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December 22, 2022

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

Attention: Mr. Chris Sandve, Chief Regulatory Officer

Dear Mr. Sandve:

Re: FortisBC Energy Inc. (FEI)

2022 Long Term Gas Resource Plan (LTGRP) – Project No. 1599324

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

On May 9, 2022, FEI filed the LTGRP referenced above. In accordance with the amended regulatory timetable established in British Columbia Utilities Commission Order G-287-22 for the review of the LTGRP, FEI respectfully submits the attached response to BCH IR No. 1.

In its responses, FEI has identified responses which were provided by, contributed to, or developed with its consultants, the Posterity Group and Guidehouse.

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

If further information is required, please contact the undersigned.

Sincerely,

FORTISBC ENERGY INC.

Original signed:

Diane Roy

Attachments

cc (email only): Commission Secretary
Registered Parties

1.0 Through this series of questions, BC Hydro seeks to better understand the decision to designate the Diversified Energy (Planning) Scenario as the planning scenario for the 2022 LTGRP.

Reference: Exhibit B-1, FortisBC Energy Inc. (FEI) Long-Term Gas Resource Plan, Section 4 and Section 10

In section 4.4.1.2, FEI states:

> "For resource planning purposes, FEI uses the "End Use Annual Method" of demand forecasting."
>
> "This method produces a Reference Case annual demand forecast and enables FEI to examine how future demand might unfold under alternate future scenarios."
>
> "The End Use Annual Method forecast process starts with developing a Reference Case forecast. The Reference Case is based on end use patterns observed, as well as any new changes in law or policy that will affect future demand and have been, or are quite certain of becoming, enshrined in legislation, codes, standards or bylaws in and as of the base year. The Reference Case keeps these patterns constant throughout the planning period."

In section 4.5, FEI states:

> "In order to examine different ways that the future could potentially unfold to impact the amount of demand, FEI has developed, in consultation with stakeholders, a range of six alternate future scenarios (in addition to the Reference Case) within which changes in demand can be modelled using the End Use Annual Method discussed above."
>
> "FEI believes that a diversified pathway in which both the existing gas and electricity systems within BC have an important role to play in decarbonizing energy use in the province, is critical to a successful, reliable, resilient and cost-effective energy future, and that the Clean Growth Pathway plays a critical role. As such, FEI is designating the Diversified Energy (Planning) Scenario as its planning scenario for the 2022 LTGRP."

In section 4.5.1, FEI states:

> "The Diversified Energy (Planning) Scenario sets the planning context for FEI's 2022 LTGRP and the actions FEI will take over the next four years to ensure it can meet customers' energy needs over the planning horizon and beyond."
>
> "In analysing the energy planning environment in BC, it was clear to FEI that a Diversified Energy (Planning) Scenario must be the solution to meeting the growing energy needs of British Columbians and reducing carbon emissions over the next 20 years and beyond."

In section 4.5.3, FEI states:

> "The Reference setting for each of the critical uncertainties is based on the expectations of what would happen if the conditions for that uncertainty remained as they were known to be as of the base year. As such, using the Reference setting for all of the critical uncertainties results in the Reference Case forecast. Based on the Reference Case, the scenario analysis alters outcomes of each critical uncertainty to be higher or lower, or accelerated or delayed, compared to the Reference setting."
>
> "A setting of 'Planning' indicates that the input value for that critical uncertainty is what FEI expects it to be in the Diversified Energy (Planning) Scenario."

In section 4.8, FEI states:

> "The Reference Case demand forecast models only those trends and known changes in conditions in the near term for all sectors that were in place at the time the scenario modelling began. Since it does not consider the future changes that are required to transition to lower carbon gas supplies and meet GHG reduction targets, it is no longer considered FEI's planning scenario."
>
> "The Diversified Energy (Planning) Scenario represents FEI's expectation of the way in which future demand will unfold, before DSM activities, when considering the actions that FEI is planning to take to transition to a deep decarbonization of the gas it delivers to customers."

In section 4.9, FEI states:

> "Since the likelihood of accurately predicting actual future conditions is low, probabilities are not assigned to the different scenario outcomes. Rather, FEI identifies and implements a set of cost-effective resources to meet the planning scenario and establishes contingency plans for meeting the scenario range of potential future annual demand."

In section 10, FEI states:

> "FEI has built its Action Plan based on the Diversified Energy (Planning) Scenario modelled on the Clean Growth Pathway to achieve the GHG emission reduction targets outlined in the Roadmap."

1.1 Please comment on the extent to which the Reference Case forecast represents a mid-range forecast.

Response:

FEI does not intend for the Reference Case gas demand forecast to represent a mid-range energy demand forecast. Rather, the Reference Case forecast represents a starting point for modeling.

In the process of developing the scenarios and examining scenario demand forecast results, it is helpful to understand the impact of each critical uncertainty against a backdrop where few of the inputs or critical uncertainties are changing. The Reference Case gas demand, therefore, includes very few changes in the energy end use trends, such as the equipment and behavioural choices energy users make. For example, the rate of customer growth in different rate classes is a projection of past trends, while codes and standards are assumed to improve only at the rate already planned.

When considering the demand forecast results, Figure 4-20 on page 4-40 of the Application shows that, in terms of total demand, the Reference Case gas demand forecast is among the lowest of the scenarios. When considering Compressed Natural Gas (CNG) and Liquefied Natural Gas (LNG) demand separately, the Reference Case gas demand forecast is also among the lower of the alternative scenario forecasts (see Figures 4-14, 4-15 and 4-16 on pages 4-34 to 4-36 of the Application). When considering residential, commercial and industrial customer demand, the Reference Case gas demand forecast provides more of a mid-range result (see Figures 4-10, 4-12 and 4-13 on pages 4-30 to 4-32 of the Application).

1.2 Please comment on the extent to which the Diversified Energy (Planning) Scenario represents a mid-range forecast.

Response:

The DEP Scenario gas demand forecast does tend to fall near the middle of the modeled scenarios and can be described as a mid-range result.

1.3 If the Diversified Energy (Planning) Scenario is more representative of a mid-range forecast than the Reference Case forecast, please explain how this is the case considering that “using the Reference setting for all of the critical uncertainties results in the Reference Case forecast” and “based on the Reference Case, the scenario analysis alters outcomes of each critical uncertainty to be higher or lower, or accelerated or delayed, compared to the Reference setting.”

