Diane Roy
Vice President, Regulatory Affairs

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

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

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

December 22, 2022

BC Climate Alliance

Attention: Ms. Judy O'Leary

First Things First Okanagan

Attention: Ms. Margaret Holm

Dear Ms. O'Leary and Ms. Holm:

Re: FortisBC Energy Inc. (FEI)

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

Response to BC Climate Alliance and First Things First Okanagan (BCCA-FTFO) 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 BCCA-FTFO 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, if FEI has provided an internet address for referenced reports instead of attaching the 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. Topic Estimates of future residential and commercial consumer energy demands References: Sections 2.2.1.4, 2.2.3, 4.2.1, 4.4.1.3, 9.2.1.1

Section 2.2.1.4, New Federal Climate Plan: Healthy Environment and a Healthy Economy

In discussing "Healthy Environment and a Healthy Economy," (HEHE) FEI states:

The HEHE does not outline a specific role for the gas system to achieve the net-zero by 2050 target except for expanded program spending for clean fuels, which includes renewable natural gas.

Further in this section, FEI outlines that although the government is committing $2.6 billion over 7 years for energy grants to homeowners and $1.5 billion over three years for green and inclusive community buildings, the Federal Canada Greener Homes Grant does not fund high- efficiency gas appliance upgrades.

1.1 How has FEI factored in lower customer demand for natural gas appliances due to lack of rebate support from federal retrofit programs? What assumptions were made?

Response:

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

Each LTGRP scenario includes explicit assumptions regarding customer forecasts and levels of end use fuel switching. Both of these critical uncertainties affect overall customer demand for natural gas appliances, which varies by scenario. Government support or lack of support for energy rebate programs is not a direct input into the demand forecast but is one mechanism through which the critical uncertainties that have been modelled could be influenced. As discussed in the Application, Table 4-1 provides a summary of the input settings and Appendix B-3 provides greater detail about the settings for all scenarios.

The following response has been provided by FEI.

Federal support or lack of support for energy efficiency rebate programs could impact FEI's DSM programs but are not considered by FEI to be either an enabling or a limiting factor in FEI being able to deliver its own DSM activities as included in the Application. FEI's estimated DSM program participation rates are driven by a number of factors including market potential as outlined in the Conservation Potential Review (CPR), stakeholder consultation, and historical program performance.

1.2 How has FEI factored in lower energy demand due to improved building standards and energy efficient appliances to the deep electricity and diversified pathways? What assumptions were made?

Response:

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

Changes to energy demand due to improved building standards and energy-efficient appliances are factored into the scenario analysis by adjusting input assumptions for three critical uncertainties: Appliance Standards, New Construction Code, and Retrofit Code.

As discussed in the Application, Table 4-1 provides a summary of the input settings and Appendix B-3 provides greater detail about the settings for all scenarios.

The following table summarizes the relevant critical uncertainty settings for the Deep Electrification and DEP Scenarios, with a brief explanation of each setting below.

	Deep Electrification	DEP
Appliance Standards	Accelerated	Reference
New Construction Code	Accelerated	Reference
Retrofit Code	Accelerated	Reference

Appliance Standards

- The Reference Setting assumes that the 2019 in-market mandatory or legally enshrined appliance standards continue across the planning horizon.
- The Accelerated Setting assumes the introduction of additional performance requirements for commercial and residential equipment, which are applied at the rate of replacement of the underlying equipment.

New Construction Code

- The Reference Setting contemplates adoption of the BC Energy Step Code based on what was known and enforceable in the BC market as of 2019.
- The Accelerated Setting contemplates earlier adoption of and compliance with more efficient steps.
- For both settings, there is differentiation between the City of Vancouver and all other regions, as the City of Vancouver has adopted by-laws that are more stringent than those in other municipalities.

The following excerpt from Appendix B-3 shows the detailed assumptions for the New Construction Code settings.

