to purchase lignin and synthesis gas that is used by a gas customer at the site where it is produced to replace, at least in part, conventional natural gas.

FEI expects to apply for the BCUC's acceptance of its synthesis gas (syngas) and lignin acquisitions in future applications.

1.3 Given that hydrogen, synthesis gas, and lignin are alternatives still under review, why are approvals being sought by FEI at this time not limited to only biomethane?

Response:

For clarity, FEI is not seeking approval to acquire hydrogen, syngas, lignin or RNG in this Application, but rather, is seeking approval for the rate schedules that will be needed to deliver all types of Renewable Gas to customers, how the charges will be set within those rate schedules, and other mechanisms for Renewable Gas acquisition cost recovery. These approvals are required irrespective of the types of Renewable Gas FEI may acquire in the future.

The *Greenhouse Gas Reduction (Clean Energy) Regulation* (GGRR) allows FEI to acquire RNG, hydrogen, lignin and syngas, and FEI intends to account for all of the Renewable Gas it acquires in the same way as it does for RNG. When FEI is able to acquire hydrogen, lignin or syngas, FEI will apply to the BCUC for acceptance of such acquisition, including addressing how that energy will be captured in the proposed LCG Account.

2.0 Reference: FEI RNG Program Application

Section 1.1, page 1

Section 4.4, page 50

Section 6.4, page 82

Section 7.1, page 84 - 86

Topic: Evaluation of Alternatives

Preamble: FEI states:

"Without a response from FEI, federal, provincial and municipal regulations and policies focused on reducing GHG emissions threaten the long-term viability of the gas delivery system and energy choice for British Columbians." **(Application, page 1)**

"FEI considered alternatives to respond to the need for change, including simply updating its voluntary renewable gas offering; a renewable gas blend for all sales customers; and directing Renewable Gas to New Residential Connections. FEI determined that a comprehensive program, including a renewable gas blend for all sales customers, 100 percent Renewable Gas for all New Residential Connections, and continuation of a voluntary renewable gas offering, was the only alternative that would maintain the long-term viability of the natural gas delivery system and energy choice for British Columbians." **(Application, page 84)**

"…to maintain the long-term viability of the natural gas distribution system and energy choice for British Columbians, FEI needs to revise the Renewable Gas Program to meet the following three objectives: 1. Meet provincial CleanBC targets for GHG emissions and balance Renewable Gas supply and demand; 2. Enable compliance with building regulations to maintain energy choice for New Residential construction; and 3. Meet customer requirements for Renewable Gas to maintain energy choice for existing customers." **(Application, page 86)**

"Over the past 10 years, FEI has invested over $386 million in energy efficiency, reducing customers' annual energy usage by 5.5 petajoules 5 (PJs) on the gas system. The energy savings attributable to the gas delivery system have resulted in a cumulative reduction of 2.3 Mt of GHG emissions." **(Application, page 50)**

"…FEI is also in the process of testing how hydrogen interacts with pipeline materials, components and other equipment on its system, enabling hydrogen transport as a blend in the gas system, and the feasibility of hydrogen transport via repurposed high pressure transmission pipelines with a long-term goal of repurposing segments of existing natural gas networks for the delivery of 100

percent hydrogen gas…..FEI is engaging with the NRCan Codes and Standards working group task force to modify and develop safety and technical standards and set longer-term objectives to transition the regional natural gas network to adopt hydrogen and synthesis gas and lignin. This includes hydrogen ready infrastructure initiatives, such as the certification of new appliances and equipment and the design of hydrogen-ready compatible natural gas infrastructure." (Application, page 82)

2.1 Please explain what alternatives to an expansion of RNG Program were considered. Please provide a detailed response that summarizes the alternatives reviewed, the steps undertaken to assess the alternatives and screen them out, along with the financial, economic, technical, and other analysis prepared and considered in order to conclude that an expansion of the current RNG Program on a mandatory basis is the only feasible option to provide low carbon energy to existing and new customers.

Response:

FEI believes that increasing the volume of Renewable Gas acquired and delivered to customers is mandatory in order to respond to public policy and that there are no alternatives that could be used as a substitute. The provincial CleanBC Plan, released in December 5, 2018, identifies policy objectives for increased Renewable Gas use among buildings and industry as follows:[1]

- Make residential natural gas consumption cleaner by putting in place a minimum requirement of 15% to come from renewable gas.
- Make industrial natural gas consumption cleaner with a minimum 15% to come from renewable gas.

In light of the policy objectives described above and in more detail in Section 3 of the Application, FEI has worked to expand its purchases of Renewable Gas as described in Section 6 of the Application. In particular, the forecast Renewable Gas supply growth depicted in Figure 6-3 of the Application shows how FEI plans to increase the supply of Renewable Gas to meet or exceed the objectives set out in the CleanBC Plan.

In October 2021, the provincial government released the CleanBC Roadmap. The Roadmap describes a new and more ambitious policy with the objective of limiting the GHG emissions from natural gas utilities to 47 percent below 2007 levels by 2030.[2] Achieving this new policy objective will require further expansion of FEI's energy efficiency initiatives and the expansion of the use of Renewable Gas. FEI considers that both of these efforts are complementary and important means of reducing the GHG emissions of its customers. However, on its own, increased energy efficiency

[1] CleanBC Plan, pp. 8-9: https://www2.gov.bc.ca/assets/gov/environment/climate-change/action/cleanbc/cleanbc_2018-bc-climate-strategy.pdf.
[2] CleanBC Roadmap, p. 29: https://www2.gov.bc.ca/assets/gov/environment/climate-change/action/cleanbc/cleanbc_roadmap_2030.pdf.

cannot satisfy current policy objectives and building regulation requirements; therefore, further expansion of FEI's Renewable Gas supply is necessary.

As explained on page 29 of the Application and further in response to BCUC IR1 1.1, FEI sees the potential Renewable Gas supply requirements being between 45 and 65 PJ by 2030. Delivering this increased amount of Renewable Gas to customers necessitates updates to the existing Renewable Gas Program. Please also refer to Section 7 of the Application where FEI discusses the program alternatives it considered in preparing the Application.

2.1.1 Please explain whether FEI evaluated greater reliance on, and additional investment in, demand side management as a strategy to address the environmental legislative requirements. Please summarize the rationale and analysis undertaken for deeming such alternative as infeasible and provide any report prepared. If such analysis was not undertaken, please discuss why.

Response:

Yes, FEI has evaluated the role that energy efficiency and its demand side management (DSM) programs will continue to play in aligning customers' emissions with GHG reduction requirements. Please refer to FEI's 2022 Long Term Gas Resource Plan (LTGRP) which includes scenario analysis demonstrating how DSM will be used to meet future policy goals.

As discussed in the response to BCUC IR1 1.1, energy efficiency is a critical tool to align with the provincial goals of the CleanBC Roadmap's GHG emissions cap. Investments in energy efficiency will be required to achieve up to 1.3 million tonnes of GHG reductions to align with the cap. Based on the 2021 Conservation Potential Review[3], this will depend on realizing a significant share of the overall potential for energy efficiency through to 2030. However, as noted in response to BCOAPO IR1 2.1, increased energy efficiency alone cannot satisfy the policy objectives in the CleanBC Roadmap.

Further, regulations in the City of Vancouver and other municipalities, and proposals for the BC Energy Step Code, require stringent GHG reduction measures for new buildings that will necessitate significantly lowering the carbon intensity of the fuel delivered to these buildings. Therefore, energy efficiency is necessary, but insufficient on its own, to reach the targets as proposed from local governments like the City of Vancouver.

[3] The 2021 Conservation Potential Review (CPR) was conducted by the Posterity Group and is FEI's latest review of the energy efficiency opportunities available among FEI's residential, commercial, and industrial natural gas customers. Please see Appendix C-1 of FEI's 2022 LTGRP for the 2021 CPR: https://docs.bcuc.com/Documents/Proceedings/2022/DOC_66503_B-1-FEI-2022-LongTermGasResourcePlan.pdf.

2.1.2 Please explain how the forecast of rising gas prices associated with the reliance of greater levels of RNG over the next 10 and more years can be expected to affect energy consumption, contributing to reduced carbon emissions, compared to a forecast that ignores these price increases.

Response:

As higher cost renewable and low-carbon gases are incorporated into FEI's supply portfolio to comply with local and provincial government GHG reduction policies, gas rates will increase. In the short-term, the price elasticity of demand for gas is inelastic; however, over the longer-term, end users will have greater incentive to improve energy efficiency, or conserve gas consumption.

2.1.3 Please explain whether more aggressive levels of DSM investment are more economically viable, and perhaps preferable to, investment required to support hydrogen injection. Please explain and provide current average DSM cost compared to current average hydrogen cost including the cost for infrastructure investment.

Response:

Please refer to the response to BCUC IR1 1.1 which estimates the level of Renewable Gas required, after DSM and other GHG mitigation strategies, to meet the CleanBC Roadmap's emissions cap. Please refer to FEI's 2022 LTGRP for further details on the role of DSM in meeting GHG reduction goals.

2.1.4 Assuming that the current electric infrastructure in British Columbia would be unable to fully absorb the fuel switching of all natural gas customers to electricity in the absence of potential significant investment in generation (and potentially transmission and distribution also), please discuss the analysis undertaken or available to FEI that assessed the ability of the electricity infrastructure to absorb natural gas customers,

including for example, the cost of required electric investments and rate increases, and other implications to fully move all customers to electricity. If no analysis is available, please discuss why not.

Response:

The most recent analysis undertaken by FEI which assesses significant electrification of the provincial energy system was in Guidehouse's report titled *Pathways for British Columbia to Achieve its GHG Reduction Goals* (Pathways Report).[4]

The Pathways Report takes into account the long-term infrastructure requirements and full cost implications of policy decisions, thus assisting the provincial government to avoid drawing near-term policy conclusions that lead to unintended negative consequences in the long term. The report evaluated two possible pathways to achieve the Province's 2030 and 2050 GHG reduction targets. The first pathway was an electrification-focused scenario and the second a diversified scenario where gas infrastructure continues to be utilized.

The Pathways Report found that an electrification pathway would see approximately 9,000 MW of new peak load from the addition of significant heating load, industrial load and vehicle charging. This was the largest cost-driver for the electrification pathway to reduce GHG emissions by 80 percent by 2050. This increase in electricity demand would require over $500 billion in new generation, transmission and distribution investment between now and 2050. As a result, by 2050, electricity rates would effectively double in real terms and would be higher than electricity rates in the diversified pathway.

2.2 Please discuss how the nearly $1.0 billion investment in the Tilbury LNG Storage facility supports and contributes to, or restricts, achieving the GHG goals threatening the long-term viability of the gas delivery system. In the response, please summarize the environmental, financial, economic, and other analysis prepared in support of FEI's conclusions.

Response:

Please refer to the response to BCUC IR1 63.1 in the TLSE CPCN proceeding, provided as Attachment 2.2a, which discusses how the TLSE Project is consistent with and will advance the BC Government's energy objectives, and in particular, the GHG emission reduction targets set out by CleanBC.

[4] https://www.cdn.fortisbc.com/libraries/docs/default-source/about-us-documents/guidehouse-report.pdf.

Please also refer to the responses to the BCUC Panel IR1 1 series in the TLSE CPCN proceeding, provided as Attachment 2.2b, which provides FEI's analysis supporting the need for the TLSE Project and the long-term viability of the gas delivery system.

2.3 Please discuss the implications if FEI is not able to meet the 15% RNG legislated requirements by 2030 (or greater assuming pending BC Step Code legislation).

Response:

For clarity, the CleanBC Plan's minimum requirement of 15 percent Renewable Gas by 2030 and the CleanBC Roadmap's emissions cap are not legislated at this time. Regardless, FEI is confident that it will meet the 15 percent Renewable Gas target by 2030. Please refer to Section 6 of the Application, which explains that FEI is well-positioned to accelerate the growth of its Renewable Gas supply portfolio to meet and exceed the CleanBC Plan's 15 percent Renewable Gas target.

Notably, FEI currently has 18 PJ of supply under contract that will begin deliveries by 2024, which is already more than halfway to the 15 percent target. The *BC Renewable and Low-Carbon Gas Potential Study*[5] indicates that there is enough supply in BC and in North America to exceed the 15 percent target by 2030, and the GGRR enables FEI to purchase or produce sufficient Renewable Gas to meet the target as well.

2.4 Given the overall objective of the RNG Program is to enable FEI to meet environmental public policy mandates and, as such, allowing all customers a continued choice in energy, please discuss why FEI has designed its program around the 100% Renewable Gas Service offering.

Response:

FEI did not design the revised Renewable Gas Program around a 100 percent Renewable Gas offering; rather, the program consists of several different offerings that were designed to meet the three objectives set out in Section 7.2 of the Application, thus meeting emission reduction targets while maintaining the long-term viability of the gas distribution system and ensuring continued energy choice. The proposed Renewable Gas Connections service, which contemplates 100

[5] 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 percent Renewable Gas service for all new residential connections, is one offering in furtherance
2 of these objectives and ensures continued access to the gas system for new residential
3 connections.

4

3.0 Reference: FEI RNG Program Application

Section 1.1, page 1

Topic: Implementation in 2024

Preamble: FEI states:

> "FEI proposes a new Renewable Gas Blend for sales customers under which all customers who purchase their gas from FEI (sales customers) will be provided with a base level of Renewable Gas as part of their regular gas service. Subject to available supply, FEI expects to begin a one percent blend on January 1, 2024." **(Application, page 1)**

3.1 Please confirm that FEI is still in the process of working with suppliers to be able to deliver a one percent blend January 1, 2024, while at the same time putting this Application forward for approval by the BCUC.

3.1.1 If the response to 3.1 is yes, then please provide the timing of when FEI expects to confirm that the one percent blend on January 1, 2024, is achievable.

3.1.2 What is the degree of confidence at this time that should be placed on meeting the one percent blend on January 1, 2024 and please explain how FEI arrived at that degree of certainty.

Response:

Confirmed. FEI is continually engaging with Renewable Gas suppliers in order to increase its supply of Renewable Gas, as described in Section 6 of the Application. This increase in supply will support the revised Renewable Gas Program, including the initial launch of the Renewable Gas Blend service.

FEI anticipates that it will be in a position to confirm the proposed January 1, 2024 launch date of the Renewable Gas Blend service in its filing to set the S&T LC rider, approximately one month in advance of the fourth quarter gas cost report in 2023. Please refer to Section 8.4.2.1 of the Application for a description of FEI's proposed process to set the S&T LC rider.

FEI's degree of confidence on the delivery of a one percent blend by January 1, 2024 is relatively high at this time. FEI's degree of confidence is primarily based on Renewable Gas supply increasing in accordance with FEI's forecast, as discussed in Section 6.2.2 of the Application. FEI notes that new supply projects have recently been approved, including the recently announced agreement with Archaea Energy,[6] which is anticipated to provide 8 PJ of incremental Renewable Gas supply by 2025.

[6] https://ir.archaeaenergy.com/news-events/press-releases/detail/19/archaea-energy-announces-expansion-of-commercial, January 27, 2020.

B. PROGRAM HISTORY AND EVALUATION

4.0 Reference: FEI RNG Program Application

Section 2.1, page 15

Topic: Legislated Cost of RNG

Preamble: FEI states:

> "In the spring of 2017, the provincial government amended the GGRR which, among other things, indicated that the acquisition of RNG is a prescribed undertaking subject to two conditions, namely 1. the public utility paying no more than $30/GJ; and 2. the total volume of RNG purchased in a calendar year not exceeding 5 percent of the total volume of natural gas provided by a public utility to its non-bypass customers in 2015 (or 8.9 PJs/year for FEI)." **(Application, page 15)**

4.1 Please confirm that FEI's past, present and future actions are in alignment with "the public utility paying no more than $30/GJ" and confirm whether FEI has interpreted this restriction to mean there is a $30/GJ all-in hard cap (that is: the cost of supply and any associated investment in capital cost) or if FEI interprets this to mean for the cost of the commodity only. Please also clarify the interpretation underpinning FEI's Application, including proposed bill impacts.