Response:

The following response has been provided by FEI in consultation with Posterity Group.

The extent to which the DEP Scenario results in more of a mid-range forecast than the Reference Case is irrelevant for making important long-term decisions about energy systems in BC. Please also refer to the response to BC Hydro IR1 1.7.

Resource plan scenarios are intended to explore possible alternative futures to support decision making. Since FEI's planning environment for energy services continues to rapidly change and present uncertainty, "business as usual" assumptions or conditions will not remain stable throughout the planning horizon. Accordingly, distinct scenarios must be developed to deviate from current "business as usual" assumptions or conditions. As such, a Reference Case scenario is commonly developed first, to serve as the basis to create alternative scenarios that explore how different permutations of key factors can yield different outcomes. The scenarios in the Application, including the DEP Scenario, are intended to highlight the impact of changes to the variables that most affect FEI's system, which are called "Critical Uncertainties" in the Application. As the Reference Case scenario reflects the continuation of current policies and the implementation of highly likely conditions (as at the time the forecast was developed), the "Reference" setting for each Critical Uncertainty was used. Prior to creating the alternative scenarios, different settings for each Critical Uncertainty were developed which reflected plausible alternative pathways for that Critical Uncertainty to unfold. Combining Critical Uncertainty settings in various positions leads to the alternative scenarios. Differences between the Reference Case and the DEP Scenarios include the following:

- More electrification in the DEP Scenario than the Reference Case;
- Higher demand for gas for low-carbon transportation and global LNG in the DEP Scenario than the Reference Case; and
- New, large industrial demand from the Woodfibre LNG export facility being included in the DEP Scenario but not the Reference Case.

1.4 Please comment on the extent to which "the solution to meeting the growing energy needs of British Columbians and reducing carbon emissions over the next 20 years and beyond" and "actions that FEI is planning to take to transition to a deep decarbonization of the gas it delivers to customers" are within the control of FEI.

Response:

FEI considers that the DEP Scenario is the best solution to meeting the growing need for both reliable and cost-effective energy and carbon emissions reductions, and that it will have some control over offering low-carbon solutions aligned with FEI's Clean Growth Pathways. However, the successful implementation of those solutions is subject to factors including government policy and support, technological advancement and commercialization, customer adoption and price competitiveness. Provided that provincial and municipal governments allow environments where FEI can make the requisite investments and expand its offering of low-carbon solutions, there is opportunity for FEI to execute these pathways. However, currently, there remain barriers and uncertainty within the technological, market, policy, and regulatory environment over whether the scenario developed by FEI can be achieved in full.

1.5 Please explain why "future changes that are required to transition to lower carbon gas supplies and meet GHG reduction targets" and "actions that FEI is planning to take to transition to a deep decarbonization of the gas it delivers to customers" are considered as part of demand forecasting rather than gas supply portfolio planning.

Response:

The transition to renewable and low-carbon gas supplies and other actions by FEI to reduce carbon emissions on behalf of customers are necessary considerations for the demand forecast. Generally, given the evolving policy environment, actions taken to reduce GHG emissions are becoming a key factor in determining future demand. Actions such as DSM reduce demand, while actions such as bringing on renewable and low-carbon gases enable demand to be met without GHG emissions. It is therefore important to link these actions to the demand forecast to show that the demand can be met while reducing carbon emissions in line with provincial policy.

1.6 Please confirm, or explain otherwise, that FEI did not develop gas supply portfolios for the other five alternate future scenarios that were developed.

1.6.1 If confirmed, please explain what "establishes contingency plans for meeting the scenario range of potential future annual demand" refers to.

Response:

FEI did not develop alternative gas supply portfolios as part of the Application. For a further discussion on how this may be a potential future matter to facilitate comparison, please refer to the response to BCUC IR1 1.1.

Section 6 of the Application describes FEI's gas supply portfolio plan to meet the total annual forecast demand, with consideration of the transition to renewable and low-carbon gas. In this section, FEI discusses the current outlook for these gas supplies and how they will impact FEI's gas supply planning moving forward. The long-term considerations that apply to FEI's energy purchases are further described in this section. These considerations exist regardless of which of the future scenarios is the most likely to unfold or occur.

Subsection 6.2.4.3 of the Application discusses in greater detail how FEI's existing portfolio of resources is prepared for managing demand outcomes either higher or lower than the DEP Scenario, should they arise in the short to medium term, and outlines the contracting flexibility of the gas supply portfolio. The contingency planning in FEI's gas supply portfolio considerations largely consists of the following:

- Holding excess resources as contingency in the supply portfolio to mitigate the risk of future load growth and supply disruptions;
- Negotiating conventional gas supply purchases primarily on an annual basis and priced based on a market index to allow FEI to reduce or resell the supply if demand declines or is displaced with low-carbon supply;
- The ability to renew transportation and storage capacity;
- The flexibility to de-contract resources in the gas marketplace if FEI encounters a future with lower demand than the DEP Scenario; and
- The development of projects like TLSE and RGSD for gas supply requirements while also meeting other needs of FEI.

FEI's gas supply portfolio planning relies on a system-wide demand forecast for Core customers each day through the entire year, as well as the peak design day, which is the coldest day of the design year estimated through extreme value analysis to have a return period of 20 years. This 1 to 5 year forecast is created annually and assessed each year within the Annual Contracting Plan (ACP), along with any changing market conditions and resources available in the regional marketplace, to develop an annual gas supply portfolio. In the short-term to 2030, as described in Section 6.2.3 of the Application, conventional natural gas and RNG will continue to make up the majority of physical deliveries to customers during this period, meaning FEI is not integrating new resources that may change the underlying infrastructure, and therefore necessitate comparison between different supply portfolios.

This approach is different for gas supply planning in comparison to an integrated electric utility, which may have to outline alternate future demand and supply scenarios together, as it could result in the construction or acquisition (and long-term commitment) of new supply-side resources or long-term contracts. In contrast, FEI's annual gas supply decisions largely (though not always) consist of minimal changes to commodity purchasing strategies, as well as storage and pipeline considerations such as contracting, adjusting, or de-contracting. In addition, the availability of supply and resources is primarily determined in the gas marketplace and, depending on the utilization and contract status from other counterparties, this, and not necessarily long-term portfolio planning, may drive the need for new resources. Given that the regional marketplace is constrained and supply resources are fully contracted, FEI has already assessed that there is a need for additional infrastructure, such as Mist storage capacity and the TLSE and RGSD projects, as outlined in Section 6.3 of the Application.