Table B3-2: New Construction Code Settings Assumptions

Setting	Years	Residential Assumptions	Commercial Assumptions
Reference	2020-2042	Step 4 (City of Vancouver)	Step 3 (City of Vancouver)
	2020-2042	Step 3 (all other regions)	Step 2 (all other regions)
Accelerated	2020-2027	Step 4 (City of Vancouver)	Step 3 (City of Vancouver)
	2028-2042	Step 5 (City of Vancouver)	Step 4 (City of Vancouver)
	2020-2027	Step 3 (all other regions)	Step 2 (all other regions)
	2028-2032	Step 4 (all other regions)	Step 3 (all other regions)
	2033-2042	Step 5 (all other regions)	Step 4 (all other regions)
Delayed	For all regions including the City of Vancouver: New buildings perform at discounted rates related to the code-mandated level. Based on industry research of how well BC buildings perform in relation to mandatory new construction performance requirements, the 2017 LTGRP assumed such buildings to perform at 63 and 70 percent of mandated performance, respectively, for residential and commercial buildings. We have applied these de-rated savings to the Reference Case to generate the savings in the delayed case for the 2022 LTGRP.		

Retrofit Code

- The Reference Setting does not incorporate a building energy Retrofit Code.
- The Accelerated Setting contemplates a retrofit code being introduced in 2030, with 1.5 percent of buildings being retrofitted annually so that space heating load is reduced 20 percent for residential customers and 15 percent for commercial customers.

Section 2.2.3, page 2-16 Municipal Actions Addressing Energy and Climate Policy

FEI states:

Many municipalities in FEI's service area are developing updated versions of their climate action plans, with a major focus on reducing GHG emissions while setting ambitious targets out to 2050. Most of the targets address emissions in the transportation and building sectors, with the use of alternative energy sources and energy efficiency helping to reduce the reliance on fossil fuels…Along with these commitments, a growing number of local governments are implementing changes to their building codes, planning guidelines, and zoning bylaws in order to reduce GHG emissions in new building construction projects and in some cases with existing building retrofits and improvements.

Section 4.2.1, page 4-3 Residential, Commercial, and Industrial, and LCT and Global LNG Customers

In figure 4-1, FEI 2019 Customer Base and Demand Overview, FEI shows 37% of annual demand from residential customers and 27.9% from commercial customers.

Section 4.4.1.3, pages 4-12 Developing a Reference Case for Annual Demand for Residential, Commercial and Industrial Demand

In Figure 4-5 "Reference Case Annual Demand Forecast for Residential, Commercial and Industrial," FEI states: Overall, the Reference Case annual demand forecast shows slight growth, driven by growth in the commercial and residential sectors.

Section 9.2.1.1, page 9-2 Demand Reduction (pre-DSM)

FEI states: The impact of natural efficiency and some electrification of end use demand in the Diversified Energy (Planning) Scenario results in slightly reduced overall demand in these customer groups over the planning horizon as shown in Figure 4-9. This demand reduction corresponds to GHG emission reductions of 0.3 Mt CO2e per year in 2030 and 0.4 Mt CO2e per year in 2040.

1.3 Please outline how the assumptions used to model annual demand up to 2043 consider the 40 % emission reduction by 2030 targets many B.C. municipalities are adopting, consistent with the CleanBC Roadmap to 2030's carbon reduction targets.

<u>Response:</u>

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

Emission reduction targets and activities being adopted by BC municipalities are primarily reflected in the settings for two critical uncertainties in the annual demand scenarios: Fuel Switching and New Construction Code. These are discussed in detail in Section 4.5 and Appendix B-3 of the Application.

Further discussion of how FEI's load forecast scenarios account for limitations on natural gas connections or consumption for new buildings resulting from regulations being implemented by local governments is provided in the response to BCUC IR1 4.3.

A detailed discussion of electrification assumptions for existing building space and water heating end uses in the residential and commercial sectors is provided in the response to BCUC IR1 25.2.

Section 9.2.1.5 of the Application explains how FEI's Clean Growth Pathway will achieve the carbon emissions cap announced in the CleanBC Roadmap to 2030. Please also refer to the response to BCUC IR1 4.1.

1.4 Show how FEI factored in lower energy demand due to improved building standards, energy retrofits and energy efficient appliances to the deep electricity and diversified pathways?