Response:

FEI's Renewable Gas acquisition costs are subject to the maximum amount in section 9 of the GGRR. The maximum amount in effect in the 2021/2022 fiscal year is $31 per GJ. The maximum amount in effect in subsequent fiscal years increases by the annual percentage change in the annual average All-items Consumer Price Index for British Columbia.

In the event that additional capital investment is required to acquire Renewable Gas supply, the annual cost of service on the capital investment will be accounted for as part of FEI's acquisition cost and will not exceed the GGRR maximum price per GJ.

The bill impacts shown in Section 8 of the Application use forecast supply costs which are within the GGRR maximum acquisition cost irrespective of whether FEI invests capital to produce the Renewable Gas or pays a third party supplier.

C. EVOLUTION OF CLIMATE CHANGE POLICY

5.0 Reference: FEI RNG Program Application

Section 3.5, pages 34, 35

Section 4.3.1, page 47

Section 6.3.2, page 78

Topic: Leveraging Existing Natural Gas Infrastructure

Preamble: FEI states:

"The adoption of GHGi targets at the local government level has resulted in a complex patchwork of regulations across BC. The implementation of GHGi levels, and the range of targets that have been set vary substantially, from 3-6 kgCO2e/m2, with some municipalities indicating a desire to move to 1 kgCO2e/m2." **(Application, page 34)**

"..meeting GHGi targets set by local governments can be challenging, leading builders and developers to select electricity, which they perceive to be simpler, instead of gas-based energy solutions." **(Application, page 34)**

> "Further, city planners currently favour electricity-based solutions, often reflecting a lack of understanding at the planning level or a concern about the existing program's lack of permanence as discussed in Section 3.5.1 above. As a result, city planners are often resistant to builders or developers proposing Renewable Gas solutions for their buildings." **(Application, page 35)**

> "Over the 10-year period shown in Figure 6-3, FEI's Renewable Gas portfolio is forecasted to grow from approximately 0.7 PJs in 2021 to 41 PJs in 2032 – the latter being equivalent to 11,389 GWhs of low carbon energy provided to British Columbians. This is more than twice the anticipated energy output from the Site C dam, and enough energy to heat approximately 891,000 homes in BC." **(Application, page 78)**

> "Electricity systems are designed to deliver for peaks as well but the differences between low volume deliveries and peak deliveries are much smaller than the gas system." **(Application, page 47)**

5.1 Please discuss what actions FEI is undertaking to address the lack of understanding by municipalities, city planners, and developers, etc.

Response:

Municipalities (and local governments generally), city planners, and developers are each heterogeneous groups with competing values and priorities. The transfer of information from one

individual or one department in a municipality also varies. As a result, the movement of information through local governments regarding FEI's innovations in Renewable Gas, and the associated GHG emission reductions that can be achieved through the revised Renewable Gas Program, is a complex and lengthy process requiring continuous and on-going interactions, raising awareness and education. As such, it is a significant challenge to ensure that local governments, and all their departments, are informed and able to adopt offerings such as Renewable Gas into their options, policies, and procedures for the building sector.

FEI's engagement with local government is described in Section 10.3.4.1 of the Application. FEI's engagement, particularly regarding Guidehouse's Pathway Report, Renewable Gas supply forecasts, and related GHG reduction opportunities, have helped local governments and city planners understand the importance of the gas system to the supply of cost-effective, reliable low carbon energy and demonstrate the significant progress FEI is making in expanding Renewable Gas supply.

Despite demonstrating the benefits of a diversified pathway and a positive supply outlook, a Renewable Gas compliance pathway that offers permanency as proposed in this Application is necessary to support local government climate action policy objectives and further Renewable Gas supply development.

Similar to local governments, FEI has had, and continues to have, discussions with developers on Renewable Gas as well as other emissions reduction strategies, such as energy efficiency. There is also significant interest from developers in a Renewable Gas tariff that includes assurance of permanence, as highlighted in a number of letters of support. Developers, the construction industry, and construction industry suppliers, contractors, and consultants have increasingly approached FEI with growing concerns regarding policies that prevent the use of gas-based equipment and the subsequent costs.

In 2020, FEI received approval through its MRP Application for additional funding to develop customer education communication on the energy transition, including the use of Renewable Gas. This funding has been used to undertake education campaigns including information on fortisbc.com, corporate blog stories, organic and promoted social media posts linking back to web or blog content, advertising on web, television and radio, advertorial content, and news coverage across all mediums. If FEI's service offerings in this Application are approved, additional funding will be required in the future to help reach local governments, developers and customers alike.

Particular emphasis, both in time and investment, has been spent on Renewable Gas awareness to help all British Columbians, including local governments, city planners, and developers, better understand the capability of Renewable Gas to reduce GHG emissions and displace the use of conventional natural gas. Ultimately, FEI's Renewable Gas Connections service provides a solution that both meets developers' needs and meets local and provincial climate targets.

5.1.1 Assuming that the BC Hydro system is not capable of absorbing significant amounts of fuel switching by natural gas customers in the absence of sizable new investment (and rate increases) or may not be operationally well-suited, please explain what discussions have occurred or are planned to occur to collaborate with BC Hydro, as a crown corporation, to provide an overall provincially unified set of education materials to best support the strategic objectives underpinning the mandated environmental legislation that are in the best interests of all British Columbians. If no collaboration has occurred, please explain why.

Response:

FEI is currently working with the BCUC and BC Hydro to evaluate energy scenarios between both utilities' resource plans to better understand barriers and pathways to decarbonization in BC.[7] While FEI continues to collaborate on this initiative, as well as others such as DSM programs, a unified set of education materials on the approaches to decarbonization has not yet been developed. This is because this initiative remains ongoing and because significant details on the policy for decarbonization in the CleanBC Roadmap have not yet been developed. Ultimately, however, collaboration between BC Hydro, FortisBC Inc., and the Province's gas utilities must also be driven across the Province. FEI continues to advocate for such collaboration in its discussions with the Province.

[7] https://www.bcuc.com/OurWork/ViewProceeding?ApplicationId=959.

6.0 Reference: FEI RNG Program Application

Section 3.6.1, page 38 Topic: Cost of RNG fuels

Preamble: FEI states:

> Hydrogen is a new and viable option for decarbonizing the gaseous fuel stream. While the potential for hydrogen has been around for many decades, the price advantage and robust natural gas supply chain has made it difficult for hydrogen to make inroads in the energy sphere. However, with increasing GHG reduction mandates, hydrogen is now seen as a viable option for decarbonizing the gas system, as recognized in the amendments to the GGGR permitting the acquisition of hydrogen..." **(Application, page 38)**

6.1 Please provide the current cost of hydrogen ($/GJ), synthesis gas and lignin, biomethane and natural gas commodity.

Response:

FEI has not yet executed any agreements to acquire hydrogen, synthesis gas or lignin supply, and therefore, does not have 'current' acquisition costs to provide. The Application uses a forecast acquisition cost for hydrogen, syngas and lignin, as set out in the response to BCSEA IR1 15.3.

6.2 Please discuss who regulates the prices for the alternate energy forms such as biomethane, hydrogen, synthesis gas, and lignin or are the prices established in a competitive market?

Response:

While prices are generally established in the competitive market, the maximum cost that FEI may pay for RNG, hydrogen, synthesis gas, and lignin is set by section 9 of the GGRR.

6.3 Please discuss whether the energy content of RNG (biomethane), hydrogen, synthesis gas and lignin provide the equivalent energy content as conventional natural gas (for an equivalent amount of energy).

Response:

RNG (biomethane), hydrogen, synthesis gas and lignin provide the equivalent energy content as conventional natural gas for an equivalent amount of energy. However, as shown below in Table 1, the fuels vary in this regard if compared on an equivalent volume basis.

Table 1: Energy Density[1] by Volume and Mass

Fuel Type	Physical Form	Energy Density by Volume (Megajoules per cubic meter)	Energy Density by Mass (Megajoules per kilogram)
Conventional Natural Gas	Gas	40[2]	54[2]
RNG (biomethane)	Gas	36 (minimum)[3]	49[3]
Hydrogen	Gas	13[2]	142[2]
Synthesis Gas	Gas	4 to 28[4]	n/a
Lignin	Viscus Fluid/Powder	n/a	26[4]

Notes:

1. Energy densities are shown at higher heating value.
2. https://www.engineeringtoolbox.com/fossil-fuels-energy-content-d_1298.html.
3. FEI Biomethane Specification.
4. bc-renewable-and-low-carbon-gas-supply-potential-study-2022-03-11.pdf (fortisbc.com).

6.3.1 If these energy forms are not equivalent in terms of energy content and the difference is significant, please provide the financial impact to the residential customer.

Response:

FEI bills its customers based on the energy they use and the GGRR allows FEI to acquire Renewable Gas based on a cost per unit of energy (GJ). Therefore, with respect to the commodity cost of hydrogen or RNG, there is no financial impact to customers from the differing energy densities set out in the response to BCOAPO IR1 6.3. There may, however, be future infrastructure costs related to hydrogen distribution which FEI cannot yet estimate.

D. A DIVERSIFIED ENERGY SYSTEM IS IN THE INTERESTS OF BRITISH COLUMBIANS

7.0 Reference: FEI RNG Program Application

Section 3.5.1, page 33

Section 4.1, page 43

Section 4.4, page 49

Topic: Municipal Regulations

Preamble: FEI states:

> "A building using natural gas for space and water heating cannot meet some of the more stringent GHGi targets; however, the carbon intensity of Renewable Gas is low enough to meet the Step 3 Code and municipal GHGi targets. 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." **(Application, page 33)**

> "FEI's assets will be critical to achieving government GHG emission targets. In particular, the extensive coverage and interconnectivity of the gas system makes the system a critical vehicle to deliver low carbon energy to British Columbians. Further, as a "drop-in fuel", Renewable Gas is an energy source that meets the objectives of all three levels of government (as discussed in Section 3), does not require significant expansions in energy delivery, does not require users to acquire new end use equipment, and as such, leads to relatively quick, easy and cost effective GHG reduction solutions. **(Application, page 43)**

> FEI's contributions towards the achievement of the provincial government's 2018 CleanBC Plan, using Renewable Gas delivered through FEI's existing distribution system, will provide 75 percent of the plan's total emissions reductions in the built environment. The emission reductions under the CleanBC Roadmap will be even greater. The magnitude of these reductions support FEI's view that the provincial government expects the gas system will continue to play a central role in its strategy to reduce GHG emissions in this sector. **(Application, page 49)**

7.1 If the spirit of provincial legislation is two-fold (1) to reduce carbon emissions and (2) to ensure such emissions reductions be attained through the use of the provincial natural gas system such that the long-term viability of the gas system is sustained, please discuss in detail the apparent dichotomy between municipal regulations effectively forcing new construction to use electricity and those overall provincial policy objectives and legislation.

Response:

FEI observes that local government regulation of emission reductions in buildings has primarily focused on electrification to date and, as such, has effectively forced builders and developers to use electricity-only solutions. This approach conflicts with provincial policies which embrace a diversified approach to achieving GHG emission reductions. As a result, there are inconsistencies between provincial policy and direction at the local government level. For example, existing GHGi thresholds set by local governments do not contemplate the use of Renewable Gas, while the provincial government has endorsed the acquisition of Renewable Gas through the GGRR. Further, the provincial government has signaled that the proposed carbon pollution standards[8] for new construction will take effect in 2024, providing time for the market to adopt the standard. The carbon pollution standards in the BC Building Code are intended to set GHG targets for new buildings.

Further, changes to building codes typically follow a market transformation curve, including various stages before implementation, to ensure the market is adequately prepared to implement a new code. The introduction of new technologies, removal of regulatory barriers to commercialize technologies and the introduction of incentives are all activities that take place prior to adoption. As a single energy source is preferred for meeting GHG targets at the local government level, and given the high dollar value incentives being provided for air source heat pump technology, the market is arguably not ready to bear the costs associated with implementing these regulations at the local level. Put another way, local governments are transitioning policies at a pace faster than the market transformation curve permits, and are doing so without considering the "spirit" of provincial legislation. In particular, as noted above, local governments have yet to include Renewable Gas as a path to decarbonization.

To address the advancement at the local government level, FEI has taken various measures, including:

- Understanding the energy needs of the Province, including peak energy. This includes the commissioning of the Pathways Report which explains the need to maintain a flexible, reliable, and resilient Province-wide energy system in the face of change;
- Rapidly increasing Renewable Gas supply and re-opening the Renewable Gas Program;

[8] https://www2.gov.bc.ca/assets/gov/environment/climate-change/action/cleanbc/cleanbc_roadmap_2030.pdf, page 68.

- Engaging with the provincial government on the CleanBC Roadmap's GHG reduction target for natural gas utilities, which FEI understands will be referred to as the Greenhouse Gas Regulation Standard (GHGRS);
- Engaging with local governments to educate on Renewable Gas to meet emissions reductions and to explore Renewable Gas supply projects;
- Informing and educating customers and the industry on Renewable Gas;
- Understanding future supply potential in British Columbia in consultation with the provincial government; and
- The submission of this Application to revise the existing Renewable Gas Program.

7.2 Please outline all of FEI's approaches, plans or actions to dealing with this apparent dichotomy, especially in regards to Renewable Gas.

Response:

Please refer to the response to BCOAPO IR1 7.1.

8.0 Reference: FEI RNG Program Application

Section 4.3.3, page 48

Section 7.2.3, page 89 Topic: Low Income Impacts

Preamble: FEI states:

> "Maintaining or increasing throughput on the system benefits all customers in mitigating increased energy bills. Typically, customers that switch to alternative energy sources are those that can most afford to do so, as we have seen with the adoption of electric vehicles, which then leaves those remaining, who are not in a financial position to switch, bearing the increased costs." **(Application, page 48)**

> "Most customers are also sensitive to the price premium paid for Renewable Gas versus conventional gas. Thereby Renewable Gas solutions must be priced in a way that encourages adoption in order to provide a feasible gas solution that maintain energy choice for these segments of customers. **(Application, page 89)**

8.1 Please provide the number of low-income customers who are currently participating in the BERC Program.

Response:

FEI does not collect customers' income level information for participants in the Renewable Gas Program.

8.2 Given that FEI's proposal is to expand the current RNG program that will be mandatory for customers and anticipated sizable rate increases will flow from this plan, please discuss what programs are being contemplated for low-income customers and provide a summary of the analysis or reports prepared.

8.2.1 If no programs have been considered, please explain why not.

Response:

FEI supports its low-income customers with ongoing initiatives such as:

- DSM measures, customer engagement and outreach initiatives, including providing energy conservation education, free home energy evaluation and upgrades, and various rebates and incentives;
- Continuation of service and bill payment support, including flexible payment arrangements, waiver of late payment charges, flexibility with security deposits, equal

payment program, referral to channels and facilitation of government funding and social assistance programs; and

- Community partnership and programs including the social housing retrofit program, Indigenous communities' conservation program, and rental apartment program.

Beyond these initiatives, FEI believes that programs to support low-income and moderate-income customers should not be administered by utility providers but should instead continue to be administered by government. This approach ensures a consistent, Province-wide approach that provides fair and equitable treatment across all of BC, is aligned with existing social programs at the provincial and federal levels and is not specific to one utility provider or energy source.

A key feature of Renewable Gas is that it is a drop-in fuel that does not require customers to purchase or change equipment (such as heat pumps) or reconfigure buildings in order to reduce emissions. This makes Renewable Gas a cost-effective measure to reduce emissions, balancing the need to reduce emissions with the impact of higher rates for all customers. Further, the addition of customers to the FEI system provides benefits to all customers by using the system more efficiently and putting downward pressure on rates overall.