However, as discussed in Section 6.1.2 of the Application, FEI is not seeking approval of any of its gas supply portfolio activities as part of the Application. The discussion of more detailed strategies and tactics are only to provide context for resource planning considerations. In future LTGRPs, it is likely that there will be a need to analyze different demand and supply scenarios, and compare integrated portfolios, given that beyond 2030 there will be increasing proportions of renewable and low-carbon supplies (such as hydrogen) that will require further considerations and processes to compare portfolios.

1.6.2 If confirmed, please comment on how the Commission and interveners can assess the extent to which the "actions FEI will take over the next four years to ensure it can meet customers' energy needs over the planning horizon and beyond" position FEI for the other five alternate future scenarios that were developed.

Response:

The responses to BC Hydro IR1 1.6 and BCUC IR1 52.2 provide further explanation on the actions that FEI would take with regard to its gas supply portfolio planning if a scenario other than a DEP Scenario begins to unfold, in addition to the description provided in Section 6.2.4.3 of the Application. In short, FEI will monitor the gas supply planning environment and take appropriate action to ensure it can continue to meet customers' energy needs.

1.6.3 If confirmed, please explain whether the Action Plan includes contingency action items.

Response:

Most of the action items identified in the Action Plan involve monitoring the planning environment that will allow FEI to identify if the conditions in any of the scenarios are emerging, and to take any necessary action regarding its gas supply portfolio, as discussed in Section 6.2.4.3 of the Application. Action Item 9, in Section 10, addresses the actions that FEI will take to monitor, assess and address gas supply portfolio considerations. Please also refer to the response to BC Hydro IR1 6.2.

1.7 Please comment on the relative potential risks and benefits to FEI ratepayers of building and advancing an Action Plan based on a scenario which "alters outcomes of each critical uncertainty to be higher or lower, or accelerated or delayed, compared to the Reference setting" compared to building and advancing an Action Plan based on the Reference Case forecast.

Response:

The potential risks and benefits to FEI ratepayers of advancing an action plan cannot be assessed solely by examining the extent to which the results of the gas demand forecast differ between the Reference Case and other demand scenarios. The entire Application is dedicated to examining the challenges and opportunities for FEI and its customers over the next 20-year planning horizon and should be considered in its entirety in assessing the Action Plan that has been advanced.

FEI considers that the long-term energy resource planning challenges and opportunities in BC are complex and that preparing an integrated resource plan that considers and models these complexities reduces risk to all energy consumers in BC from long-term energy use decisions. FEI's Action Plan appropriately recognizes the energy transition is a reality that is rapidly changing the policy environment and operating conditions which impact FEI and its customers. A reliance on an action plan based on "business as usual" conditions and assumptions would be irresponsible given this context of complex change.

2.0 Through this series of questions, BC Hydro seeks to better understand the approach to forecasting demand in the FEI Long-Term Gas Resource Plan compared to the FBC Long-Term Electric Resource Plan.

Reference: FortisBC Inc. (FBC) 2021 Long-Term Electric Resource Plan, Volume 1, Section 3

In section 3.1, FBC states:

> "The [Business as Usual] is the forecast used for annual rate setting which is then extended out for the 20-year planning horizon. The Reference Case load forecast builds on the BAU forecast by including electric vehicle charging load, and new industrial loads with high confidence of materializing, which are discussed in detail in Appendix F, Section 3.1.3 and 3.4. The Reference Case load forecast is the resulting forecast used for planning purposes in this LTERP."

2.1 Please explain the methodological differences, if any, between the Reference Case load forecast in the FBC Long-Term Electric Resource Plan and the Reference Case load forecast in the FEI Long-Term Gas Resource Plan.

Response:

A discussion of the differences in forecast methods between FBC and FEI leading to the respective Reference Case forecasts is provided below. It should be noted that the forecasting methods for each utility do not differ across each utility's respective scenarios and for FEI, as described in Appendix B-3 of the Application, both its Reference Case and DEP Scenario use Reference settings for a number of the critical uncertainties in its demand forecast method. As such, the LTERP's use of its Reference Case as its planning scenario and the LTGRP's use of the DEP Scenario as its planning scenario remain closely aligned in that both resource plans are consistent with planning for FortisBC's Clean Growth Pathway.

The Reference Case load forecast in the FBC LTERP is developed by building on the BAU forecast by including electric vehicle charging loads and new industrial loads with high confidence of materializing. The BAU forecast is based on traditional load drivers inherent in the actual data as well as third party forecasts of the economic drivers of load growth for the FBC service area and includes the following components:

- BC Gross Domestic Product (GDP) as forecast by the Conference Board of Canada (CBOC). The CBOC forecast provides an outlook for the expected economic climate, and is used directly in the forecasts of the load growth in FBC's commercial and industrial rate classes;
- FBC's service territory population as forecast by the Ministry of Technology, Innovation & Citizens' Services, BC Statistics branch (BC Stats), which is used to forecast the number of residential customers FBC will serve over the planning horizon; and

- Forecasts provided through annual surveys for individual wholesale and industrial customers.

The Reference Case load forecast in this Application is explained below for each customer category.

The method for residential, commercial and industrial customers is explained in Section 4.4.1.3 of the Application. A key similarity between the FEI and FBC reference cases is that they both employ traditional drivers of demand and trends embedded in actual data from the recent history of customer energy use. As well, both the FBC and FEI reference cases include new demand (or demand growth) that is quite certain. A key difference is that the LTGRP Reference Case is developed using the end-use method, rather than a time series method (referred to in the Application as the Traditional Annual Method [1]). For the LTGRP, new loads that are quite certain lead to the reference case settings described in Appendix B-3 of the Application, which are used to prepare the Reference Case end-use demand forecast.

For the other two customer demand categories in the LTGRP demand forecast (Low-carbon Transportation and Global LNG as discussed in Section 4.4.2 of the Application, and New Large Industrial Demand as discussed in Section 4.4.3 of the Application), there are no corresponding demand categories in the FBC Reference Case demand forecast. To clarify, while both FBC and FEI do have transportation and industrial customers in their respective Reference Case demand forecasts, the description of these demand categories in the Application and the region in which they are modelled to occur in the FEI service territory (namely the Lower Mainland) are such that they are not considered to be overlapping customer categories and so they are only modelled in the LTGRP.