Response:

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

Please refer to the response to BCCA-FTFO IR1 1.2, which discusses how changes in energy demand due to improved new construction building standards, energy efficient appliances and retrofit codes are factored into the scenario analysis by adjusting input settings. The DEP Scenario uses the Reference Case settings while the Deep Electrification Scenario uses the Accelerated settings for all three of these critical uncertainties. Further details about the energy savings resulting from these settings is discussed below.

Residential Buildings

In the DEP Scenario, the application of new construction code assumptions in the model results in an average new dwelling using approximately 43 percent less gas for space heating than the average existing dwelling in the base year. If the efficiency of the heating appliances were held constant, the gas reduction due to code improvements to the building envelope would be approximately 37 percent. The modeled average space heating consumption in existing dwellings is also assumed to decrease over the course of the forecast period, by approximately 9 percent by 2042. In the case of existing dwellings, most of the reduction is from improved heating appliance standards. The improvement due to the application of retrofit codes to renovation projects is partly canceled out by increased energy use in dwellings where the renovation adds more livable space. The net reduction if the efficiency of the heating appliances were held constant, would be approximately 1 percent.

The model also assumes improvements in residential Domestic Hot Water (DHW) in the DEP Scenario. In existing homes, the natural replacement of dishwashers and clothes washers by new units that meet updated appliance standards is assumed to reduce the load on the DHW appliance by approximately 9 percent by 2042. The water heaters themselves are also assumed to be replaced naturally by new units meeting updated standards, so that the overall improvement by 2042 is approximately 12 percent. DHW in new dwellings is assumed to be nearly 40 percent lower than in the average existing home, because of the assumption that updated codes and standards would apply to all the appliances being installed.

In the Deep Electrification Scenario, the accelerated code settings in the model result in new homes using approximately 70 percent less gas for space heating than the average existing dwelling in the base year by 2042, as increasingly stringent step codes are applied to homes built in later years in the forecast period. The space heating consumption in existing dwellings is assumed to decrease by approximately 13 percent by 2042. In both new and existing dwellings, the difference in the level of improvements between the two scenarios is due primarily to differences in code requirements rather than appliance standards.

The model also assumes the code requirements result in considerably less DHW use in new homes, with a reduction of nearly 70 percent by 2042 relative to the average existing dwelling in the base year. The change in existing dwellings is similar to the assumptions in the DEP Scenario discussed above.

Commercial Buildings

In the DEP Scenario, the application of new construction code assumptions in the model results in an average commercial building using approximately 21 percent less gas per square metre of floorspace for space heating, compared to the average existing building in the base year. This effect is much more pronounced in the City of Vancouver, where the model assumptions reflect more stringent municipal requirements resulting in a reduction of approximately 35 percent compared to the base year existing building. These improvements are assumed to come mainly from code improvements to the building envelopes. Heating appliances are assumed to contribute less than 5 percent improvement over the forecast period. In existing commercial buildings, a combination of renovations and natural heating appliance replacement is assumed in the model to produce a reduction of 4-5 percent in space heating gas consumption per square metre over the forecast period. The reduction in existing buildings is primarily from natural appliance replacement with equipment that meets new standards.

The model also assumes improvements to gas consumption for Service Hot Water (SHW) over the forecast period. New buildings are assumed to use approximately 21 percent less gas per square metre of floorspace for SHW. The reduction is more pronounced for new buildings in the City of Vancouver – approximately 29 percent. The majority of the reduction in new buildings is from more efficient fixtures and water-using appliances. In existing buildings, gas consumption for SHW is assumed to drop by approximately 8 percent over the forecast period, with the gas reductions in new buildings primarily from natural replacement of water heating appliances.

In the Deep Electrification Scenario, the reduction in space heating consumption per unit of floorspace in new buildings is assumed to be greater, because of the accelerated step codes. New buildings are expected to use approximately 31 percent less gas for space heating by 2042, relative to the average existing building in the base year. In the City of Vancouver, this is more pronounced, with a reduction of approximately 43 percent. The reduction in new buildings is primarily from code improvements to the building envelopes. In existing buildings, the model assumes improvements of approximately 11 percent by 2042, with gas reductions primarily from natural replacement of heating appliances.