For FEI's Renewable Gas Program specifically, the increased costs resulting from increases in renewable content in FEI's gas portfolio result from the CleanBC Plan. Therefore, the costs to meet those requirements will be incurred by the utility regardless of whether FEI's proposed changes to the Renewable Gas Program are approved as applied for. Please refer to the response to BCUC IR1 1.1 for a discussion of the Renewable Gas supply required to meet CleanBC Plan targets.

Providing new residential connections with 100 percent Renewable Gas, as proposed in this Application, will facilitate FEI's ability to continue adding new customers and provide customers with energy choice that meets the applicable requirements set by local governments for GHG emissions and GHGi requirements. Additionally, FEI's proposal to provide new residential customers with 100 percent Renewable Gas at the same rate as existing residential natural gas customers will provide price equality for low-income customers who may be renting in new residential premises.

Absent being able to add new customers, the additional costs associated with increasing Renewable Gas content in FEI's gas portfolio will be borne by all remaining customers (which would decline over time), resulting in higher costs for those remaining customers, and in particular, those customers that are unable to switch away from gas to electric heat pumps due to the high cost of the equipment or required building retrofits.

Please also refer to the response to BCUC IR1 23.1.3 for the bill impacts if the Renewable Gas Connections service is not approved.

E. WHAT CUSTOMERS NEED FROM A RENEWABLE GAS PROGRAM

9.0 Reference: FEI RNG Program Application
Section 2.2.1, page 17
Section 2.2.2, page 18
Section 5.1, page 52
Section 7.2, page 86 Appendix B-1, slide 25
Topic: Bill Affordability, Customer Survey

Preamble: FEI States:

> "More broadly, FEI stated in the 2010 Biomethane Application that the program would: • Meet the demands of FEI's customers in a safe, reliable and economical manner." **(Application, page 17)**
>
> "Therefore, to maintain the long-term viability of the natural gas distribution system and energy choice for British Columbians, FEI needs to revise the Renewable Gas Program to meet the following three objectives:
>
> 1. Meet provincial CleanBC targets for GHG emissions and balance Renewable Gas supply and demand;
> 2. Enable compliance with building regulations to maintain energy choice for New Residential construction; and
> 3. Meet customer requirements for Renewable Gas to maintain energy choice for existing customers." **(Application, page 86)**

"As FEI described in its 2015 BERC Application, the premium paid for Renewable Gas over conventional gas had increased to the point of discouraging voluntary customers from enrolling in the Renewable Gas Program. In that application, FEI provided feedback from large volume customers that the BERC rate was too high to consider increasing their purchase volumes." **(Application, page 18);**

In general, FEI understands that customers want their gas service to be affordable and reliable, for it to provide comfort and convenience, for it to be efficient, and increasingly, for it to have low emissions. **(Application, page 52)**;

"British Columbians are highly price sensitive when it comes to actually signing up" **(Slide 25)**; and

"From the insights gained from customers and stakeholders through these interactions, FEI has a robust understanding of the energy needs of consumers. Given the evolution of government policy with respect to emission reductions, FEI is well-placed to participate in,

and contribute to, the transition to a lower-carbon economy. In particular, and importantly, these customer insights reinforce the need for the suite of solutions proposed in this Application. Based on knowledge and discussions with customers some of the broad themes that emerge are: 1. Customers Value Multiple Attributes of Gas Service: Customers want gas service to be affordable, reliable, provide comfort and convenience, and to be efficient and have low emissions….2. Need to Balance Affordability and Emission Reductions: Many customers want to reduce emissions, but also want the source of their energy to be affordable. 3. Natural Gas is Preferred More Than Other Energy Sources: Feedback from customers indicate they would rather have a home with natural gas over other energy forms…4. Customers Value the Benefits of Natural Gas: For many years, FEI's customers have indicated that they want natural gas and the benefits it provides them in their home or business. In recent years, customers have increasingly sought to reduce their emissions and energy usage and are looking to FEI to provide solutions that do not compromise the affordability, comfort, convenience, and reliability of conventional natural gas. 5. Customers Are Not Always Aware of Emissions Reduction Policies..."**(Application, page 54)**

9.1 With respect to the three RNG Program objectives outlined by FEI, please provide FEI's perspectives on its ranking or weighting (qualitative) of the three objectives as a result of the proposals contained in the Application.

Response:

From FEI's perspective, none of the three objectives are weighted differently or take priority. Each objective is essential to ensuring the overall success of the revised Renewable Gas Program. In particular, each contributes to the gas system's ability to continue to provide service in the long term, while also contributing positively to a low-carbon future for BC, in order to maintain energy choice, affordability and system resiliency. Please also refer to the response to BCUC IR1 10.1.

9.2 Considering customers' strong sensitivity to price, please discuss why FEI's three RNG Program objectives no longer include an objective associated with price.

Response:

While price is a central consideration for FEI when acquiring Renewable Gas supply, price has never been an objective of the program itself. Historically, the program's primary objective has been to provide BC energy consumers with access to sustainable, low carbon energy through the existing gas system. The currently approved BERC rate methodology also identified three objectives, as described in Order G-133-16:

1. Maximize the recovery of program costs from RNG customers.

2. Manage biomethane inventory.
3. Establish a BERC rate setting mechanism that is robust, effective and provides regulatory efficiency.

None of these objectives directly relate to price, although the objective of maximizing the recovery of program costs from RNG customers implies setting a price which generates as much revenue as possible from voluntary program participants.

Both policy and regulations have evolved in recent years, as described in Section 3 of the Application. FEI now believes that under the policy direction established through the CleanBC Plan, and now the CleanBC Roadmap, the acquisition and inclusion of Renewable Gas into FEI's gas supply is in-effect mandatory in order to achieve the associated policy objectives for GHG emission reductions. The costs of Renewable Gas supply will therefore be part of FEI's gas supply costs and will affect the price that customers pay for gas service. FEI has some ability to mitigate the impact on the price by negotiating for the lowest cost supplies of Renewable Gas, after controlling for other important considerations such as the quality and reliability of the individual suppliers.

The price paid by various customer groups is a function of how FEI proposes to recover the costs of Renewable Gas supply (cost allocation to various customer groups) as set out in this Application. FEI has proposed rate structures that are both reasonable and fair, and that are in the long-term interests of FEI ratepayers.

9.3 Please reconcile and explain how FEI arrived at its three RNG Program objectives considering the broad themes that emerged through its discussions with customers and stakeholders which appear to have a strong focus on affordability.

Response:

FEI appreciates this question's focus on affordability. Energy affordability is one of the central ways that the gas system has provided value to British Columbians, and can continue to do so in a low carbon future. Please refer to Section 4 of the Application for further discussion in this regard.

While FEI believes that energy affordability is a central concern of ratepayers, and FEI has long advocated for affordability concerns with various levels of government and stakeholders, the utility is nonetheless a regulated utility and BC company, and thus subject to policies and regulations of British Columbia. Current public policy initiatives are directing the reduction of GHG emissions from all sectors of the economy. FEI has an important role to play in the energy transition and must respond accordingly. The proposals described in the Application reflect shifts in policy and

regulations and will allow FEI to make substantial progress towards reducing GHG emissions from natural gas use, while maintaining access to the gas system for energy consumers in FEI's service territory, and keeping rates as affordable as possible for customers by keeping demand on the system. The following elements of the proposal promote affordability:

1. **Renewable Gas Connections:** Under this offering, the owners of new residential homes pay a rate equivalent to the cost of conventional natural gas service for owners of existing homes. This maintains energy affordability for the owners of new homes. This offering also allows new loads to be added to the system to replace existing loads naturally leaving the system due to building turnover and other factors. A decline in the load on the gas system can therefore be averted. A declining load would necessarily put upward pressure on rates as more of the utility's fixed costs and Renewable Gas supply costs will be recovered across a reduced volume of throughput.
2. **Voluntary Renewable Gas:** Under this offering, customers who wish to voluntarily purchase more Renewable Gas at the premium rate may do so. Participation in the program is optional. This offering therefore shifts a portion of the cost of Renewable Gas supply away from customers who did not voluntarily request Renewable Gas service (i.e., Renewable Gas Blend customers), onto customers who did. As a result, less Renewable Gas supply cost must be recovered through the S&T LC rider, thus helping keep rates more affordable for all customers. This service also helps retain load on the gas system, as declining load would be detrimental to overall rates and affordability.
3. **Renewable Gas Blend Service and S&T LC Rider:** Any Renewable Gas volumes not sold through the Renewable Gas Connections or Voluntary Renewable Gas offerings will be distributed across all FEI sales customers through the Renewable Gas Blend service. Renewable Gas supply costs that are otherwise unrecovered will be recovered from all sales customers through the S&T LC rider. By distributing the volumes and costs in this manner, all sales customers will receive some benefit from the Renewable Gas that FEI must acquire to contribute towards government policy objectives, while minimizing the impact of the supply costs on rates.

9.4 If no economic-based objective was established to guide (and evaluate on a post-facto basis) in the delivery of the RNG Program, does that suggest that price is no longer a concern? If not, please explain how the lack of an economic-based objective should be appropriately interpreted.

Response:

FEI assumes that the term "economic-based objective" refers to customer costs. Price and affordability remain central concerns for FEI. In addition to the program's features which are described in the response to BCOAPO IR1 9.3, FEI seeks to manage costs through its Renewable Gas supply acquisition process. As described in Section 6 of the Application, FEI now has a well-

established reputation, track record, and "first mover" advantage among Renewable Gas suppliers. FEI believes it can leverage its strengths to help keep the cost of Renewable Gas as affordable as possible for all customers.

9.5 If no economic-based objective is established to guide in the delivery of the RNG Program, how does FEI ensure that cost continues to be a paramount consideration in order to satisfy the needs of its customers?

Response:

As described in the responses to BCOAPO IR1 9.2, 9.3 and 9.4, FEI is acutely aware of, and shares the concern over, the cost of the proposed Renewable Gas Program. FEI also believes that customers will begin to migrate away from the gas system in favour of alternative energy sources if cost and affordability do not remain primary considerations for the utility, and an area where the utility successfully delivers value to ratepayers. Such a migration would put additional upward pressure on rates, threatening the viability of the gas system. Therefore, FEI is strongly incentivized to ensure that cost continues to be an important consideration in all of its activities.

9.6 Please explain FEI's views on whether the demographic makeup of the survey participants is considered representative of FEI's total customer base.

Response:

FEI does not collect or have data on the demographic makeup of its customer base. However, in order to be responsive, FEI provides the following information about the sample populations:

- **BC Adults:** The survey set targets and weighted the sample to ensure that it is representative of the BC adult population according to Census data.
- **RNG Customers:** The survey set targets and weighted the sample to ensure it was representative of RNG customers in terms of region of the Province, RNG blend purchased, and annual gas consumption.
- **Small Business Customers:** FEI did not have detailed demographic or firmographic data on FEI's small business customers. The survey set targets and weighted the sample to ensure it was representative of small business customers based on region of the Province.

9.7 Please explain FEI's views on whether the survey participants are considered representative of FEI's total customer base of customers.

Response:

Please refer to the response to BCOAPO IR1 9.6.

9.8 Please explain if customer survey participants were provided any information regarding the potential increase in the cost of the gas anticipated with the introduction of the RNG Program? If yes, please provide the cost data provided and discuss customer responses. If not, please explain why.

Response:

FEI understands "the potential increase in the cost of the gas" to mean an increased cost of gas service generally, as a result of including greater volumes of Renewable Gas in the supply of gas, and the requirement to fully recover the cost of Renewable Gas supply.

The surveys did not provide customers with any specific information about the impact on the cost of gas service generally due to the purchase of greater volumes of Renewable Gas. However, the surveys did indicate that FEI intended to increase the amount of Renewable Gas in the gas supply and that Renewable Gas is more expensive than conventional natural gas, and sought the respondents' feedback on how best to partition the recovery of those costs. The results of this line of questioning can be seen on slides 30, 31 and 32 of Appendix B-1 to the Application.

FEI believes that affordability and cost are a central concern to ratepayers. FEI shares this concern. However, both the CleanBC Plan and CleanBC Roadmap contemplate a significant role for low carbon gas, including biomethane and hydrogen, and set ambitious targets for GHG emissions reductions for the gas system. Given these policies, increased purchases of Renewable Gas are necessary. FEI also believes that while other options can contribute to achieving the policy objectives, they cannot do so without the inclusion of a greater volume of Renewable Gas. Ultimately, incurring the higher cost associated with greater volumes of Renewable Gas cannot be avoided and, as such, FEI's focus has been on how to allocate the Renewable Gas resource and recover the costs of Renewable Gas in a manner that is equitable and in the long-term interests of all ratepayers. Please also refer to the responses to BCUC IR1 13.2, 16.2, 23.4 and 30.1 for a discussion on the rate setting mechanisms and how keeping rates affordable for all ratepayers is one of the evaluation criteria considered by FEI.

9.9 Please explain if customer survey participants were provided any information regarding the potential increase in the cost of the gas anticipated under the RNG Program along with other anticipated rate increases associated with FEI's capital projects associated with, for example, Tilbury, Okanagan, and automated meters. If yes, please provide the cost data provided and discuss customer responses. If not, please explain why.

Response:

Please refer to the response to BCOAPO IR1 9.8. FEI's capital projects were not discussed with the survey participants.

F. PROPOSED RENEWABLE GAS PROGRAM

10.0 Reference: FEI RNG Program Application

Section 7.4.2, page 100

Topic: Renewable Gas Connection Service

Preamble: FEI states:

> "FEI is proposing that all New Residential Connections will receive 100 percent Renewable Gas, where New Residential Connections are all residential dwellings served by a service line installed after the date of implementation of the service, including new construction activity, conversions and retrofits…..All Renewable Gas Connections will be designated as low carbon and will be served by a tariff that is tied to the building, rather than the customer." **(Application, page 100)**

10.1 Please confirm or otherwise explain that Renewable Gas Connections designated as 100% low carbon is notional only and that the actual physical supply of gas will be consistent with the blended supply of FEI's system.

Response:

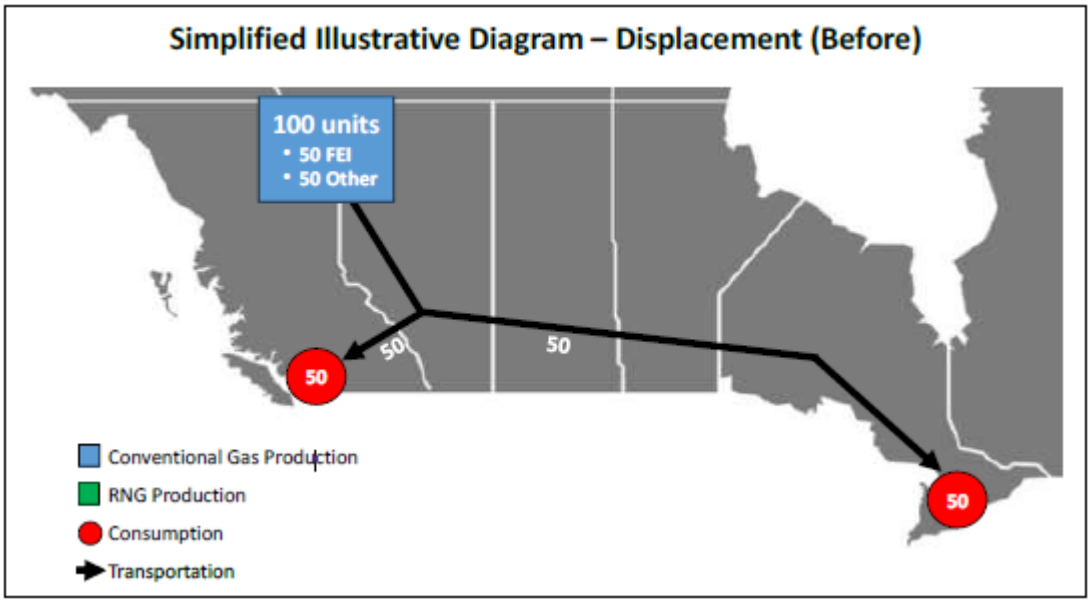
The physical supply of gas received at a customer's location will be a function of the customers' proximity to different sources of supply and how gas flows through the system.