2.2 Please explain why the FBC Long-Term Electric Resource Plan builds on the BAU forecast for planning purposes while the FEI Long-Term Gas Resource Plan designates a scenario as its planning scenario.

Response:

The LTERP Reference Case load forecast builds on the BAU forecast and is the load forecast FBC uses for planning purposes. This is because the Reference Case load forecast represents FBC's most likely, or expected, load forecast.

The FEI LTGRP has designated the DEP Scenario as its planning scenario, rather than the Reference Case load forecast, because the DEP Scenario best reflects changes in the planning environment, primarily carbon emission regulation and related technology advances, that FEI anticipates will occur over the planning horizon, but which are not captured in the reference case

[1] See Section 4.4.1.1 of the Application.

definition and forecast. In choosing the DEP Scenario as its planning scenario, FEI can develop the actions it expects to take in FEI's energy transition and in contributing to BC's GHG emission reduction goals. As such, the DEP Scenario represents the future that FEI is planning towards. Please also refer to the response to BCSEA IR1 7.1.

3.0 Through this series of questions, BC Hydro seeks to better understand how demand forecast uncertainty is considered in the Action Plan.

Reference: Exhibit B-1, FortisBC Energy Inc. (FEI) Long-Term Gas Resource Plan, Section 4 and Section 10

In section 4.6.2.3, FEI states:

> "Figure 4-17 below provides a regional look at the Low-Carbon Transportation and Global LNG Demand Category for the Planning setting, which is applied to the Diversified Energy (Planning) Scenario. This graph depicts the effect of adding LCT load to the distribution system and illustrates how the majority of LCT load is expected to come onto the system in the Lower Mainland since this is where the LNG is produced and since the largest portion of LNG demand is for the marine sector. Though not shown, this locational effect is seen across the scenarios that include substantial demand growth in this category."

In section 10, FEI states:

> "As discussed throughout this LTGRP, the energy planning environment is rapidly changing and FEI is undergoing an important shift to decarbonize the energy it delivers to customers. These changes have implications for FEI's services and infrastructure that continue to need further study and discussion as part of the long-term resource planning process. As such, FEI believes the period between filing this LTGRP and filing its next LTGRP should be shorter than the previous interval. FEI anticipates filing its next LTGRP approximately 2 to 3 years following the conclusion of the regulatory process for its 2022 LTGRP."

3.1 Please describe the process through which FEI intends to monitor, report on and respond to changes in forecast demand and supply between now and its next LTGRP.

Response:

As with each of its successive LTGRPs, FEI intends to continue monitoring all aspects of the planning environment described in Section 2 of the 2022 LTGRP. Activities FEI undertakes in this regard include the following:

- engaging with federal, provincial and municipal governments to understand trends in energy and emissions related policy and regulation;
- updating its short-term annual demand forecasts and its peak demand forecasts each year;
- updating its gas supply portfolio, including growth in RNG and low carbon gas sources;
- examining third party outlooks and reports on energy market issues and emerging trends;

- participating in codes and standards development work with applicable organizations to understand and influence trends in energy related building requirements and equipment standards;
- gathering feedback from customers, communities and industry experts on their expectations for future demand;
- engaging industry experts through FEI's Resource Planning Advisory Group;
- contracting consultants and conducting research to update various background reports and studies related to energy use data, challenges and opportunities;
- conducting business with energy producers and service providers; and
- gathering feedback from carrying out other activities including ongoing operations, project development and other regular business of the utility.

3.2 Please identify the Action Plan activities related to system expansion that FEI intends to begin to implement before its next LTGRP.

Response:

There are several Action Plan activities related to system expansion that FEI intends to begin to implement before its next LTGRP. These are identified in Action Plan items 5, 7, 9 and 10 in Section 10 of the Application. Please refer to the response to BCOAPO IR1 10.2 regarding the timing of the next LTGRP.

Such activities include:

- FEI's proposed Okanagan Capacity Upgrade (OCU) Project (see Action Item 7 – first bullet), which would support growing peak demand in the Central and North Okanagan, is the only capacity-related system expansion project in the Action Plan that FEI expects could be in service prior to the next LTGRP;
- FEI's proposed Regional Gas Supply Diversity (RGSD) project (see Action Item 5) will be in an advanced stage of development, possibly to the point of FEI submitting a CPCN;
- To support LCT and LNG global demand, some initial expansion of Coastal Transmission System (CTS) compression or pipelines could occur if the demand is secured (see Action Item 10); and
- The construction of the Eagle Mountain Gas Pipeline (see Action Item 7 – second bullet) could be under way if the final commitment to construction is made and the project is authorized.

3.3 Please explain how the timing of these system expansion activities consider demand forecast uncertainty.

Response:

The timing of Coastal Transmission System (CTS) upgrades to support LCT and LNG expansion are triggered when markets are secured to support the expansion and therefore are not subject to forecast uncertainty to any significant degree. The Okanagan Capacity Upgrade (OCU) Project is addressing a current capacity deficit and FEI is engaging in a variety of temporary mitigation measures to meet peak demand until the First Nations engagement and regulatory processes are completed and approval to proceed is granted. Forecast uncertainty is not negating the present capacity need, but could influence the longevity of the current OCU upgrade, and therefore influence the scope and timing of future enhancements to the project that may or may not be required to meet future peak demand. Other Action items noted in response to BC Hydro IR1 3.2 include the ongoing assessment of need and timing for system expansion.

3.4 Please identify the activities in the Action Plan that are being advanced because of the Planning setting being applied to the Diversified Energy (Planning) Scenario for the LCT and Global LNG.

Response:

Action Plan item #3, “Continue pursuing FEI’s LCT and global LNG initiatives to address market opportunities for load growth in support of customer rates and reducing local and global GHG emissions”, is being advanced to support LCT and global LNG growth, as detailed on page 10-2 of the Application.

3.5 Please comment on the level of uncertainty regarding the application of the Planning setting for LCT and Global LNG and explain how the timing of the activities set out in response to Question 3.4 consider this risk.

Response:

Over the next 2-3 years, prior to FEI filing its next LTGRP, FEI considers that there is a low level of uncertainty regarding the application of the Planning setting for LCT and Global LNG. The

timing of the Action Plan related to LCT and Global LNG, discussed in Section 10 of the Application and in the response to BC Hydro IR1 3.4, align with this low level of uncertainty in the short term. These issues will be addressed further in the next LTGRP to address the timeframe beyond 2-3 years, which has more uncertainty.