The model also assumes the code requirements result in considerably less SHW use in new commercial buildings, with a reduction of nearly 28 percent by 2042 relative to the average existing building in the base year. This is more pronounced in the City of Vancouver, with a reduction of approximately 39 percent. The gas reduction is primarily from more efficient fixtures and water using appliances. In existing buildings, the reduction is assumed to be approximately 15 percent by 2042, primarily from natural replacement of water heating appliances.

1.5 How has Fortis accounted for the reduction in building emissions expected from conservation and switching to electricity that is expected to meet emissions reduction targets? What assumptions have been made regarding this in the demand forecast?

Response:

Please refer to the following IR responses for a discussion on the reduction in building emissions expected from conservation (DSM) and non-DSM reductions such as fuel switching to electricity that is incorporated into scenarios for FEI to meet the proposed emissions reduction targets for the GHGRS.

- BCUC IR1 69.1 and 69.2 describe the breakdown of the reductions in demand due to natural efficiency and electrification as well as methodologies and assumptions used in the modeling process across alternate scenarios.
- BCUC IR1 70.1 and 70.2 describe the breakdown of the reductions in demand due to conservation observed in the DSM analysis as well as methodologies and assumptions used in the modeling process across alternate scenarios.
- BCUC IR1 72.2 provides an overview of emission reductions across scenarios including non-DSM reductions (i.e., fuel switching and natural efficiency), DSM reductions, renewable and low-carbon gas reductions that are being undertaken to meet the proposed GHGRS emissions cap.

1.6 Provide examples where electrification is not feasible and LNG and RNG provide the best solutions to replace higher-emitted fuels such as diesel.

Response:

Examples of where electrification is not feasible, and where LNG and renewable and low-carbon gases provide the best solutions to replace higher-emitting fuels such as diesel, include high temperature industrial processes, transportation including medium/heavy duty fleet and marine applications, and remote power generation. Note that some of these applications may not count toward the GHGRS emissions cap which specifically applies to the buildings and industry sectors.

In Section 3.3.4 of the Application, FEI discusses the potential for hydrogen to decarbonize the industrial sector, which in 2019 represented 21 percent of BC emissions inventory. A large portion of these emissions are a result of industrial heat and unavoidable process emissions. Industrial heat requirements are difficult to decarbonize by electrification, due to the nature of the established processes and equipment involved such as kilns and furnaces. Industries such as pulp mills and cement manufacturing are among the largest industrial contributors to GHG emissions in BC and good candidates as hydrogen projects.

In Section 3.5 of the Application, FEI discusses its investment in LCT infrastructure to decarbonize the transportation sector, which in 2019 represented 39 percent of BC emissions inventory. Freight transportation is one of the most challenging sectors to decarbonize. FEI is working to convert medium-duty and heavy-duty fleet vehicles and marine vessels to lower carbon alternative fuels like CNG and LNG.

Supplying fuel for LCT, remote power generation for non-grid connected communities, and industrial sites currently using higher carbon fuels are key opportunities. In the LCT and remote power generation sectors, FEI is looking to displace petroleum fuels such as diesel with cleaner-burning natural gas and RNG. Where opportunities exist, substituting conventional natural gas with RNG can increase emission reductions further. RNG is a direct substitute for conventional natural gas in vehicles and requires no incremental capital investment to the vehicles or infrastructure that are already capable of operating on natural gas.

In Section 3.6 of the Application, FEI discusses FEI's investment in LNG to lower GHG emissions in marine fueling and global markets. BC's LNG can also power large ocean vessels, which would displace higher-emissions fuels like diesel and heavy oil. Adoption of liquified natural gas as a marine fuel for the global marine vessel market is growing as a result of the implementation of global environmental regulations that support a shift away from higher carbon fuels that have traditionally been consumed by the global marine market.

2. Topic: Federal and provincial Methane Emission targets Reference: Section 2.2.2.2.6

Section 2.2.2.2.6. OIL AND GAS SECTOR

FEI states: The Roadmap aims to reduce methane emissions from upstream oil and gas, reduce oil and gas emissions in line with sectoral targets, advance CCUS [carbon capture utilization and storage], and engage industrial customers in GHG reduction planning. While there are few details on the cap for oil and gas emissions, the benefits of reduced emissions reduction in upstream gas production will reduce the carbon intensity of natural gas that FEI distributes and provincial emissions.