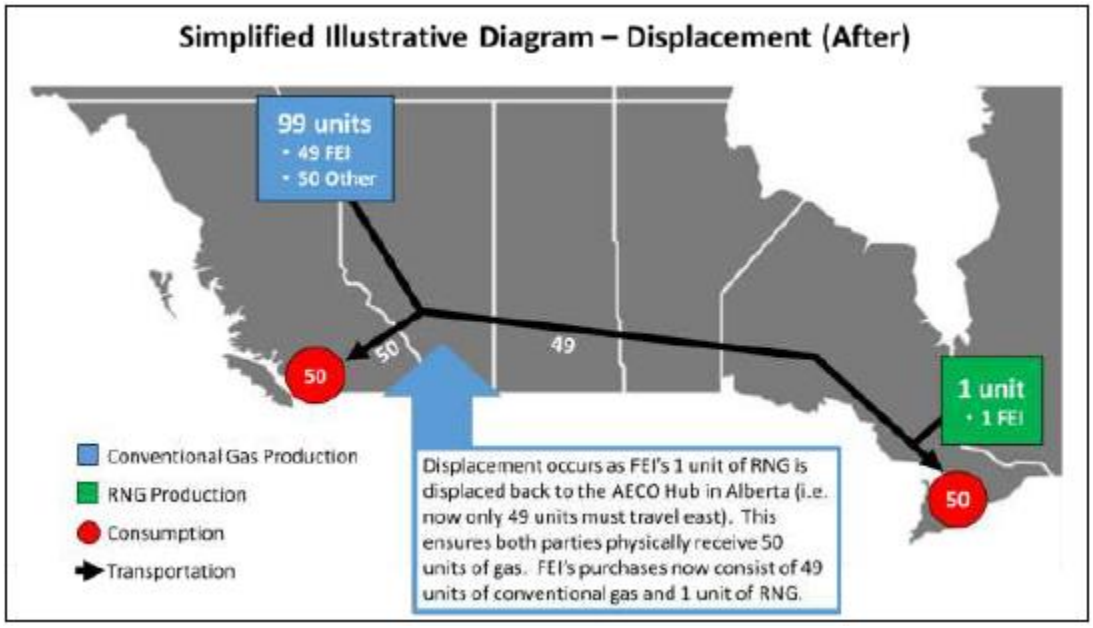
FEI supplies various blends of Renewable Gas to different customers, including 100 percent for the Renewable Gas Connections service, based on the principle of receipt by displacement. Receipt by displacement refers to the common practice of deeming energy injected into a transmission and/or distribution system in one location to have been received by another party at a different location on the system. The actual molecules or electrons that are injected into the system do not necessarily arrive at the receiving party's location; however, they cause a displacement of electrons or molecules in the system, on behalf of the receiving party. The receiving party is also deemed to own the specific attributes of the energy they purchased. Receipt by displacement can be employed with various forms of Renewable Gas and clean electricity. This principle has been employed across North America for both conventional natural gas and electricity for many decades.

The diagrams below underscore the carbon neutrality of Renewable Gas and the principle of receipt by displacement. In particular, the RNG produced at one facility, in this case Ontario, can cause an equivalent reduction in the amount of natural gas molecules being deployed to Ontario from a region like Alberta. As illustrated in the diagrams, the result is:

- A reduction in the flow of gas from west to east which reflects the delivery, by displacement, of RNG to FEI; and

- A reduction in the amount of conventional natural gas that is produced and injected onto the system.





Conventional and renewable natural gas molecules are indistinguishable, as the combustion of both forms results in the same "physical volume" of GHG emissions being emitted into the atmosphere at end use. However, the combustion of RNG is not adding new carbon into the atmosphere. Thus, this fuel is considered "carbon neutral." Please also refer to the response to CEC IR1 3.2.

Reliance on receipt by displacement enables FEI's customers to choose and purchase various blends of Renewable Gas, and for purchased volumes to be injected into the existing energy system with considerable cost savings, thus negating the need to construct new Renewable Gas-specific facilities adjacent to customers requesting service. In particular, absent receipt by displacement, multiple, independent systems of wires and/or pipes would have to be built to connect individual customers to specific producers. For example, if a customer wanted to purchase wind-generated electricity, it would require transmission and distribution lines from the windmill (thousands of kilometres away) directly to the customer's house. This approach would be cost prohibitive and not technically feasible.

Receipt by displacement is a common and essential practice within energy transmission and distribution systems as it also allows multiple shippers and receivers to use the same energy delivery infrastructure. It is also accepted by governments and is commonplace in energy transmission and delivery systems regulated by the Canadian Energy Regulator. To date, FEI has employed receipt by displacement in order to serve customers under its Renewable Gas Program.

11.0 Reference: FEI RNG Program Application

Section 8.5, page 121 Topic:

Bill Presentation

Preamble: FEI states:

> "Table 8-4 above shows the calculations that will be included on customers' bills. Similar to the way bills are produced today, some of the line items above will be rolled into a single line item to keep the bills simple and easy for customers to understand. All customers receiving a percentage of Renewable Gas through the Voluntary Renewable Gas, Renewable Gas Connections and through the Renewable Gas Blend will be able to see their total percentage of Renewable Gas on their bill each month. This percentage will also be applied to the customers' Carbon Tax credit on their bills." **(Application, page 121).**

11.1 Please explain whether the LCG forecast rate will be reflected on a customer's bill? If not, please explain why.

Response:

FEI has not yet finalized the bill design; however, all rates are, and will continue to be, set out in the utility's tariffs which are accessible on FortisBC's website. The rates provided in this Application are calculated based on a number of assumptions and are not the actual rates that will be in place in any year. The actual LCG rates that FEI will be charging customers will be calculated each year and filed for approval with the BCUC.

FEI's current plan is that the LCG Charge will be included in the Storage & Transport line item and the percent of Renewable Gas included will be shown below that line item. Please note that this approach has not been finalized and is subject to change.

Please see Figures 1, 2 and 3 below for mock bill examples for 2024 for a residential Renewable Gas Connections customer, a residential Renewable Gas Blend customer, and a Voluntary Program residential customer, respectively.

Figure 1: 2024 Mock Residential Monthly Renewable Gas Connection Customer with 1% RG Blend

Delivery Charges		
Basic Charge (30 days at 0.4085 per day)	12.26	
Delivery (10.0 GJ at 4.915 per GJ)	49.15	
	61.41	^*
Commodity Charges		
Storage and Transportation (10.0 GJ at 2.779 per GJ)	27.79	~
Renewable Gas Connections (9.9 GJ at 7.863 per GJ)	77.84	
	105.63	^*
~ Includes 0.1 GJs of Renewable Gas		
Taxes and fees		
Carbon Tax (10.0 GJ at 4.019 per GJ)	40.19	*
Clean Energy Levy (0.4% of ^ amounts)	0.67	
Biomethane Credit (10.0 GJ at 4.019 per GJ)	(40.19)	*
GST (5% of * amounts)	8.35	
Total Charges	176.06	
You used 10.0 GJ of energy of which 10.0 GJ (100%) was Renewable Gas		

Figure 2: 2024 Mock Residential Monthly Customer with 1% RG Blend

Delivery Charges		
Basic Charge (30 days at 0.4085 per day)	12.26	
Delivery (10.0 GJ at 4.915 per GJ)	49.15	
	61.41	^*
Commodity Charges		
Storage and Transportation (10.0 GJ at 2.779 per GJ)	27.79	~
Cost of Gas (9.9 GJ at 3.844 per GJ)	38.06	
	65.85	^*
~ Includes 0.10 GJs of Renewable Gas		
Taxes and fees		
Carbon Tax (10.0 GJ at 4.019 per GJ)	40.19	*
Clean Energy Levy (0.4% of ^ amounts)	0.51	
Biomethane Credit (0.1 GJ at 4.019 per GJ)	(0.40)	*
GST (5% of * amounts)	8.35	
Total Charges	175.91	
You used 10.0 GJ of energy of which 0.1 GJ (1%) was Renewable Gas		

Figure 3: 2024 Mock Residential 10% Voluntary Monthly Customer with 1% RG Blend

Delivery Charges		
Basic Charge (30 days at 0.4085 per day)	12.26	
Delivery (10.0 GJ at 4.915 per GJ)	49.15	
	61.41	^*
Commodity Charges		
Storage and Transportation (10.0 GJ at 2.779 per GJ)	27.79	~
Cost of Gas (9.0 GJ at 3.844 per GJ)	34.60	
Renewable Gas Voluntary (0.9 GJ at 14.863 per GJ)	13.38	
	75.77	^*
~ Includes 0.1 GJs of Renewable Gas		
Taxes and fees		
Carbon Tax (10.0 GJ at 4.019 per GJ)	40.19	*
Clean Energy Levy (0.4% of ^ amounts)	0.55	
Biomethane Credit (1.0 GJ at 4.019 per GJ)	(4.02)	*
GST (5% of * amounts)	8.67	
Total Charges	182.57	
You used 10.0 GJ of energy of which 1.0 GJ (10%) was Renewable Gas		

11.2 Please provide a mock residential customer bill reflecting FEI's proposals in this Application.

Response:

Please refer to the response to BCOAPO IR1 11.1.

G. ACCOUNTING TREATMENT, PROGRAM MECHANICS, RATE SETTING, AND CUSTOMER BILL IMPACT

12.0 Reference: FEI RNG Program Application

Section 6.3.2, page 78

Section 8.6, page 123 Topic: Bill Impacts

Preamble: FEI states:

> "The forecast until 2026 is based primarily on existing and prospective supply agreements. During this period, FEI also expects to begin pilot and pre-commercial stage projects using alternate forms of Renewable Gas; however, these volumes are expected to be relatively low initially. Commencing in 2025, FEI expects to increase supply from alternate forms of Renewable Gas, such as hydrogen and synthesis gas. From 2027 and onwards, the forecast incorporates FEI's expectation of further growth in the use of hydrogen, synthesis gas and lignin." **(Application, page 78)**
>
> "All else equal, a non-voluntary RS 1 residential customer's bill will increase from approximately $1,390 in 2024 to $1,900 in 2032 from acquisition of supply, increases in carbon tax, and proposals in this Application." **(Application, page 123)**

12.1 Please provide a table that identifies all the assumptions underpinning FEI's bill impact calculations for each year. This should include, but not limited to, all RNG $/GJ price assumptions (biomethane, hydrogen, etc.), the volume assumptions for each energy type, total RNG supply costs by energy type, program costs forecast for each year, investment in infrastructure costs (that is, additions to rate base), and the annualized revenue requirement.

Response:

Please refer to the responses to BCUC IR1 35.1, BCSEA IR1 15.3 and Section 8.6 of the Application for a list of the supply, demand, price, cost and other assumptions underlying the bill impact calculations. FEI did not forecast any additions to rate base for this Application. Consistent with current practice, the annual cost of service, including a return on investment, related to Renewable Gas infrastructure (e.g., upgraders and interconnection pipes) is included as part of the cost to acquire Renewable Gas and accounted for in the BVA (proposed to be renamed the LCG Account). Consequently, any capital investments related to the acquisition of Renewable Gas will not fall to delivery rates; rather, they will be accounted for as part of the cost to acquire Renewable Gas supply. The supply costs that FEI will incur are constrained by the maximum cost of acquisition for Renewable Gas allowed under section 9 of the GGRR. FEI's supply cost assumptions embedded in the Application are independent of whether FEI acquires the Renewable Gas from a third party or invests in infrastructure to produce it.

12.1.1 To the extent that investment in infrastructure costs have not been reflected in FEI's bill impact determinations, please explain why.

Response:

As discussed in Section 8 of the Application, to illustrate the impact of FEI's proposals in this Application FEI estimated the bill impacts in Figures 8-4, 8-5 and 8-6 by changing only the amount of Renewable Gas a customer would receive, the cost of that Renewable Gas and the carbon tax, holding all else equal.

Please also refer to the response to BCOAPO IR1 12.1.

12.1.2 If investment in infrastructure costs have not been reflected in FEI's bill impact determinations, please provide forecast capital expenditures along with updated bill impact calculations.

Response:

FEI interprets the question as a request for bill impacts including all future infrastructure projects along with Renewable Gas projects. Please refer to the response to BCUC IR1 42.4.

12.2 Please provide the total investment made to date and anticipated for research and development associated with, for example, hydrogen and identify how such costs are being recovered and allocated to customers/customer classes through rates, assuming that such activities are being undertaking within the regulated utility.

Response:

FEI continues to invest in research and development associated with alternative Renewable Gas supply through: (1) FEI's approved Clean Growth Innovation Fund (CGIF); and (2) its O&M budget (included as part of FEI's approved flow-through O&M expenses) that funds an internal team, supported by external contract consulting services, focusing on hydrogen, syngas and lignin development activities.

The total anticipated cost for research and development associated with, for example, hydrogen, is not certain at this time. The total investment to date is approximately $2.15 million, including CGIF investment disbursements.

13.0 Reference: FEI RNG Program Application

Section 2.1, pages 12 and 14

Topic: Cost Allocation and Rate Design

Preamble: FEI states:

> "At the outset of the pilot program, the BERC rate was set at $9.904 per GJ below the maximum price for delivered biomethane on the system of $15.28/GJ." **(Application, page 12)**
>
> "During the period following the 2013 Decision until January 2015, the BERC rate increased from $11.696 per GJ to $14.414 per GJ by the end of 2014. By this time, it was apparent to FEI that the BERC rate had increased to a level that discouraged enrollment in the program and had the potential to result in costs from unsold biomethane not being recovered from the voluntary program participants. In response to this market signal, FEI concluded that the price setting mechanism of the program needed to be adapted to suit market conditions. More specifically, RNG had to be sold at a price customers were willing to pay, otherwise much of the volume of RNG purchased by FEI would go unsold, and therefore, the reduction in GHG emissions enabled by the program would go unfulfilled. **(Application, page 14)**

13.1 Please clarify and explain under the current voluntary program established in 2010, whether BERC customers were ever required to pay the full BERC costs (regardless of the rate mechanism)?

Response:

Prior to the 2015 BERC Application, which included the Phase 1 Pilot Program (2010-2013) and the Phase 2 Permanent Program (2014-2016), voluntary RNG customers paid the full program costs.

14.0 Reference: FEI RNG Program Application

Section 7.4, page 98

Section 8.2, page 108

Section 8.3, pages 112 and 114

Topic: Cost Allocation and Rate Design

Preamble: FEI states:

> "NGV customers and T-Service customers will pay a Low Carbon Gas Charge equivalent to the average weighted cost of supply of Renewable Gas." **(Application, page 98)**
>
> "In summary, the LCG Account will capture all Renewable Gas recoveries and associated volumes through the LCG Charge and the S&T LC rider." **(Application, page 114)**
>
> "The LCG Account functions in the same way as FEI's existing Midstream Cost Reconciliation Account (MCRA)." **(Application, page 108)**
>
> "If FEI constructs and operates Renewable Gas facilities, the cost of the facilities will be included in FEI's rate base and the associated cost of service accounted for in the LCG Account." **(Application, page 112)**

14.1 Please provide a table that identifies all the costs proposed to be recovered as part of the RNG program.

Response:

Please refer to the response to BCUC IR1 34.1 which details the costs of the Renewable Gas Program and how they are allocated.