4.0 Through this series of questions, BC Hydro seeks to better understand the technical and logistical requirements that FEI feels are not plausible under the Lower Bound and Deep Electrification scenarios.

Reference: Exhibit B-1, FortisBC Energy Inc. (FEI) Long-Term Gas Resource Plan, Section 4

In section 4.6.1.1, FEI states:

> "Both the Lower Bound and the Deep Electrification scenarios create technical and logistical requirements for alternative energy systems to be able to manage the scale of shifting energy resources that are not plausible, particularly to support peak energy, reliability and resiliency requirements."

4.1 Please describe the technical and logistical requirements to support a peak energy load as described in the Deep Electrification pathway.

Response:

Please refer to the response to BCUC IR1 30.3.

4.2 Please provide the evidence used in this analysis to conclude that meeting these technical and logistical requirements is "not plausible".

Response:

Please refer to the response to BCUC IR1 30.3.

5.0 Through this series of questions, BC Hydro seeks to better understand FEI's plans to source renewable and low-carbon gas supply and the implications of a certificate trading system approach.

Reference: Exhibit B-1, FortisBC Energy Inc. (FEI) Long-Term Gas Resource Plan, Section 3

In section 3.2.2.3, FEI states:

> "FEI has provided safe and reliable gas service in the province for many years and as part of the Clean Growth Pathway it will continue to provide this service for many years, even if the fuel composition changes."

In section 3.3.2, FEI states:

> "FEI has been working with suppliers of RNG, hydrogen, syngas and lignin in BC and other jurisdictions to expand its portfolio of renewable and low-carbon gases."

Reference: Exhibit B-1, FortisBC Energy Inc. (FEI) Long-Term Gas Resource Plan, Section 6

In section 2.2.2, FEI states:

> "By leveraging the energy trading capabilities made possible by the existing gas transportation network, discussed in Section 6.2.2.1 above, renewable and low-carbon gases can be purchased from producers across Canada and the US, with the carbon reduction benefits of that production being delivered to FEI's customers in BC. FEI expects this source of supply to be an important part of its transition to renewable and low-carbon gas supplies, particularly in the early years of the transition. Over the planning horizon, however, FEI expects to purchase or produce increasing amounts of its supplies of renewable and low-carbon gas within BC."

Reference: Exhibit B-1, FortisBC Energy Inc. (FEI) Long-Term Gas Resource Plan, Appendix D-2

Section 5.4.3 states:

> "FortisBC is currently buying RNG produced outside of B.C. (e.g., Lethbridge, AB and Des Moines, Iowa) for an existing voluntary market. This option is in line with other jurisdictions, such as California, that use a certificate trading system to 'move' RNG between jurisdictions by separating and selling the environmental benefits of these gases. Buyers can then claim these benefits for their own gas use whereas, at the injection point, the RNG is treated as if it was generic natural gas. The green benefits therefore accrue where the buyer uses natural gas, not where the producer injects it, geographically decoupling RNG production and use.

While avoiding trade barriers, this system may leave most of the socio-economic benefits from renewable and low-carbon gas production outside of B.C. However, it can be harnessed to obtain low-cost RNG (e.g., from landfill gas sites) or hydrogen to protect B.C. ratepayers from exposure to high renewable and low-carbon gas pricing. It may also enable sourcing RNG with very low, or even negative, carbon intensities. This would be an advantage for reaching provincial and corporate GHG targets more quickly. Yet, sourcing all, or a large portion of, gases from outside B.C. will economically benefit producers in other jurisdictions, rather than keeping ratepayers' money inside the province. Some balance between imports and local production is therefore desirable.

As outlined in Chapter 2.0, the potential for anaerobic RNG production in the rest of Canada and the U.S. is large enough to cover all of B.C.'s gas needs. Both qualify as vendors of renewable gas because they are connected to B.C. through the continental gas grid. The Canadian potential (including B.C.) is deemed to be about 70 petajoules by 2030 and 80 petajoules by 2050. U.S. potential is deemed to be close to 600 petajoules in 2030 and about 630 petajoules in 2050. This means the entire 2030 B.C. target could, in theory, be procured inside Canada and any 2050 target could be complied with using Canadian and U.S. sources.

B.C. utilities are unlikely to secure as much of this gas as they wish to due to competition. In the U.S., several jurisdictions have implemented renewable gas policies and have created lucrative markets for RNG certificates (see Section 5.5). In Canada, Quebec is currently seeing uptake of RNG from landfill gas.

Any first-mover advantage that B.C. gas utilities currently have may therefore disappear soon."

5.1 Please comment on the reviews that FEI has undertaken of any supply risks related to efforts to expand its portfolio of renewable and low-carbon gases.

Response:

Please refer to the response to BCUC IR1 52.4.

5.2 For each year of the planning horizon, please provide the volumes of renewable natural gas (RNG) that FEI anticipates:

- Being available within B.C;
- Acquiring from within BC; and
- Acquiring from producers across Canada (not including B.C.) and the United States.

Response:

Please refer to the response to BCUC IR1 52.8.

5.3 Of the volumes of renewable and low-carbon gas supply that FEI anticipates acquiring from sources located outside of B.C., please identify the volumes that are expected to be transported into B.C. and consumed within B.C. in each year of the planning horizon.

Response:

Please refer to the response to BCUC IR1 52.8.

5.4 Please explain whether sources of renewable and low-carbon gas supply outside of B.C. need to be connected to the North American gas transportation network for FEI to acquire renewable and low-carbon gas from these sources.

Response:

Under BC's existing regulatory framework, there is no requirement that sources of renewable and low-carbon gas supply outside BC must be connected to the North American gas transportation network for FEI to acquire renewable and low-carbon gas from these sources.

5.5 Please explain whether FEI anticipates that gas utilities in jurisdictions outside B.C. will seek to acquire renewable and low-carbon gas supply from sources within B.C.

Response:

FEI believes that gas utilities in jurisdictions outside BC are not likely to acquire physical renewable and low-carbon gas supply from sources within BC because BC's gas utilities are not open access transportation carriers. However, if a supplier were to inject renewable and low-carbon gas directly into an open access pipeline such as the Westcoast pipeline, then gas utilities in jurisdictions outside BC could potentially transport renewable and low-carbon gas supply from the point of origination within BC to a location outside the province. Also, depending on how Renewable Natural Gas certificate schemes evolve, it may be possible that utilities or other

market entities could seek to acquire the environmental attributes of renewable and low-carbon gas supply from sources within BC. For further discussion regarding risks from potential competition for renewable and low-carbon gas supply resources as well as the mitigation of those risks and important opportunities arising from such competition that also need to be considered, please refer to BCUC IR1 52.4.