2.1 Please provide estimates of the anticipated upstream methane emissions associated with adding new methane sources (RNG, hydrogen) to the FortisBC natural gas system.

Response:

The total life cycle emission factors adopted in the modeling for the Application are provided in Table 1-2 of the Application. These fuel-specific emission factors include methane emissions associated with all stages of the fuel life cycle from production to end use, including upstream emissions. Individual GHG emissions from each life cycle stage (i.e., upstream) are not available.

2.2 Please outline the modelling used to estimate the fugitive emissions and if this follows new Canadian and BC standards for calculating fugitive emissions.[1]

Response:

Fugitive emissions are considered as part of the life cycle emission factor of the fuel and presented in Table 1-2 of the Application. For RNG, the life cycle emission factors adopted is a function of the historical carbon intensity which was determined using the provincially-accepted life cycle model (i.e., GHGenius).

[1] Methane leaks are estimated to be equivalent to at least 7 per cent of Canada's total greenhouse gas emissions from energy supply and demand and possibly 13 per cent or higher according to recent research into Canada's fugitive emissions (Chan et al. 2020; Tyner and Johnson 2021; MacKay et al. 2021). The International Energy Agency (IEA) recently raised its estimates of Canada's methane fugitives by 43 per cent (IEA 2022) and has recommended that all producers aim to reduce their fugitives by at least 75 per cent (IEA 2021a).

3. Topic: Lifetime Emissions from RNG Sources Reference: Executive Summary, 1, page ES-2.

Table ES-2 Fuel Types and Decarbonization Technologies Used in the 2022 LTGRP

The figure given for the lifetime emissions factor for Renewable natural gas (RNG) is 0.0100 (tCO2e/GJ).

Future RNG sources listed by FEI vary widely in type (upgraded biogas produced from farm waste, municipal organic biomass, upgraded synthesis gas produced from wood biomass at pulp mills).

3.1 Please detail lifetime emissions associated with each type of source of RNG. For example, emissions from harvesting and transporting wood sources.

<u>Response:</u>

Please refer to Table 1-2 of the Application which provides an estimate of the life cycle and end use emission factors for different types of renewable gas, including RNG from wood biomass. For all projects, the life cycle emission factor is assessed on an individual supply basis using provincial or federally accepted models. This includes GHGenius and Clean Fuel Regulation - OpenLCA.

3.2 Please detail the expected percent of each type of RNG source for the LTGRP planning horizon.

<u>Response:</u>

Please refer to the response to BCUC IR1 52.6.

4. Topic: Pillar 4: Investing in liquefied natural gas to lower GHG emissions in marine fueling and global markets

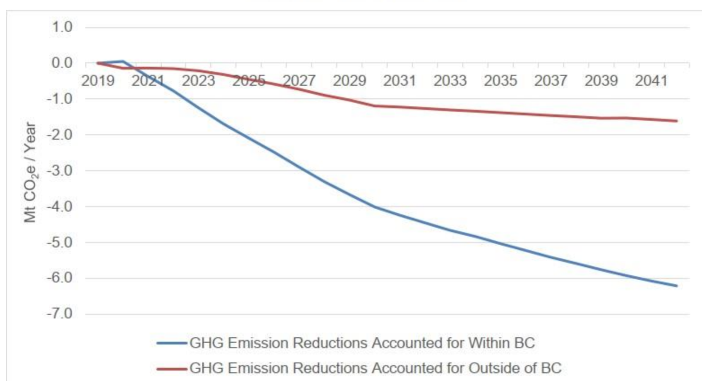
References: Introduction, page 1-1; Section 3-6

Introduction, page 1-2.

FEI's describes four pillars underpinning the Diversified Energy Scenario. Pillar 4 is defined as: Investing in liquefied natural gas (LNG) to lower GHG emissions in marine fueling and global markets.

In Figure ES-9: Total GHG Emission (Life Cycle) Reductions for the Diversified Energy (Planning) Scenario - BC and Outside of BC, FEI shows emission reductions accounted for outside of BC.