14.2 Please explain and provide the rationale for how FEI proposes to address the variances between the forecast average weighted cost of supply of Renewable Gas for NGV and T-Service customers and the actual cost/volumes, including which customers/customer classes will be responsible for any variance.

Response:

Please refer to the response to BCUC IR1 35.3.

14.3 Is the LNG Charge and S&T LC rider conceptually consistent with the cost of gas and S&T charge for conventional natural gas? If it is not, please explain.

Response:

The LCG Charge is conceptually consistent with FEI's typical cost of gas charge, while the S&T LC rider is not conceptually the same as FEI's S&T charge.

The S&T LC rider contains: (1) the acquisition cost for the Renewable Gas volume that will be delivered to all sales customers (Renewable Gas Blend) through the rider; (2) the Renewable Gas acquisition cost that is not recovered from the Renewable Gas Connections and Voluntary Renewable Gas services customers; and (3) variances between forecast and actual costs and recoveries of Renewable Gas (as discussed in the response to BCUC IR1 35.3).

FEI's S&T charge is the cost to transport gas from market hubs (AECO, Station 2, Sumas) to FEI's interconnection points, gas balancing (daily as well as Commodity Unbundling balancing) and also the cost to store gas in the summer months for withdrawal in the winter.

14.4 Please explain the appropriateness of treating the return (associated with the cost of low carbon gas facilities/investment) as a pass-through cost subject to true-up through a variance account.

Response:

FEI's proposed treatment for the return is appropriate as it is consistent with FEI's 2020-2024 Multi-Year Ratemaking Plan (MRP), under which clean growth projects and the cost of service of investments in Renewable Gas production equipment are subject to flow-through treatment. Please also refer to the response to BCOAPO IR1 12.1.

14.5 Please provide FEI's views as to whether the cost of fuel associated with its proposed mandatory RNG Program might appropriately be viewed as another supply of fuel, the cost of which is pooled with all fuel costs such that all customers pay an equivalent per GJ price?

Response:

Under the policy direction set by the CleanBC Plan and CleanBC Roadmap, the acquisition and inclusion of Renewable Gas into FEI's gas supply is in effect mandatory to achieve the associated policy objectives. By extension, all FEI ratepayers must contribute towards the full recovery of Renewable Gas supply acquisition. Utilities are given discretion regarding how they go about achieving the policy objectives, subject to review and approval by the BCUC where required.

FEI believes that the allocation of the Renewable Gas resource, as well as the recovery of Renewable Gas supply costs, should be arranged such that the long-term interests of FEI ratepayers are protected while achieving the policy objectives. As such, the proposal suggested in the question would not lead to a positive outcome for FEI ratepayers or potential new gas customers given the present policy and regulatory context. For example, without the proposed Renewable Gas Connections service, new residential customers would be prevented from connecting to the gas system due to a lack of service offering, which would in turn drive up costs for all remaining customers. Similarly, a pooled approach may not provide sufficient Renewable Gas to satisfy the needs of large institutional customers. If the Voluntary Renewable Gas offerings were not available then these customers may ultimately leave the gas system, further compounding the impact to remaining customers. Please also refer to the response to BCOAPO IR1 9.3 where FEI describes how each of the components of the revised Renewable Gas Program help to address affordability.

14.5.1 Please explain what makes the fuel associated with the proposed mandatory RNG Program different from conventional natural gas that warrants a different rate treatment?

Response:

FEI understands "different rate treatment" to be referring to the difference between the Permanent LCG Charge, and the conventional commodity cost. For clarity, residential customers who receive conventional natural gas and new residential customers (i.e., those receiving the Renewable Gas Connections service) will bear the same net energy cost because FEI has proposed that the Permanent LCG Charge be set to equal the cost of the conventional gas commodity, plus an amount equivalent to the carbon tax. While the cost of supply of conventional natural gas is currently lower than Renewable Gas to acquire, only the former is subject to a carbon tax.

Conventional natural gas and Renewable Gas are derived from different sources and have different supply costs. In order to preserve equal access to the gas system for all customers, including new residential customers, FEI has proposed an offering that avoids charging these new customers a higher rate than existing customers because their home or building can only

1 obtain Renewable Gas in order to be compliant with local government regulations. Please also
2 refer to the response to BCUC IR1 13.2.

3

15.0 Reference: FEI RNG Program Application

Section 2.1, page 14

Topic: Cost Allocation and Rate Design

Preamble: FEI states:

> "During the period following the 2013 Decision until January 2015, the BERC rate increased from $11.696 per GJ to $14.414 per GJ by the end of 2014. By this time, it was apparent to FEI that the BERC rate had increased to a level that discouraged enrollment in the program and had the potential to result in costs from unsold biomethane not being recovered from the voluntary program participants. In response to this market signal, FEI concluded that the price setting mechanism of the program needed to be adapted to suit market conditions. More specifically, RNG had to be sold at a price customers were willing to pay, otherwise much of the volume of RNG purchased by FEI would go unsold, and therefore, the reduction in GHG emissions enabled by the program would go unfulfilled." **(Application, page 14)**

15.1 Given that the $7/GJ premium stems from an entirely different program with the objectives of limiting unsold biomethane, and encouraging growth in the voluntary program, please explain the appropriateness of continuing to apply a discounted rate of $7/GJ above the CCRC to the voluntary option of the proposed RNG Program.

Response:

Please refer to the responses to BCUC IR1 11.1, 28.1 and 28.2.

15.2 Please provide the analysis which supports that the $7/GJ premium continues to represent the price voluntary customers are willing to pay under the proposed new RNG program. If no such analysis was prepared, please explain when FEI intends to undertake a review.

Response:

Please refer to Sections 5.2.2 and 5.8 and Appendix B-2 of the Application, and FEI's responses to BCUC IR1 11.1, 28.1 and 28.2.

15.3 Please discuss the appropriateness of the $7/GJ premium to be charged to customers who elect greater than the blended gas offering, under legislation that is focused on reducing carbon emissions. That is, why charge a premium at all?

Response:

While it is unclear what legislation is referenced in the question, FEI assumes the question is posed within the context of the government stressing the importance of GHG emission reductions through, among other things, the CleanBC Plan and CleanBC Roadmap.

As discussed in the response to BCUC IR1 28.1, the $7 per GJ premium is consistent with the objective of maximizing revenues and strikes a balance that provides customers the option of having FEI purchase greater amounts of Renewable Gas on their behalf while also benefiting other gas system customers and advancing progress toward provincial GHG emissions targets.

The following response is provided by Concentric.

As discussed in the response to BCUC IR1 13.2, the Voluntary Renewable Gas service is appropriately priced differently than the Renewable Gas Blend or Connections services. Customers who voluntarily choose to purchase up to 100 percent Renewable Gas are charged a premium over conventional natural gas or the average cost of acquisition of Renewable Gas for that premium service. This distinction is well-supported in ratemaking principles. Charging a different price for a different service is just discrimination where that service is distinguishable from the default service, and where the value of that service to the customer is materially different. In FEI's proposal, new customers joining the natural gas system are not provided a distinguishable service as compared to the service provided to existing customers. By contrast, Voluntary Renewable Gas service customers voluntarily pay FEI to acquire fully-decarbonized supply, which is distinguishable both as a matter of cost causation and value. Therefore, charging the directly assigned stand-alone cost to those customers is "just discrimination".

The elimination of any premium for Voluntary Renewable Gas would violate the principle established by the BCUC that the voluntary program should maximize revenues to cover as many of the higher Renewable Gas costs as possible while still maintaining customer interest in the program. It would also not produce the reductions in the S&T LC rider for blended rate customers that would result from the voluntary service.

15.4 Please discuss the appropriateness of the $7/GJ premium to be charged to customers who elect greater than the blended gas offering under a set of proposed RNG Program objectives which do not consider economics.

Response:

Please refer to the responses to BCUC IR1 11.1, 28.1 and 28.2.

16.0 Reference: FEI RNG Program Application

Section 7.4.2 page 100

Section 8.3, page 112

Table 8-4, page 120

Topic: Cost Allocation and Rate Design

Preamble: FEI states:

> "All Renewable Gas Connections will be designated as low carbon" **(Application, page 100)**

16.1 Please clarify and explain what designating all Renewable Gas Connections as low carbon means. For example, will a customer's bill state 100% RNG?

Response:

Designating all Renewable Gas Connections as low carbon means that these customers will be allocated Renewable Gas for 100 percent of their demand and FEI will be obligated to ensure that its supply portfolio includes sufficient Renewable Gas to serve these customers with 100 percent Renewable Gas. All customers receiving Renewable Gas service will see the percentage of Renewable Gas that they receive on their monthly bill. Please refer to the response to BCOAPO IR1 11.1 where FEI provides a sample bill.

16.2 Please confirm or otherwise explain that the costs intended to be captured in the LCG Account (as reflected in the Application, page 112) are not reflected in the LCG Charge as shown in Table 8-4 (page 120).

Response:

Confirmed. The LCG Charges for Renewable Gas Connections customers and Voluntary Renewable Gas customers in Table 8-4 are independent of the costs intended to be captured in the LCG Account. The costs to be captured in the LCG Account will be the supply costs.

In Table 8-4, FEI proposes that the LCG Charge for the Renewable Gas Connections service be set to equal the Cost of Gas per GJ plus the Carbon Tax per GJ, and the LCG Charge for the Voluntary Renewable Gas service be set to equal the Cost of Gas per GJ plus the Carbon Tax per GJ plus $7.

16.3 Please explain the purpose of the LCG Charge/Rate as reflected in Table 8-4 for Renewable Gas Connections that is simply the bundling of the cost of conventional natural gas and the carbon tax?

Response:

The purpose of setting the LCG Charge for the Renewable Gas Connections service equal to the cost of conventional natural gas plus carbon tax was to set the charge such that it equals the cost of conventional gas service. FEI is proposing this pricing mechanism so that new gas customers continue to have a choice of the type of energy they use, that they are able to meet the various GHGi targets that provincial and local governments are implementing, and that these new customers are not harmed by marginal cost or vintaged pricing. Vintaged pricing means that, by virtue of when they joined the system, new customers pay a different price from customers already on the system, which is an unduly discriminatory ratemaking practice.

By setting the LCG Charge for the Renewable Gas Connections service in this way, Renewable Gas Connection (new) customers will have the same bill as Renewable Gas Blend (existing) customers.[9]

16.4 Please explain what price signal is intended to be conveyed to customers with an LCG Charge/Rate that does not reflect any costs incurred with providing low carbon energy, but rather reflects the cost to provide conventional natural gas plus the carbon tax?

Response:

The following response is provided by Concentric.

The statement that the "LCG Charge/Rate that does not reflect any costs incurred with providing low carbon energy" is inaccurate. As discussed in the response to BCUC IR1 13.2, FEI has proposed to set the rate for customers under both the new Renewable Gas Blend service and the Renewable Gas Connections service to reflect the rolled-in or average cost of providing those services. Rolled-in or average cost ratemaking for these services: (1) is cost-based and consistent with longstanding ratemaking principles and regulatory practices including those of the BCUC; (2) will not result in unjust discrimination; and (3) supports economic efficiency including the efficient use of existing infrastructure to the benefit of all customers.

[9] At the same consumption volume.

16.5 If price and economics are not objectives of FEI's RNG Program, please explain why setting an LCG Charge greater than the rate for conventional natural gas is necessary?

Response:

For clarity, and as shown in Figure 8-4 of the Application, new Renewable Gas Connection customers and Renewable Gas Blend sales customers will pay the same annual bill, assuming the same usage, not greater as indicated by the question.

FEI's fundamental objective for its Renewable Gas Program is to support societal energy policy objectives and to satisfy the obligation imposed on it by provincial and governmental policy. Establishing just, fair and reasonable pricing, consistent with long-standing ratemaking principles including recovery of the revenue requirement, fair apportionment of costs, sending efficient price signals, avoiding undue discrimination, and others were objectives of establishing the pricing under FEI's revised Renewable Gas Program. As discussed in the responses to BCUC IR1 13.2 and 16.2, FEI's proposed pricing achieves these objectives.

16.6 Please explain the compatibility and appropriateness of charging a carbon tax to Renewable Gas Connections whose gas supply is deemed 100% renewable and low carbon.

Response:

Customers receiving Renewable Gas via the Renewable Gas Connections service will not pay the carbon tax. These customers will be charged a Low Carbon Gas Charge, which is specific to New Residential Connection customers. This rate will equal the CCRC rate of conventional gas plus an amount equivalent to the carbon tax. This rate will maintain energy cost parity for Renewable Gas Connections customers with residential customers not enrolled under the Renewable Gas Connections service. This ensures that owners of new residential homes will have the same access to the gas system as the owners of existing homes as the net energy cost is equivalent between both groups of homeowners. This is a fair and reasonable outcome as it maintains equal access to the gas system, while helping to ensure its long-term viability for the benefit of all customers.

16.7 Please explain how FEI intends to explain to customers who are deemed being served by 100% renewable low carbon energy, that they must pay the carbon tax?

Response:

Please refer to the response to BCOAPO IR1 11.1 where FEI has provided a sample mock residential monthly bill for a Renewable Gas Connections customer. The sample bill shows that customers receiving Renewable Gas via the proposed Renewable Gas Connections service receive a Biomethane credit in the amount which fully offsets the carbon tax.

17.0 Reference: FEI RNG Program Application

Section 9.2 pages 129 - 130

Topic: Rate Mitigation Plan

17.1 Has FEI developed a rate mitigation plan/strategy to:

i) Moderate the rate impacts associated with RNG including deferring a portion of the higher fuels costs in the initial years and amortizing them into rates overtime? If yes, please summarize the plan. If not, please explain why not.

ii) Moderate the rate impacts associated with the numerous capital spend projects planned or underway along with the rate impacts associated with the RNG Program? If yes, please summarize the plan. If not, please explain why not.

Response:

While FEI has not proposed a mechanism to moderate rate impacts related to increasing supply of Renewable Gas within this Application, the BCUC maintains oversight over FEI's rates and the BCUC has jurisdiction to implement rate-smoothing deferral accounts as needed, if there is a reasonable opportunity to defer costs.

Attachment 2.2a

F. PROVINCIAL POLICY AND ENVIRONMENTAL OBJECTIVES

63.0 Reference: PROVINCIAL GOVERNMENT 1 ENERGY OBJECTIVES AND POLICY CONSIDERATIONS

Exhibit B-1-4, Section 9.2, p. 206;

BC Energy Objectives

On page 206 of the Updated Public Application, FEI states:

> British Columbia's energy objectives are defined in section 2 of the CEA. Based on the results of the socio-economic evaluation described below, the Project will support the British Columbia energy objective in section 2(k) of the CEA "to encourage economic development and the creation and retention of jobs" in two ways: through construction and through reducing the risk of a supply disruption.

Section 2 of BC's Clean Energy Act outlines BC's energy objectives, including:

> (b) to take demand-side measures and to conserve energy,…
>
> …
>
> (g) to reduce BC greenhouse gas emissions
>
> …
>
> (iii) by 2020 and for each subsequent calendar year to at least 33% less than the level of those emissions in 2007,
>
> (iv)by 2050 and for each subsequent calendar year to at least 80% less than the level of those emissions in 2007, and
>
> (v)by such other amounts as determined under the Climate Change Accountability Act;
>
> (h)to encourage the switching from one kind of energy source or use to another that decreases greenhouse gas emissions in British Columbia;
>
> (i)to encourage communities to reduce greenhouse gas emissions and use energy efficiently;

63.1 Please discuss the extent to which FEI considers the TLSE Project is consistent with and will advance the BC government's energy objectives as set out above.

Response:

The TLSE Project is consistent with and will advance the BC government's energy objectives, as set out above.

FEI sees a continued and growing role for its existing and proposed infrastructure, including the TLSE Project, to achieve the BC government's energy objectives to strengthen its economy while driving the transition to a low-carbon energy system, as identified in its legislated GHG emissions reduction targets.