5.6 Please discuss the competitive supply and demand landscape for renewable and low-carbon gas supplies in Canada and the U.S., with reference to the total volume that FEI anticipates is available in the region and the scale of demand driven by legislated or policy targets of various entities.

Response:

Please refer to the responses to BCUC IR1 52.4 through 52.6 and BCUC IR1 77.2, in which FEI discusses the competitive supply and demand landscape for renewable and low-carbon gas supplies in BC, Canada and the US, and total volume described in the BC Renewable and Low-Carbon Gas Supply Potential Study[2]. With regards to the scale of demand driven by legislated or policy targets of various entities, please refer to the response to BCUC IR1 5.2 discussing how policy actions taking place in Washington and Oregon may affect FEI's competitive landscape for procuring RNG by 2030 and 2050, and regional prices for conventional natural gas..

In addition to that discussion, the recently-announced investment tax credits in the American federal *Inflation Reduction Act* and the Canadian Clean Technologies Investment Tax Credit are expected to provide major stimulus for investment in developing renewable and low-carbon gas supply, especially hydrogen. At this point, it is not clear how these policies will impact regional availability, although they are expected to increase North American renewable and low-carbon gas supply in the coming years.

5.7 Please explain whether FEI agrees with the statement in Appendix D-2 that "B.C. utilities are unlikely to secure as much of this gas as they wish to due to competition".

Response:

Not confirmed. As demand increases for renewable and low-carbon gas, competition for those resources will naturally increase. However, FEI considers that the 630 PJ of RNG (biomethane) potential supply discussed in the preamble, for example, is large enough to ensure suitable access to RNG to meet the Province's 2030 targets. Over the longer-term, it is currently unclear how much RNG FEI will require to meet policy and market requirements, as well as the timelines

[2] Exhibit B1-1, 2022 LTGRP Application, Appendix D-2.

to develop supply. Therefore, FEI sees the need to develop other opportunities to diversify supply availability including in-BC production and import of renewable and low-carbon gas such as hydrogen and synthesis gas, and low-carbon fuels such as lignin, to address risks of competition for RNG supply.

5.8 Please explain whether FEI agrees with the statement in Appendix D-2 that "While avoiding trade barriers, this [certificate trading] system may leave most of the socio-economic benefits from renewable and low-carbon gas production outside of B.C.".

Response:

FEI does not agree with the statement. Rather FEI considers that some, but not most, of the socioeconomic benefits of renewable and low-carbon gas production will arise in the jurisdiction where it is being produced. Important benefits will also arise in the jurisdiction that receives the gas supply. The socioeconomic benefits flowing to British Columbians in this case are lower costs of clean energy and the associated environmental attributes, including an expanded supply market for renewable natural gas (RNG). FEI's ability to acquire RNG supply from outside of BC can lower the overall cost of its supply portfolio, which is an important benefit that FEI realizes on behalf of its customers.

FEI notes that it is also receiving RNG from an equivalent number of operational RNG projects in BC as it is from projects outside BC. The ability to acquire out-of-province RNG has not supplanted FEI's focus on BC-based projects.

6.0 Through this series of questions, BC Hydro seeks to better understand how the total social costs of the Diversified and Deep Electrification pathways were calculated.

Reference: Exhibit B-1, FortisBC Energy Inc. (FEI) Long-Term Gas Resource Plan, Appendix A-2

Page 15 states:

> "The total societal cost for each pathway was assessed by considering the consumer commodity costs, utility system costs, incremental infrastructure costs, consumer equipment costs, retrofit costs, and government subsidies."

Table 2 states:

Cost of New Electricity Generation

> "$126/MWh was assumed in both pathways. This value represents an estimate of the expected cost of Site C and is considered a conservative estimate of new renewable power costs. It is conservative because solar, wind, and energy storage costs are significantly higher and do not provide the same level of inter-seasonal storage. These higher priced renewable assets may need to be deployed due to the difficulty of developing large hydro in Canada. It is assumed that hydro resources will be available at the levels modelled in the pathways, which further assumes the deployment of multiple large hydro facilities (similar in size to Site C) in both pathways."

Renewable Gas Costs

> "The weighted average cost across all renewable gases for each pathway in 2050 are:
>
> Electrification Pathway: $19/GJ ($0.068/kWh equivalent) Diversified Pathway: $23/GJ ($0.083/kWh equivalent)
>
> The Diversified Pathway renewable gas cost is higher because it requires more RNG at higher prices and includes a small amount of synthetic methane, which is the most expensive renewable gas."

Table 3 states:

Hydrogen

> "Hydrogen was modelled to make up a maximum of 15% (by volume) of BC's natural gas mix to represent the estimated operational limitations of the gas system to incorporate higher volumes."

Synthetic Methane

"Synthetic methane is hydrogen that has been upgraded with CO2 to create methane (CH4) and that can be safely injected into the natural gas mix at any level. Synthetic methane is modelled as the most expensive renewable gas because its price includes the cost of hydrogen plus an incremental cost related to carbon capture and storage to provide the required CO2. Guidehouse only modelled the production of synthetic methane when the requirement for renewable gas exceeded both the technical potential of RNG and the physical limit of hydrogen (i.e., 5% of the fuel mix)."

Reference: Resource Supply Potential for Renewable Natural Gas in B.C., Hallbar Consulting[3]

Figure 5 on Page 23:

This figure shows the "Achievable long-term no tech advance" volume of RNG is approximately 12 PJ/yr and the "Achievable long-term tech advancements (NRCan estimate)" is approximately 94 PJ/yr.

The "Achievable long-term no tech advance" volume of RNG is approximately 13% of the "Achievable long-term tech advancements (NRCan estimate)" volume of RNG.

6.1 Please provide the calculations, including specific volumes and prices, for the various sources of renewable gas comprising the $23/GJ cost estimate provided in Table 2 of Appendix A-2.

Response:

FEI cannot provide specific volumes and prices for the $23/GJ cost estimate because it was developed by a third party using a propriety model and best available information at the time, including Hallbar Consulting's *Resource Supply Potential for Renewable Natural Gas in B.C.* report.[4] This estimate assumes that progress will be made in wood-to-RNG technology to achieve the levels of RNG modeled in Appendix A-2.