Figure ES-9: Total GHG Emission (Life Cycle) Reductions for the Diversified Energy (Planning) Scenario - BC and Outside of BC



In section 3.6, page 3-22, FEI states:

However, domestic use of conventional natural gas may possibly decrease over time to reach CleanBC's 2050 domestic target. In that scenario, BC's natural gas could then be exported as LNG to Asia to displace higher carbon and higher polluting fuels such as coal and oil, which could result in a net reduction of global GHG emissions.

4.1 Explain why future projected emission reductions outside of BC are relevant to the LTGRP.

<u>Response:</u>

Emission reductions outlined in the Application that are not accounted for within BC are relevant to the Application because they result from FEI's delivery of energy to its customers over the next 20 years. Objectives 1 and 2 of the Application are stated as follows:

1. Ensure cost-effective, secure and reliable energy for customers; and
2. Provide cost-effective DSM initiatives and lower-carbon solutions.

These objectives are further discussed in Sections 1.4.1 and 1.4.2 of the Application.

Further, because climate change is a global issue that will require coordinated action beyond national borders, FEI detailed areas of GHG abatement it is contributing to internationally that may impact its planning environment. In recognition of this principle, 192 countries, Canada included, have joined the Paris Agreement[2]—an international treaty that sets long-term climate action goals to guide all nations.

Article 6 of the Paris Agreement establishes a framework for voluntary international cooperation for countries to reduce emissions and meet their individual country-level pledges (often called nationally determined contributions or NDCs). While the details of Article 6 and international transferred mitigation outcomes are being developed through the UN Framework Convention for Climate Change, there are possible pathways for FEI, BC and Canada to advance GHG reductions beyond business-as-usual levels through the trade of low-carbon energy carriers and for this trade to advance progress toward our domestic GHG reduction goals. For this reason, emission reductions outside of BC are relevant in FEI's long-term resource planning scenarios.

In addition, according to the International Marine Organization's (IMO) initial strategy for GHG emissions reductions, there is significant interest in the use of gas as a fuel for international shipping, as its combustion results in less harmful pollutants being emitted as compared to the combustion of fuel oil. Depending on the gas used, emissions can be virtually sulphur-free and thereby can reduce the emission of NOx. Further, the IMO has supported the use of gas fuels under the International Convention for the Prevention of Pollution from Ships (MARPOL) Annex VI, to permit the testing of gas fueled engines.[3] When FEI's natural gas is used as fuel for international shipping, even though it is not being used on BC soil, it plays a role in reducing emissions abroad.

4.2 Explain why Pillar 4: Investing in LNG to lower GHG emissions in marine fueling and global markets, when FEI is a BC public utility.

Response:

FEI's investments in LNG benefit BC ratepayers and lower GHG and air contaminant emissions both in BC and globally. Investing in LNG delivery to customers diversifies the use of FEI's infrastructure and investments, supporting the use and usefulness of FEI's infrastructure over the

2 United Nations, Paris Agreement (2015) online at: https://unfccc.int/sites/default/files/english_paris_agreement.pdf.

3 Adoption of the Initial Strategy on Reduction of GHG Emissions from Ships and Existing IMO Activity Related to Reducing Emissions in the Shipping Sector: https://unfccc.int/sites/default/files/resource/250_IMO%20submission_Talanoa%20Dialogue_April%202018.pdf.

long term and helping address cost pressures over time for individual ratepayers using the system.

While serving global markets, FEI will be achieving GHG abatement both within and outside of BC as GHG emissions are released into the shared the global atmosphere. Internationally, shipping emissions represent approximately 2-3 percent of global GHG emissions.[4] Heavy fuel oil (HFO), often called "bunker fuel", has been the primary fuel for international marine shipping, with current market share at approximately 80 percent.[5] Bunker fuel is one of the more emissions-intensive fuels, releasing not only carbon dioxide, but also sulfur oxide, particulate matter and nitrogen oxides. Unlike some coastal areas which have "emissions control areas", historically, little-to-no emissions rules existed for international waters. As a result, these cheaper and higher-emitting marine fuels such as HFO continue to be used to power international shipping. In recent years, the IMO has implemented stricter policies surrounding sulfur pollution and approaches to energy efficiency, and has announced a strategy to reduce GHG emissions.[6] LNG and low-carbon and renewable fuels have the potential to meet the IMO's requirements and goals, reducing emissions from international marine vessels. In FEI's view, BC has a role to play in the reduction of marine transportation emissions, even if those emissions are effectively reduced beyond BC's borders. While the emissions reductions may be modest in the context of total global emissions, contributing to international efforts to reduce GHG emissions remains an important goal. Further, FEI as a local operator has a desire to reduce the emissions associated with BC's ports, which switching to LNG will achieve.