FortisBC's *Clean Growth Pathway to 2050* describes measures that FEI will take to align its investments, program offerings, and energy supply to achieve CleanBC's identified GHG emission reduction goals. FortisBC's 30BY30 target is enabling the reporting and accountability framework by which to achieve the goals of its Clean Growth Pathway. More specifically, the TLSE Project enables greater resilience of the gas energy delivery system, which as noted the *Clean Growth Pathway to 2050*, is expected to deliver an increasing proportion of renewable and low carbon energy into the future. The need for resilience is even greater as energy supply on both gas and electric systems shifts to incorporate intermittent sources. Accordingly, the TLSE plays a fundamental role in providing resilience to the energy system and supports BC's climate action framework. FEI explains in more detail below.

Informing FEI's look to the future of its infrastructure and BC's energy system in the low-carbon transition is the Guidehouse report *Pathways for British Columbia to Achieve its GHG Reduction Goals* (Pathways report). The Pathways report, provided in Attachment 63.1, highlights the critical role that the gas system will have in the Province's decarbonization path because of: i) the significant GHG reduction potential embedded in the gas system both in the form of introducing high blends of renewable gases to supply, and to displacing more carbon intensive fuels like refined petroleum products in commercial transport; ii) lower costs of decarbonization when using gas system solutions; and iii) the heightened resiliency and reliability of using low-carbon solutions from both gas and electric infrastructure.

The report also highlights some key challenges to achieving BC's GHG reduction goals. Decarbonizing BC's energy system cannot come at the cost of the system's resiliency and its ability to meet BC's energy requirements, particularly during extremely cold weather conditions. Expanding peak electrical generating capacity to meet load growth as some end-uses electrify (e.g. light duty transportation) is one of the primary cost-drivers of decarbonization where there are significant electric capacity constraints. However, the gas and electric systems are able to complement each other. Meeting peak thermal requirements and providing resiliency and reliability from the gas system is essential for moderating electric peak load growth and ensure an overall smoother low-carbon transition for BC's energy consumers.

The TLSE Project is a key addition to the resiliency and integrity of BC's gas distribution system and strengthens the overall Provincial energy system as it decarbonizes in line with Provincial targets. The Pathways report demonstrates that serving peak demand periods will require low-cost storage and low-carbon fuels in the form of renewable gases. The TLSE Project improves the gas system's ability to meet peak periods and to help moderate peak load growth on the gas system. Furthermore, FortisBC's success in meeting the CleanBC objectives depends on the use of the entire gas system across all regions of the Province.

Attachment 2.2b

1.0 Exhibit B-21, BCUC IR 81.1, 83.2

Future Changes in Gas Supply

In response to British Columbia Utilities Commission (BCUC) Information Request (IR) 81.1, FortisBC Energy Inc. (FEI) stated:

> There are several developments affecting the Lower Mainland region that could change natural gas use over time; however, those changes also increase the use of renewable and low carbon energy, such as RNG [renewable natural gas], which FEI expects to be an integral part of BC's clean energy future. Policies such as the Province's plan to cap greenhouse gas emissions from gas utility customers, or the transition of new buildings to zero emissions by 2030, are expected to result in less conventional natural gas use in the residential, commercial, and industrial sectors. However, FEI expects the continued development and expansion of renewable gas supply, such as RNG and hydrogen, will offset this impact.
>
> …
>
> To avoid the future uncertainties that will affect future peak demand, FEI believes sizing the TLSE [Tilbury Liquefied Natural Gas Storage] Project based on the 2019/20 design load forecast remains appropriate. Finally, the risk associated with the peak demand declining over time can be mitigated through the flexibility of FEI's contracted assets (i.e., off system storage at JPS or Mist). In particular, FEI's storage profile typically has contracts expiring once every three years. If the load duration curve changes over time (such that less supply is needed from the TLSE assets), FEI has the ability to de-contract a portion of its off-system storage resources.

In response to BCUC IR 83.2, FEI stated:

> FEI is enabled under the amended GGRR [Greenhouse Gas Reduction (Clean Energy Regulation] to acquire hydrogen to meet near term objectives including:
>
> …
>
> • Purchasing hydrogen that could be distributed through dedicated infrastructure (new or repurposed) to gas customers to displace conventional natural gas usage.
>
> …
>
> Over the longer term (assumed between 2030 and 2050), as demand for hydrogen grows, the existing gas system high pressure transmission pipeline corridors would be retrofitted, upgraded, and expanded to transport an increasing share of hydrogen and (bio)methane in a progressively decarbonized gas system.

1.1 Please provide a range of forecast scenarios for firm peak demand in the Lower Mainland (LML) in 2030 and 2050, which at a minimum outline a high, reference and low demand forecast. For each scenario, please explain:

a. The key assumptions underpinning the forecast scenario;

b. The volume of the proposed tank and regasification capacity that would need to be reserved for resiliency purposes.

Response:

FEI's long-term forecast of peak demand is based on a 20-year planning horizon consistent with the 2022 Long Term Gas Resource Plan (LTGRP) to be submitted to the BCUC at the end of March.

FEI's response to BCUC Panel IR1 1.2 also provides important context and background and should be read in conjunction with this response. Over the next 20 years and beyond, FEI's infrastructure needs to support multiple objectives, including:

- a transition to renewable and low carbon gas that includes methane, hydrogen, and smaller amounts of other resources;
- continuing to support the energy transition through delivery of conventional and renewable sources of methane supplies;
- maintaining and improving system resiliency to serve the need of customers and to reduce supply risk; and
- enabling innovative new energy solutions upstream, on-system, and near the end use to help reduce BC and global carbon emissions and to realize other benefits.

Over the timeframe from 2030 to 2050, the vast majority of energy molecules delivered by FEI's system will be methane, bio-methane and hydrogen. FEI's response to BCUC Panel IR1 1.2 discusses this transition further, indicating that the mix of these energy resources delivered to customers will change over time. FEI fully expects this mix to fall within a range of combinations of the various gas resources and that the expected range requires the TLSE Project to provide resiliency for the system throughout the LTGRP planning horizon and beyond. While the percentage of hydrogen delivered to customers on FEI's infrastructure will grow in the future, the resiliency benefits of the TLSE Project are upheld with on-system hydrogen mixes.

Forecast Descriptions and Assumptions

The rest of this response models a particular mix of methane, bio-methane and hydrogen over time that provides a conservative outlook on the need for the TLSE Project within this dynamic future. The derivation of the following forecasts developed in order to provide this response is explained in the paragraphs below:

- Traditional Peak forecast (used as the reference case in this response);
- High forecast – Traditional Peak forecast plus 10 percent;
- Low forecast – Traditional Peak forecast minus 25 percent; and
- Peak end use demand forecast (hypothetical low peak forecast based on exploratory peak demand method being examined in FEI's 2022 LTGRP)[1].

The above-noted **Traditional**, **High** and **Low** peak demand forecasts are associated with the **2022 LTGRP Diversified Energy Future scenario**; FEI uses the Diversified Energy Future scenario as its planning scenario.[2] Key planning assumptions underpinning the Diversified Energy Future scenario build upon a diversified approach to energy delivery and emissions reductions to British Columbians. Under this scenario, customer growth occurs for both the electric and gas utilities and growth in the use of natural and renewable gas as a transportation fuel is larger in the Lower Mainland than in other regions of the Province, particularly in the marine transportation sector. For the analysis requested in this information request, the total Diversified Energy Future scenario demand for the CTS has been adjusted to reflect only the customer demand in the Lower Mainland that would be supported by the TLSE Project under peak conditions that would be affected by a significant supply disruption. The peak demand for these firm customers is 865 MMcf/day in the winter of 2019-2020. Also for this analysis, FEI has not included system demand from Woodfibre LNG (WLNG) of 95 PJ annually in the calculations shown since the TLSE Project is neither designed nor intended to support WLNG demand, and WLNG demand is considered a flow-through load rather than an end-use for the purpose of assessing GHG emissions.

The **Traditional Peak Forecast** method is based on current customer peak consumption per account and future account forecasts and as such represents a "reference case" as it reflects the continuation of current system use; FEI uses this method today to plan for future infrastructure upgrades.

[1] In its 2022 LTGRP, FEI explores a potential alternative method for forecasting peak demand using end-use energy equipment information derived from FEI's long term end-use annual demand forecast results. This method remains hypothetical because empirical evidence linking changes to energy equipment and customer behavior to reductions in peak demand has not been identified but merits further investigation. Since this hypothetical or exploratory method results in a lower peak demand than the method FEI employs, FEI believes including it in this analysis offers a conservatively broad spectrum of peak demand forecasts with which to prepare this response.

[2] In the 2022 LTGRP, the Reference Case annual demand scenario is based on a future that is a continuation of current conditions at the time future scenarios were established (2020). As such, it does not include the actions that FEI needs to take, or anticipates will occur, in order to decarbonize energy supplies on behalf of customers. For this reason the Reference Case is not selected as FEI's long-term planning scenario. Instead, FEI uses the Diversified Energy Future scenario which uses the existing gas infrastructure to deliver low carbon energy solutions to customers as its planning scenario. The LTGRP also examines a number of other substantially different future scenarios which demonstrate that the Diversified Energy Future is the appropriate scenario to plan for.

FEI's forecasts currently extend to 2042 in the LTGRP. Therefore, FEI has extrapolated the above forecasts to 2050 by calculating the average peak growth in the forecast in the five-year period from 2038 to 2042 and applying that growth to the eight-year period from 2043 to 2050. This is a reasonable means of projecting the observed trajectory of the forecast in the absence of more detailed information.

In the TLSE Application, FEI uses units of volume (e.g., MMcf or Bcf) as measurements of peak demand as they are the most relevant to the proposed tank and increased regasification capacity. However, representing energy in standard volumes such as MMcf is inadequate to compare peak demand in future years where a portion of the demand will be supported by hydrogen. This is because hydrogen has approximately one-third the energy content of natural gas or renewable natural gas (RNG) per unit volume. Therefore, the tables below present much of the information in TJ/day rather than MMcf/day. The base year demand of 865 MMcf/day is represented in the tables as equivalent to 950 TJ/day. When appropriate, FEI has converted demand back to MMcf/day so that the results can be compared easily to the peak demand of 865 MMcf/day and regasification capacity of 800 MMcf/day presented in the Application. In the tables below, FEI has separated the peak demand associated with the future hydrogen system.

In preparing this response, FEI assumed that end-use gas equipment will evolve to be able to utilize hydrogen gas along different potential paths. Today, end-use equipment is assumed to be able to burn a blended mix of methane and low concentrations of hydrogen. The scenarios presented assume that equipment will evolve to 1) be able to utilize higher concentrations of hydrogen mixed with methane and 2) some gas equipment (industrial process equipment for example) could evolve to be able to fuel switch between hydrogen and methane and some customers may choose to install equipment that will be hydrogen dedicated. FEI assumes in these scenarios that all of these types of equipment except equipment that is solely dedicated to utilizing hydrogen will be able to benefit from the resiliency provided by the TLSE Project. The eventual mix of these types of equipment throughout FEI's service territory is yet to be determined. Therefore, in order to examine the implications of these alternatives on the need for and benefits of the TLSE Project, FEI has modelled this changing mix in two ways (as further illustrated in the tables below):

- Scenario A - FEI assumes that equipment is dedicated to using only hydrogen as a fuel, that none of the hydrogen used in the system is blended with natural gas and RNG, that a concentration of 100 percent hydrogen is provided to consumers, and that the TLSE Project may not be able to support the peak demand for this portion of the demand.
- Scenario B - FEI assumes that the equipment can use a varying blend of methane and hydrogen or can fuel switch between the two fuels, that about 50 percent of the hydrogen that is used in the CTS is blended with the natural gas and RNG and delivered to consumers. As such, methane/bio-methane from the TLSE Project can displace 50 percent of the on-system hydrogen during peak events.

While the planning for hydrogen is evolving in industry, and the ultimate mix is unknown, FEI expects Scenario B to be in the range of a more realistic outcome in the future because it demonstrates the compatibility of methane fuels with hydrogen within the network. However, Scenario A is useful to show a very conservative assumption for TLSE tank volume and regasification capacity.

Scenarios Demonstrate the Appropriateness of TLSE Tank Volume and Regasification

The following analysis will demonstrate the appropriateness of the TLSE tank volume and regasification capacity in the vast majority of scenarios in 2030, 2042, and 2050.

2030 Forecasts

FEI anticipates that in 2030 on an annual basis FEI will be providing approximately 24 percent[3] of its projected annual demand in the form of renewable and low carbon gases consisting of hydrogen and RNG, along with some syngas/lignin and some carbon capture and sequestration (CCS).

Approximately 50 to 55 percent of renewable and low carbon gases will be on-system and 45 to 50 percent will be supplied and consumed outside of FEI's service territory (as further explained in the response to BCUC Panel IR1 1.2). In the CTS, the hydrogen will be delivered via dedicated systems and blended into downstream distribution systems in larger volumes.

Accordingly, by 2030 in the Lower Mainland, FEI projects that approximately 3 to 4 percent of the demand would be served by hydrogen. Consequently, 96 to 97 percent of the peak demand in 2030 is expected to be provided by natural gas or RNG that is able to be supported by the TLSE Project storage and regasification in the event of a supply disruption.[4]

Table 1 below details the projected peak demand for the four forecasts in 2030. The second column from the right shows the send out requirement to support the natural gas and RNG demand (in MMcf/day) after subtracting the portion of the system demand supported by hydrogen.

The table demonstrates that:

- ***Regasification capacity (2030):*** The values are all very near or over the capacity of the 800 MMcf/day regasification, indicating that in all forecast scenarios the proposed regasification is needed on a peak day in 2030.
- ***Tank volume (2030):*** The last column shows the volume (in Bcf) of LNG storage required over the coldest three days of a design year in 2030. The forecast requirement for LNG inventory ranges from 2.1 to 2.4 Bcf.[5]

[3] 24 percent represents the renewable and low carbon gas required to meet Provincial emission reduction targets for the residential, commercial and industrial sectors and accounts for load growth from the use of natural gas and RNG as a transportation fuel, which also reduces carbon emissions in BC and globally.

[4] Natural gas and RNG used to produce LNG at Tilbury is removed from the percentages and peak demand presented in the table as this demand is curtailed when the TLSE send out would be required.

[5] As the proposed regasification capacity of the TLSE Project is 800 MMcf/day the volume able to be delivered each day is limited to 800 MMcf/day even on days where the peak demand may exceed 800 MMcf/day. The difference

Table 1

Diversified Energy Future Peak Demand Forecasts	2019	2030							
				Scenario A			Scenario B		
	Base Year Peak demand (TJ/day)	Total Peak Demand (TJ/day)	Hydrogen (TJ/day)	NG and RNG (TJ/day)	NG and RNG (MMcf/day)	Volume Required to Support Three Coldest Winter Days (Bcf)	NG, RNG & H2 (TJ/day)	NG, RNG & H2 (MMcf/day)	Volume Required to Support Three Coldest Winter Days (Bcf)
High (Traditional peak+10%)	950	1104	40.8	1063	**968**	**2.40**	1084	**987**	**2.40**
Traditional Peak	950	1048	38.8	1009	**919**	**2.37**	1029	**937**	**2.39**
Low (Traditional Peak-25%)	950	910	33.7	876	**798**	**2.20**	893	**813**	**2.26**
End Use Peak (theoretical method)	950	891	33.0	858	**781**	**2.11**	875	**796**	**2.19**

950 TJ/day is 865 MMcf/day

2042 Forecasts

FEI anticipates that in 2042 on an annual basis FEI will be providing just over 43 percent[6] of the projected annual demand as renewable or low carbon gases. Approximately 80 percent will be on-system and 20 percent will be supplied and consumed outside of FEI's service territory. In the CTS, the hydrogen will be delivered in dedicated systems and blended into the distribution systems in larger volumes.