6.2 Please re-calculate the $23/GJ cost estimate, scaling down the amount of RNG by a factor of 0.13 and replacing the missing RNG volume with Synthetic Methane.

[3] Available at: https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/electricityalternative-energy/transportation/renewable-low-carbonfuels/resource_supply_potential_for_renewable_natural_gas_in_bc_public_version.pdf.

[4] https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/electricity-alternative-energy/transportation/renewable-low-carbon-fuels/resource_supply_potential_for_renewable_natural_gas_in_bc_public_version.pdf .

Response:

Please refer to the response to BC Hydro IR1 6.1 regarding the $23/GJ cost estimate and why FEI cannot re-calculate it.

New analysis conducted in the BC Renewable and Low-Carbon Gas Supply Potential Study[5] supplements the approach taken in the NRCan study mentioned in the Application and uses considerably more research and analysis to develop a detailed RNG potential estimate for BC. For this study, FEI partnered with the BC Bioenergy Network and the provincial government to obtain a detailed understanding of future supply volumes of renewable and low-carbon gases, which forms the basis of all renewable gas supply estimates in the Application. The supply potential for renewable gas based on the maximum scenario shows an availability of 50 PJ by 2030 and 444 PJ by 2050. The Canadian potential (including BC) is deemed to be about 70 PJ by 2030 and 80 PJ by 2050. The US potential is deemed to be close to 600 PJ in 2030 and about 630 PJ in 2050. This study develops renewable and low-carbon gas supply potential estimates for 2030 and 2050 under both optimistic and conservative assumptions and finds that by 2030, between 25 and 50 PJ of supply will be available within BC. This does not include volumes available for import.

Please see below Figures 1 and 2 from the study, which provide more detail on the range of supply volume and cost by 2030 for RNG and synthetic methane.

[5] Exhibit B-1, 2022 LTGRP Application, Appendix D-2.

Figure 1: Estimated Renewable and Low-Carbon Gas Supply Volume in BC in 2030 in the Maximum Scenario

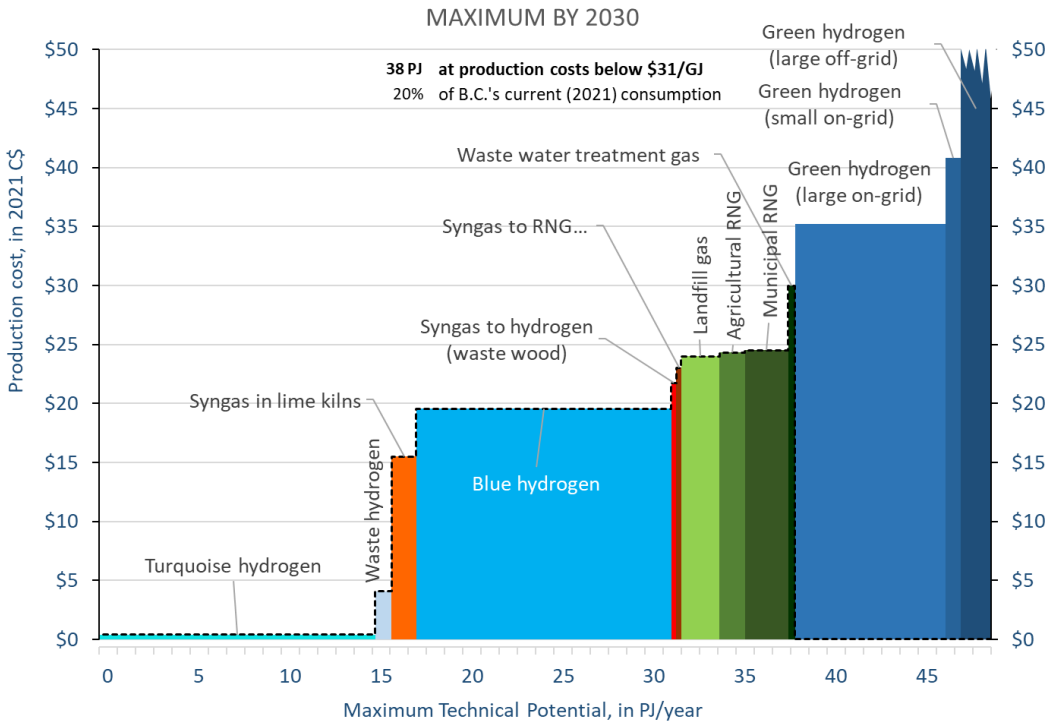
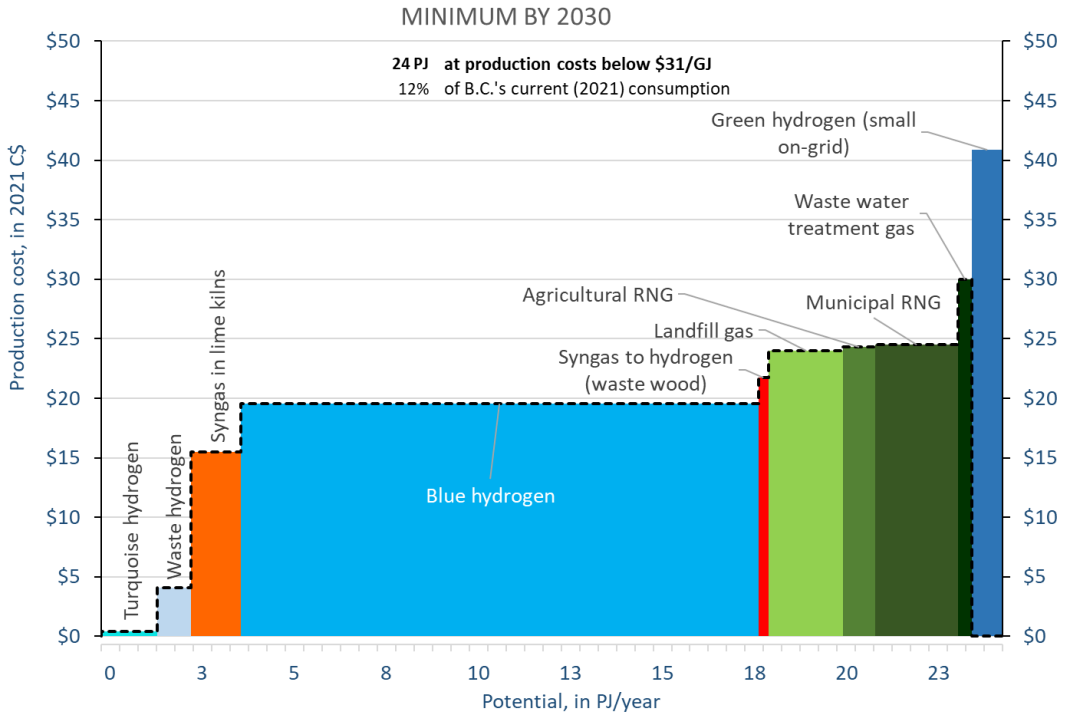


Figure 2: Estimated Renewable and Low-Carbon Gas Supply Volume in BC in 2030 in the Minimum Scenario



6.3 Is there a price or availability threshold at which FEI would instead source conventional natural gas to serve its customers?

Response:

Provincial and federal government policies guide FEI's acquisition of conventional, renewable and low-carbon gases, including the price threshold for acquiring renewable and low-carbon gas as set out by the GGRR. FEI will abide by all provincial and federal policy mandates to meet GHG emissions reduction goals and ensure that its approach to acquiring gas supply is aligned with policy obligations.

6.4 Please provide evidence to support the statement that the $126/MWh cost assumed for new electricity generation is "conservative because solar, wind, and energy storage costs are significantly higher".

Response:

The following response has been provided by FEI in consultation with Guidehouse.

The $126/MWh cost for new electricity generation calculation was included in the Guidehouse Pathways Report[6] which was conducted in 2018-2019. Guidehouse relied on proprietary technology cost curves and third-party (International Energy Agency and Lazard) cost curves to develop a forecast energy price for renewable electricity generation. However, FEI is able to provide the following response.

For the modelling, Site C was used as a proxy for the cost of future development of large-scale hydro projects as Site C costs were the most current cost estimates at the time to develop large-scale hydro in BC; therefore, Guidehouse used publicly available 2019 estimated Site C costs. A key part of the Pathways report assumption was that BC Hydro would maintain its current hydroelectric generation assets and add additional assets to comprise approximately 65 percent of the future mix with the remaining 35 percent as a blend of fossil fuel generation, which would eventually be phased out to include utility-scale solar and wind generation, as well as battery energy storage.

Lazard analysis on energy plus storage costs indicates that at the scale required at the time of the analysis in 2019, $126 per MWh was low-cost. Lazard estimates that the levelized cost of storage for large-scale capacity of 100 MW and energy of 400 MWh to be between $131 and $232 per MWh. However, this type of storage still only provides four hours of storage to the grid and likely is unsuitable for the type of seasonal storage needed to displace the service provided by the gas system. Lazard estimates costs for long-duration storage that could provide 10 hours of storage to the grid to be between $136 and $286.[7] Even at 10 hours of storage, other storage technologies may still be required.

Future electricity commodity costs used in the Application's modelling consider the following:

- BC Hydro current generation mix;
- Technology costs of utility-scale solar, wind, and battery energy storage;
- Phasing out of fossil fuel generation for renewable generation; and,
- Incremental hydroelectric generation based on Site C size, scale and cost.

FEI notes that wind and solar must be complemented by energy storage to be compared on a cost basis.

[6] Exhibit B-1, Application, Appendix A-2.
[7] https://www.lazard.com/media/451882/lazards-levelized-cost-of-storage-version-70-vf.pdf.

6.5 Please provide the total social costs of the Diversified and Deep Electrification pathways if the following estimates are used for the assumed Cost of New Electricity Generation:

- Wind, solar and energy storage cost assumptions developed from the National Renewable Energy Laboratories Annual Technology Baseline report for 2018 as provided in Appendix C of Appendix A-9.1;
- Reference: 2030 Li-Ion battery cost and BC Hydro Wind/Solar cost as set out in Table 2 of Appendix A-9.5; and
- Low Cost: 2050 Battery ≈ pumped storage cost and NREL 2050 Wind/Solar cost as set out in Table 2 of Appendix A-9.5.

Response:

The following response has been provided by FEI in consultation with Guidehouse.

The Clean Growth Pathway report was completed in 2019 and took many months to prepare. Revising the report to reflect the total social costs of the Diversified and Deep Electrification pathways based on the new assumptions provided in the information request would require significant further analysis, which cannot be accommodated within the schedule of the current regulatory proceeding. Any updates to the Clean Growth Pathway report in the future will include updated cost assumptions and FEI expects that the cost benefits of greater diversification to meet climate goals will persist even with new cost assumptions. FEI remains open to further collaboration with BC Hydro on a more detailed and thorough examination of costs, including those suggested above, between the Diversified and Deep Electrification pathways.

7.0 Through this series of questions, BC Hydro seeks to better understand the cost curves provided in Appendix D-2.

Reference: Exhibit B-1, FortisBC Energy Inc. (FEI) Long-Term Gas Resource Plan, Appendix D-2

Section 5.3 states:

> "The potentials shown above result in the cost curves displayed in Figure 32 and Figure 33. The (horizontal) x-axis indicates the potential in petajoules per year and the (vertical) y-axis shows the production cost for each pathway. The lowest-cost pathway is shown on the left. The potential increases as higher-cost options are considered, resulting in a stepped curve. Eventually, the costs per gigajoule surpass the $31 threshold that the GGRR requires. The viable potential under the current regulatory framework is limited to the area in the graph that is outlined by a dashed line. Note that, to keep the graphs legible, the size of the x-axis is not the same."

7.1 Please confirm, or explain otherwise, that the cost curves in Figure 32 and Figure 33 are FEI's reviews of the information presented. If not, please provide identically laid out versions of the graphs in Figure 32 and Figure 33 that represent FEI's own, most current assessment of the cost curves for these fuels.

Response:

FEI confirms that the BC Renewable and Low-Carbon Gas Supply Potential Study[8] is the more up-to-date and comprehensive evaluation of gas supply and costs and that the high-level findings of the report broadly represent FEI's view on the supply potential and costs in BC. Due to the emerging nature of this market and the significant pace of innovation and technology development for renewable and low-carbon gases, this view will continue to be updated as new perspectives, experiences and other developments are brought to light as FEI continues to expand the supply of renewable and low-carbon gas volumes in BC.

[8] Exhibit B-1, 2022 LTGRP Application, Appendix D-2.