By 2042 in the Lower Mainland, FEI expects that approximately 20 to 25 percent of the forecast peak demand would be served by hydrogen. The remaining 75 to 80 percent of the peak demand in 2042 will be provided by natural gas or RNG that could be supported by the TLSE Project storage and regasification.

Table 2 below details the projected peak demand for the four forecasts for 2042. This table demonstrates that:

- ***Regasification capacity (2042)***: The send-out requirements in the second column from the right show that after subtracting the portion of the system demand served by on-system hydrogen, the high, traditional, and low forecasts still require more than 600 MMcf/day of send-out. As such, the proposed regasification capacity would still be required in 2042 in each of the forecasts. Further, even using the theoretical end-use peak forecast method, 600 MMcf/day will be required to serve a peak day in the Lower Mainland until approximately 2038 in the lowest end-use peak forecast.
- ***Tank volume (2042)***: The last column shows the range of forecasts for the volume of LNG storage that would be required over the coldest three days of a design year in 2042. The forecast requirement for LNG inventory ranges from 1.6 to 2.4 Bcf. In all cases, the proposed TLSE tank sizing remains appropriate.

would need to be provided by curtailing the excess firm demand present in those future forecast scenarios.

[6] 43 percent represents the renewable and low carbon gas required to meet Provincial emission reduction targets for the residential, commercial and industrial sectors by 2050, interpolated to 2042, and accounts for load growth from use of natural gas and renewable/low carbon gas as a transportation fuel which also reduces carbon emissions in BC and globally.

Table 2

Diversified Energy Future Peak Demand Forecasts	2019	2042							
				Scenario A			Scenario B		
	Base Year Peak demand (TJ/day)	Total Peak Demand (TJ/day)	Hydrogen (TJ/day)	NG and RNG (TJ/day)	NG and RNG (MMcf/day)	Volume Required to Support Three Coldest Winter Days (Bcf)	NG, RNG & H2 (TJ/day)	NG, RNG & H2 (MMcf/day)	Volume Required to Support Three Coldest Winter Days (Bcf)
High (Traditional peak+10%)	950	1271	284.7	986	**898**	**2.39**	1129	**1028**	**2.40**
Traditional Peak	950	1156	258.9	897	**817**	**2.26**	1027	**935**	**2.40**
Low (Traditional Peak-25%)	950	867	194.2	673	**613**	**1.71**	770	**701**	**1.96**
End Use Peak (theoretical method)	950	794	177.9	616	**561**	**1.57**	705	**642**	**1.79**

950 TJ/day is 865 MMcf/day

2050 Forecasts

Based on an extrapolation of the 2042 forecasts, FEI anticipates that by 2050 on an annual basis it will be providing just under 60 percent[7] of the projected annual demand as renewable or low carbon gases. For this analysis, FEI assumes that 86 percent of this supply will be on-system and 14 percent will be supplied and consumed outside of FEI's service territory. In the CTS, the hydrogen will likely be primarily delivered in dedicated systems and blended into the distribution systems.

By 2050 in the Lower Mainland, FEI expects that approximately 35 percent of the forecast peak demand would be served by hydrogen. The remaining 65 percent of the peak demand in 2050 will be provided by natural gas or RNG that could be supported by the TLSE Project storage and regasification.

Table 3 below details the projected peak demand for the four forecasts for 2050. The table demonstrates:

- ***Regasification capacity (2050):*** The send-out requirements in the second column from the right show that, after subtracting the portion of the system demand supported by on-system hydrogen, the high and traditional peak forecasts still require more than 600 MMcf/day of send-out; thus the proposed regasification capacity would still be required in 2050 in these forecasts. The two lower forecasts may not require the full 800 MMcf/day vaporizer capacity at that time, but as indicated previously this capacity will be needed until 2038 to 2042.
- ***Tank volume (2050):*** The last column shows the range of forecasts for the volume of LNG storage that would be required over the coldest three days of a design year in 2050. The forecast requirement for LNG storage ranges from 1.2 to 2.4 Bcf. In all cases, the proposed TLSE tank storage remains appropriate.

[7] Since FEI has not prepared a forecast to 2050, this value is based on an extrapolation of the LTGRP 20-year forecast to 2050. 60 percent represents the approximate renewable and low carbon gas required to meet Provincial emission reduction targets of 80 percent for the residential, commercial and industrial sectors and accounts for load growth from use of natural gas and renewable/low carbon gas as a transportation fuel which also reduces carbon emissions in BC and globally.

Table 3

Diversified Energy Future Peak Demand Forecasts	2019	2050							
				Scenario A			Scenario B		
	Base Year Peak demand (TJ/day)	Total Peak Demand (TJ/day)	Hydrogen (TJ/day)	NG and RNG (TJ/day)	NG and RNG (MMcf/day)	Volume Required to Support Three Coldest Winter Days (Bcf)	NG, RNG & H2 (TJ/day)	NG, RNG & H2 (MMcf/day)	Volume Required to Support Three Coldest Winter Days (Bcf)
High (Traditional peak+10%)	950	1383	481.3	902	821	2.27	1142	1040	2.40
Traditional Peak	950	1230	428.0	802	730	2.04	1016	925	2.40
Low (Traditional Peak-25%)	950	838	291.6	546	497	1.39	692	630	1.76
End Use Peak (theoretical method)	950	738	256.8	481	438	1.22	610	555	1.55

950 TJ/day is 865 MMcf/day

Forecast Scenarios Support Project Need

FEI's forecast information above for a diversified energy future strongly supports a tank size of at least 2 Bcf (consistent with its analysis in Section 4.3.5.3 of the Application) and regasification capacity of 800 MMcf/day (consistent with its analysis in Section 4.4.2 of the Application) to meet the Minimum Resiliency Planning Objective. In particular:

- ***Tank volume:*** In all forecast scenarios, more than 2 Bcf is still required beyond 2030 to support demand on the coldest three days. In 2050, the Low (Traditional Peak forecast minus 25 percent) forecast volume remains close to 2 Bcf in scenario B, and even the theoretical end use peak forecast volume is above 1.2 Bcf.
- ***Regasification capacity:*** The forecasts also show that more than 600 MMcf/day of send-out would be needed until at least 2042 in all but the theoretical end-use forecast. This indicates the proposed 800 MMcf/day of regasification capacity is sized appropriately to meet forecast need until at least 2042. By 2050, both the traditional peak forecast and the high forecast support FEI's proposed 800 MMcf/day regasification sizing in order to meet the Minimum Resiliency Planning Objective.

1.2 Please discuss the expected resource mix (e.g. conventional natural gas, renewable natural gas, hydrogen etc.) that FEI anticipates would serve customers in the LML while meeting provincial greenhouse gas (GHG) targets in 2030 and 2050. Please also discuss the extent to which the resource mix may change in a higher or lower load scenario.

Response:

As discussed in the response to BCUC IR2 80.1.2, FEI's framework to transition to a low carbon energy future is the Clean Growth Pathway to 2050. The Clean Growth Pathway is a diversified approach that is technology agnostic. At this point in the energy transition it is important to maximize the number of decarbonization pathways available and explore business models that meet energy demands and maximize the use of existing assets, thereby avoiding the costs that would come with the complete re-engineering of BC's energy sector. In the 2022 LTGRP, the Clean Growth Pathway to 2050 is represented by the Diversified Energy Future scenario.

With this in mind, FEI is planning for gas supply resources made up of increasing amounts of renewable and low carbon gas over the next 20 years and beyond. The components of this resource mix are expected to include renewable natural gas (RNG), hydrogen (H2), natural gas, and smaller amounts of syngas and lignin, supplemented later in the planning period by carbon capture, utilization or sequestration (CCUS). The amount of each resource to be acquired and delivered to customers throughout the planning period will ultimately be predicated on a number of a variables, including:

- **Quantity and Timing of Resource Availability**: Although FEI has modelled the mix of renewable and low carbon gases in certain proportions over time in the LTGRP planning scenario, the actual amount of each component that is acquired and delivered to customers could vary from the modelled amounts over the planning horizon based on a number of factors, including resource costs and supply project opportunities and development. Renewable and low-carbon gases with the highest volume potential over the planning horizon are RNG and H2. In particular, RNG is interchangeable[8] with natural gas and has wider availability so will make up a greater proportion of the resource mix in the near term. RNG will continue to be a large part of the resource mix throughout the planning horizon and beyond. While H2 resource development is underway, it is expected to become more widely available and make up an increasing proportion of the resource mix later in the planning horizon beyond 2030.
- **Resource Development and Delivery:** Many pathways exist for bringing the benefits of renewable and low carbon gas to FEI's customers; however, there are a number of ways in which these resources can be developed and delivered to customers which will ultimately impact the overall resource mix. For example, one means of incorporating more renewable and low carbon gas into the resource mix is through acquiring off-system supply, wherein FEI acquires renewable and low carbon gases in other regions and transports the gas by displacement to its system. While this process ultimately displaces conventional natural gas molecules, FEI customers physically receive conventional natural gas along with the environmental attributes associated with renewable and low carbon gas through displacement. The incorporation of these types of off-system supply will play an important role over the planning horizon as more on- or near-system resources are developed. FEI has also identified a number of ways to develop H2 supplies. These include, but are not limited to:
    - locating H2 production facilities that use RNG and natural gas as a feedstock near the end use;
    - blending H2 from physical production facilities on-system or upstream with natural gas on existing pipelines; and

[8] The physical properties of renewable natural gas, such as, specific gravity, viscosity and heating value, etc., falls with the range of the physical properties of FEI's conventional sources of natural gas. The capacity impacts and gas supply resource needs are comparable, and both sources of methane can utilize the same upstream and on-system infrastructure.

- developing dedicated delivery infrastructure over the longer term.

- **Location:** Given the length of the planning horizon, the geographic location where renewable and low carbon supply production is physically delivered to FEI's customers is not yet known in detail. Production facilities for RNG and H2 supplies are expected to be developed both on FEI's system and, over time, in locations where these low carbon gases can be injected into the existing upstream gas infrastructure. While many potential projects are in the concept and development stages, the location of all those that will proceed during the next 20 years is uncertain. In particular, the extent to which such resources are developed and delivered to customers on one portion of FEI's system will impact the amount of RNG and natural gas that will still need to be delivered on other portions of the system over the planning horizon.

FEI will discuss these resources and the range of quantities, timing of availability, modes of development and delivery and production location in greater detail as part of its 2022 LTGRP. However, as discussed in the response to BCUC Panel IR1 1.1, throughout the energy transition over the next 20 years and beyond to 2050, methane (both renewable and conventional natural gas) will continue to play a significant role in providing firm energy service to customers in the Lower Mainland. Therefore, the TLSE Project will be required to support the resilience of methane-based energy deliveries to customers well into the future.

FEI's modelling of supply resources over the next 20 years provides the following observations regarding supply resource mix in the future for FEI's 2022 LTGRP planning scenario. These observations apply to a moderate range of higher or lower demand forecasts. Note that the 2022 LTGRP modelling only extends to 2042; therefore, scenarios extending to 2050 are based on the trends regarding resource mix observed at the end of the LTGRP planning horizon, informed by the results of the Guidehouse report on *Pathways for British Columbia to Achieve its GHG Reduction Goals*[9] which considers a longer planning horizon. Table 1 below sets out the anticipated gas supply resource mix observations for annual and peak demand for the 2022 LTGRP Diversified Energy Future (Planning) Scenario over the planning horizon and to 2050. Below the table, FEI provides its observations on resource mixes under high and low demand scenarios as well.

[9] https://www.cdn.fortisbc.com/libraries/docs/default-source/about-us-documents/guidehouse-report.pdf?sfvrsn=dbb70958_0.

1 **Table 1**

Year	Resource Mix Observations	
	Annual	Peak
2030	Off-system supplies of RNG and H2 will be relied on in the early stages of FEI's carbon reduction transition. Natural gas and RNG will continue to make up the majority of physical deliveries to customers during this period. For off-system supplies, carbon reductions are achieved through the displacement of conventional gas in favor of renewable and low carbon purchases. By way of displacement, FEI customers physically receive conventional gas in addition to the environmental attributes associated with the renewable and low carbon gas purchased in other jurisdictions. Physical flows of H2 on FEI's gas infrastructure are expected to be limited to smaller amounts and portions of FEI's system until around 2030 as the technologies and infrastructure needed to manage larger volumes are refined and implemented. One or more syngas and lignin projects will displace some industrial load, though natural gas may continue to provide firm back-up service for periods when syngas/lignin production is unavailable. CCUS is expected to still be in development stages, perhaps available in small amounts through pilot projects, in 2030.	The majority of FEI's firm customers, including those in the Lower Mainland, will continue to be using methane for space and water heating. Natural gas will provide firming service to on-system RNG resources during peak periods. As such, peak requirements for deliveries of methane molecules are expected to change little by 2030.
2042	This is the end of the planning horizon for the 2022 LTGRP and as such is subject to greater uncertainty with regard to the range of factors discussed above. The proportion of FEI customers using methane for space and water heating as opposed to other renewable and low carbon gas supplies will have decreased, but will still make up a majority of customers. While the development of on-system resources will have grown in the intervening years, FEI anticipates there will still be reliance on off-system supplies, and therefore, the need to flow physical molecules of RNG and natural gas to a majority of FEI's customers.	As a majority of FEI customers will still be using methane for space and water heating as opposed to other renewable and low carbon gas supplies, a large requirement for methane peaking services will remain. To the extent that a portion of customers have switched completely to H2 service, the TLSE Project will be able to provide resiliency benefits to the remaining "methane customers" over a longer period of time (i.e., a longer cold snap or potential pipeline outage).

Year	Resource Mix Observations	
	Annual	Peak
2050	The steps taken early in the planning horizon have set FEI on a pathway to deep decarbonization by 2050 and well on its way to carbon neutrality on an annual basis. RNG and H2 will both be an important part of FEI's resource mix.	A large portion of FEI's demand continues to be met via delivery of methane to customers and delivery of methane to H2 production facilities. As such, the resiliency benefits of the TLSE Project remain important, particularly as extreme weather events continue into the future.

Resource Mix Under Higher or Lower Demand Scenarios

FEI expects the mix of supply resources described in the table above to apply to a moderate range of possible higher or lower demand forecasts based on a diversified energy future, namely one in which both the electric and gas infrastructure systems are relied on to decarbonize BC's energy infrastructure.

If, however, substantially different futures unfolded, a different resource mix could also unfold. FEI anticipates that if a substantially higher demand scenario began to occur within the planning horizon, higher growth in demand for RNG and natural gas would ensue, creating greater dependence on the TLSE facility to provide resiliency for the system. In contrast, if a substantially lower demand scenario began to unfold such as deep electrification and a lack of support for renewable and low carbon gas development, FEI anticipates that unintended consequences to the electricity system would begin to emerge, creating at best an uncertain future for the reliability and performance of BC's energy infrastructure overall. Under such circumstances, the resiliency of BC's energy infrastructure could be expected to become strained, requiring costly and reactive responses.

1.2.1 Please discuss the extent to which FEI's reliance on the T-South system for supply would be expected to change compared to today based upon the expected resources supplied in the LML in 2030 and 2050. Where possible, please provide a quantitative estimate of the change in reliance on T-South.

1.2.1.1 If FEI's future reliance on T-South for LML supply were to reduce in future, please discuss how this would change FEI's utilization of the TLSE Project for resiliency purposes.

Response:

As discussed in the response to BCUC IR2 81.1, and further described in the response to BCUC Panel IR1 1.2, the existing upstream infrastructure that FEI relies on for gas supply will continue to be an integral part of BC's clean energy future. Although there will be a significant amount of RNG incorporated into FEI's resource mix by 2030, the majority of this supply will be acquired outside of FEI's service territory (i.e., off-system) and received at the AECO/NIT or Station 2 hubs by way of displacement. Therefore, FEI will still require the same level of contracted third-party pipeline infrastructure such as T-South to deliver gas (whether conventional or renewable) to FEI's Lower Mainland load centre.

Between 2030 and 2050, FEI expects additional low carbon energy supply projects, such as those that produce hydrogen for use in place of natural gas, to be incorporated into the resource mix. Although there is still uncertainty as to what the impact will be to each of FEI's service regions, many of these projects will continue to utilize the upstream infrastructure in a significant way. For instance, while the appropriate amounts are yet to be determined, there is a major opportunity to inject hydrogen into the gas supply to create a blended product within the existing upstream gas infrastructure. Therefore, until new pipeline infrastructure is added into the region, FEI will continue to rely heavily on the T-South system for energy delivery into the Lower Mainland and the Interior.

While FEI expects its reliance on the T-South system to continue in the absence of new pipeline infrastructure, it is difficult to precisely quantify the extent of such reliance between 2030 and 2050. In particular, there are a number factors that impact the optimal amount of available T-South capacity. For example, in the responses to BCUC Panel IR1 1.1 and 1.2, FEI discusses the resource mix in the Lower Mainland from a peak and annual demand perspective. However, the T-South pipeline supplies gas to all FEI service regions, and this capacity is required throughout the 151-day winter heating season (November to March). As such, the optimal T-South capacity is closely tied to the winter design load duration forecasted over those 151 days. Further, the appropriate level of contracted T-South capacity also depends on market conditions in the region, as detailed in Section 3.4 of Appendix C (ACP Compliance Report) and in the response to BCUC IR1 46.1.

To manage regional market risks, FEI has held T-South pipeline capacity above its existing Lower Mainland customer load forecast as a contingency resource since 2014. Until new infrastructure is developed, FEI does not expect market conditions to change in the region, but will evaluate the appropriate amount of T-South capacity as a contingency resource over time. The only foreseeable development that would have a material impact on reducing FEI's reliance on the T-South system would be FEI's proposed Regional Gas Supply Diversity (RGSD) solution. This solution will serve not only potential load growth in the region (please also refer to the response to BCUC IR2 80.1.1), but create a flow path separate from the T-South system, thus providing much needed pipeline diversity for FEI and the region. Further, as noted in the response to BCUC IR2 80.1.2, the RGSD solution will also be a critical component in FEI's de-carbonization strategy. Given that the project will be built to be "hydrogen ready", it will enable greater capture and access

to cost-effective supplies of hydrogen, enhancing the potential for GHG emission reductions in the long-term. Ultimately, a quantitative estimate of the reduced reliance on the T-South system would depend on the final sizing of the RGSD project; however, in order to maximize FEI's resiliency, the optimal amount would be to contract at least half of its T-South holdings to the Lower Mainland on the RGSD pipeline. This was discussed in Section 4.3.4.5.1 of the Application.

Finally, the use of the TLSE Project for resiliency purposes would not be impacted if FEI's future reliance on T-South for the Lower Mainland was reduced in the future. As explained in Section 4.3.1.1 of the Application, FEI's efficient gas supply portfolio requires pipeline capacity to cover different demand characteristics (i.e., baseload and longer-term seasonal demand) than FEI's on-system storage (shorter-term peak demand). Also, as discussed in the response to BCUC Panel IR1 1.2.1, FEI's reliance on T-South would only be reduced if a new pipeline was built along a different corridor. Section 4.3.4.5.1 of the Application explains how the utilization of the TLSE Project for resiliency purposes would not be materially impacted if a new regional pipeline were to be constructed.

1.2.2 Please outline any technical implications for LNG storage associated with the expected future resource mix.

Response:

The feedstock entering the Tilbury facility in the future is expected to differ from the present natural gas supply by incorporating increasing amounts of RNG (including biomethane) and hydrogen. RNG is interchangeable with conventional natural gas, and can be liquefied and stored at the Tilbury facility. A minor difference between these resources is that RNG feedstock may include a slightly higher amount of biomethane generation byproducts (such as nitrogen) than is typically seen in conventional pipeline gas at present. The amount and types of byproducts is unknown at this time as it would vary according to the source of the RNG, but it is expected that these would be minor components of the overall gas stream. If the predicted amount of these contaminants is expected to exceed allowable levels for liquefaction equipment, systems will be incorporated into the plant design to remove them ahead of the liquefaction process. These systems are not expected to materially impact the overall cost or operability of the facilities. As the contaminant mix is not yet known, only a high-level cost estimate is possible; at an AACE Class 5 estimate level of definition, the cost would be expected to represent a minor incremental increase of approximately 3 to 5 percent of the overall cost of the liquefaction facilities. Since liquefaction is not included within the scope of the TLSE Project, these incremental costs would not affect the TLSE Project cost.

Hydrogen cannot be stored within an LNG tank due to its much lower boiling temperature. Any hydrogen that enters the Tilbury facility would need to be removed prior to liquefaction, collected, and diverted to other uses rather than LNG storage. If and when the gas pipelines to which the

Tilbury facility are interconnected begin to contain significant amounts of hydrogen, FEI will need to incorporate systems to remove hydrogen from the incoming gas stream. This ability would be incorporated into future designs and retrofitted into existing equipment if necessary. These systems are not expected to materially impact the overall cost or operability of the Tilbury facilities. As sizing and the hydrogen mixture is not yet known, only a high-level cost estimate is possible; at an AACE Class 5 estimate level of definition, the cost would be expected to represent a minor incremental increase of 1.5 to 4 percent of the overall cost of the liquefaction facilities. Since liquefaction is not included within the scope of the TLSE Project, these incremental costs would not affect the TLSE Project cost.

Notwithstanding the modifications discussed above, FEI expects that the Tilbury facility will continue to play a critical role in maintaining a safe, reliable, and cost-effective gas supply (whether from conventional or renewable methane) to hundreds of thousands of Lower Mainland customers.

1.3 If not addressed above, please discuss the extent to which the proposed tank would be used and useful if FEI supplied no conventional natural gas by 2050.

Response:

In all future scenarios, FEI expects that the proposed TLSE tank will continue to be used and useful.

FEI does not foresee a scenario where it would be supplying energy with no methane component (i.e., no conventional natural gas or RNG) by 2050. As explained in the response to BCUC Panel IR1 1.1, FEI anticipates that by 2050 approximately 65 percent of the Lower Mainland peak demand will be served by methane-based energy, and therefore, the proposed TLSE tank will continue to be used and useful. Please also refer to the response to BCUC Panel IR1 1.2 for a detailed explanation of the expected future resource mix.

Further, as explained in the response to BCUC Panel IR1 1.2.2, the feedstock entering the Tilbury facility in the future is expected to include increasing amounts of RNG and hydrogen. RNG is interchangeable with conventional natural gas and can be liquefied and stored at the Tilbury facility without modification. Hydrogen, in contrast, cannot be stored within an LNG tank due to its much lower boiling temperature. However, future modifications and equipment retrofits, such as hydrogen separation equipment upstream of the liquefaction equipment, will be incorporated (if necessary) to ensure the ongoing and continuing usefulness of the proposed TLSE tank and facility. As noted in the response to BCUC Panel IR1 1.2.2, liquefaction is not included within the scope of the TLSE Project; as such, these incremental costs would not affect the TLSE Project cost.

1.4 Please discuss whether FEI considers the LML has the potential for new or repurposed dedicated hydrogen-only infrastructure.

Response:

FEI continues to advance a range of activities to study, test, and verify that hydrogen is safe to use in the existing gas system and to identify any changes that may be required to ensure ongoing safe operation of the gas system. FEI's Coastal Transmission System (CTS) pipelines in the Lower Mainland will continue to be used and useful as they are capable of safely transporting a blend of hydrogen.

The following provides background regarding blending hydrogen in pipelines and describes FEI's key ongoing activities to investigate doing so.

Hydrogen-ready pipe is well understood

Hydrogen gas has been safely stored and transported in dedicated high-pressure steel tanks and pipelines for many decades. As such, the engineering challenges are well understood. Pipelines that are considered fully hydrogen-ready have been specified, designed, and constructed from their outset to transport pure hydrogen. As such, consideration is given to materials, components, and procedures (e.g., pipeline steel, welds, gaskets/seals, valves, etc.) that are known to be able to operate in a pure hydrogen environment.[10] However, as FEI explains below, even pipe that was not designed and constructed from the outset for hydrogen service can still transport meaningful quantities of hydrogen, in some cases with little to no modifications.

Preliminary analysis shows FEI's CTS can transport a blend of hydrogen

FEI has completed preliminary analysis to understand the admissible limits for hydrogen blending for its existing natural gas infrastructure and end-use customer equipment and applications. The analysis was informed by current industry knowledge and indicates that the existing transmission pressure pipelines in the Lower Mainland can transport a blend of hydrogen and methane (i.e., conventional and renewable natural gas). This is consistent with industry experience from hydrogen blending pilot projects around the world that have consistently demonstrated that steel pipelines can accommodate low hydrogen concentrations (approximately 10 percent or less) with no negative effects.

FEI is investigating methods to mitigate risks of higher hydrogen blends

Hydrogen has different chemical properties compared to methane. The most significant concern in the context of steel pipelines is variously known as "hydrogen embrittlement" or "hydrogen-

[10] https://h2tools.org/.

induced cracking". Hydrogen gas is made up of hydrogen molecules which can dissociate into hydrogen atoms on the inside surface of steel pipe and, because hydrogen is the smallest atom, it has some propensity to adsorb into the steel lattice comprising the pipe body and welds. This can degrade the mechanical properties of the steel, and, in simple terms, can cause it to become more brittle and result in the formation or growth of cracks. This is why FEI's ongoing program of hydrogen research and development activities, including for example the data collected by FEI's proposed CTS TIMC Project and other ILI activities, will allow FEI to identify and address any cracking threats on the CTS pipelines. This work will help FEI evaluate the safe operation of the CTS pipelines under various hydrogen blending scenarios in the future. FEI is also investigating emerging industry solutions to inhibit hydrogen embrittlement, such as the presence of small quantities of oxygen. Further research and technical assessment is ongoing to analyze if the levels at which the oxygen is present would be sufficient to mitigate the risk of embrittlement if high concentrations of hydrogen were added to the CTS pipelines.

FEI is exploring future distribution of 100 percent hydrogen

The distribution of 100 percent hydrogen may be pursued by FEI in the future either through retrofitting existing infrastructure, investments in new infrastructure, or by production of hydrogen closer to the point of use. However, at this time, FEI does not know which, if any, of the segments of the CTS might need to be replaced or repurposed, nor the timing of this work.

FEI does not envision CTS pipelines being removed and replaced with new hydrogen-ready pipelines, as this would not be a cost-effective method to potentially support 100 percent hydrogen distribution. Instead, by 2030, FEI envisions that blending of hydrogen would expand across the low-pressure gas distribution system, with the potential for segments of the system around hydrogen hubs to be converted to 100 percent hydrogen. Between 2030 and 2050, as demand for hydrogen grows, FEI envisions that the existing gas system pipeline corridors would be retrofitted, upgraded, and expanded to transport an increasing share of hydrogen and (bio)methane in a progressively decarbonized gas system. Additional amounts of hydrogen to support FEI's low-carbon diversified pathway may also be transported by other new or repurposed infrastructure.

In addition to the above, please refer to FEI's responses to BCUC Panel IR1 as part of the CTS TIMC CPCN proceeding (provided as Attachment 1.4), in which FEI provides additional information on FEI's evaluations for blending hydrogen into existing infrastructure, and the need for repurposing existing pipeline segments or replacing pipeline segments for 100 percent hydrogen use.

1.4.1 Please confirm, or explain otherwise, that LNG storage would not be useful for customers served by dedicated hydrogen infrastructure.

Response:

If dedicated hydrogen delivery infrastructure is developed (i.e., a pipeline system to deliver gas with no methane component), then the Tilbury LNG storage system could not be used to feed those networks. However, if a user also takes supply from FEI's natural gas system, the Tilbury LNG storage system could be used to provide resiliency for that load in the event of a supply disruption on the dedicated hydrogen network.

Despite the premise of this question, at this time, FEI expects that methane (whether from conventional or renewable sources) will continue to exceed 80 percent by volume of the gas transported by the CTS pipelines for at least 20 years. The TLSE Project's LNG storage volumes are meant to support the resiliency of FEI's overall system in the event of a supply interruption. This resiliency benefit will be effective for the system even if it delivers a hydrogen/methane gas mixture in the future, although in this scenario where the TLSE storage tank is utilized, the proportion of hydrogen within the systems being fed from the TLSE storage would temporarily drop until the supply interruption is corrected and normal service resumes.

Please also refer to the response to BCUC Panel IR1 1.2.2.

1.5 Please provide a discussion of the expected annual cost savings associated with de-contracting a portion of FEI's off-system storage resources, in the event of a decline in FEI's peak demand.

1.5.1 Please discuss the factors that FEI considers are likely to affect the costs of off-system storage in the medium and long term.

Response:

There are a number of factors that FEI would consider before de-contracting its off-system storage resources.

First, FEI's off-system storage resources are intended to cover different demand characteristics compared to FEI's on-system storage. In Section 4.3.1.1 of the Application, and in the response to CEC IR1 46.1, FEI explains how its efficient supply portfolio strategy includes off-system storage resources to provide short- to medium-duration seasonal supply (i.e., 10 to 60 days), as well as on-system storage resources (i.e., the Tilbury and Mt. Hayes LNG facilities) which provide shorter duration supply (i.e., 1 to 10 days) to cover the winter demand peaks associated with cold weather events.

Second, FEI's off-system storage resources are generally used for daily load balancing in normal operations. As discussed in the response to the BCUC IR1 22.1, FEI's on-system LNG storage resources can help with daily balancing; however, given the smaller size of these assets, their utilization is prioritized for cold weather events and/or emergency purposes.

In the event that the future peak demand, winter load profile, and daily balancing requirements demonstrate a declining trend, FEI would evaluate the potential to de-contract a portion of its off-system storage resources (i.e., storage contracts at the Jackson Prairie and/or Mist facilities). Since the amount that could be de-contracted is subject to a number of unknown future variables, FEI has estimated the future savings using the cost of FEI's most recent off-system storage renewal and based on de-contracting 25 MMcf/day of deliverability and 1.5 Bcf of storage (i.e., 60 days of storage). Using these assumptions, the estimated annual savings would be approximately $5 to $6 million.

However, this cost savings estimate is likely conservative (low). The costs of all existing supply resources in the region (including off-system storage and pipeline capacity) are expected to increase in the medium- to long-term. For example, until new pipeline infrastructure is added, existing assets will remain fully contracted and are essential to managing winter load requirements. Therefore, if shippers need to contract additional pipeline capacity or renew off-system storage contracts, they will need to pay some premium (reflected in the forward market prices in the region) to a counterparty to obtain access to the asset. FEI provided evidence supporting this in the response to BCUC IR1 46.2. Further rationale for why these costs may increase in the medium- to long-term is as follows:

- Given the need for increased maintenance of aging third-party assets, FEI expects its costs (i.e., tolling costs and storage demand charges) will increase in the short- to medium-term; and
- Woodfibre LNG is expected to be in-service by the end of this decade.[11] If this project comes online prior to any new infrastructure, there will be supply issues in the winter for any shippers that have not contracted enough firm resources for their load requirements. Therefore, there will be higher costs associated with trying to contract additional pipeline capacity or trying to renew any off-system storage contracts.

Finally, FEI notes that any new infrastructure in the region (e.g., Westcoast T-South expansion, and/or expansions to off-system storage assets, etc.) will also come at a higher cost than existing tolls.

[11] Woodfibre LNG. (Posted on November 23, 2021). "Woodfibre LNG awards EPFC contract to McDermott."