Please refer to the response to BCCA-FTFO IR1 4.1 for further discussion of why investing in LNG to lower GHG emissions in global markets is a priority for FEI.

4.3 Pleasatte discuss the assumptions used to estimate emission reduction that would result from global LNG sales; and whether recent lifecycle comparison analysis reports, which show current proposals for new LNG terminal capacity are roughly equivalent to current proposals for new coalfired power plants, were considered.[7]

Response:

The assumption in this information request that current proposals for new LNG terminal capacity are roughly equivalent to current proposals for new coalfired power plants is incorrect. There is

[4] International Shipping: https://www.iea.org/reports/international-shipping.

[5] Bunker Fuel 2020: Beginning of a New Era for Marine Fuels: https://www.fortunebusinessinsights.com/thoughtleadership/bunker-fuel-9375.

[6] Initial IMO GHG Strategy.

[7] The results of the lifecycle comparison, including fugitive methane emissions, show that current proposals for new LNG terminal capacity, if fully developed, would lock in global warming impacts that are roughly equivalent, when considered on a 100-year horizon, to those of current proposals for new coalfired power plants. See: APPENDIX C. Life Cycle Greenhouse Gas Comparison of Global Coal Plant Development and Global LNG terminal development. The New Gas Boom TRACKING GLOBAL LNG INFRASTRUCTURE, Global Energy Monitor. Ted Nace et al.

one "recent lifecycle comparison report" that shows this, which is the reference provided, not multiple reports, as the information request implies. The International Gas Union responded to this report as follows:

> Natural gas is a reliable tool, helping governments meet national and international climate targets, delivering energy system resiliency in severe weather when other technologies fail, enabling cleantech for all energy uses, all while ensuring energy remains affordable in the face of rising costs. It is also an indispensable power system flexibility provider, ensuring reliability that is so important nowadays to the proper functioning of our businesses and economies.
>
> The recent Global Energy Monitor study misses all that. Worse still, its CO2 emissions analysis, that serves as the base for the dismissal of gas, is incorrect. The analysis relies on a highly disputed methane emissions assessment study, which was based on data collected from a portion of the U.S. supply chain and relied on top-down methodology, that has been shown to overstate emissions, due to a temporal limitation in a recent comprehensive work published by the National Academies of Sciences (*https://www.pnas.org/content/115/46/11712*).
>
> According to the latest analysis by the International Energy Agency, natural gas emits between 45% and 55% lower greenhouse gas emissions than coal when used to generate electricity. Going forward, technologies like carbon capture utilization and storage (CCUS), renewable gases and hydrogen can help further minimize carbon content of natural gas, by as much as 90%.[8]

To estimate GHG emission reductions outside of BC as a result of global LNG sales, FEI assumes that LNG with a lifecycle emission factor of 0.06996 tCO_2e per GJ (see footnote 7 on the preceding page for the source) displaced coal with a life cycle emission factor of 0.1146 tCO_2e per GJ[9], resulting in a 39 percent lifecycle emission reduction. This results in emission reduction as a result of FEI global LNG sales of 1.2 Mt CO_2e per year in 2030 and 1.6 Mt CO_2e per year by 2042 for the DEP Scenario. FEI considers that this emission reduction estimate is a conservative estimate of GHG reductions from export of LNG to industry in China. In Confidential Attachment 4.3 to this response, FEI provides an article from the *Journal of Cleaner Production*, Volume 258, June 10, 2020, entitled, "Greenhouse-gas emissions of Canadian liquefied natural gas for use in China: Comparison and synthesis of three independent life cycle assessments". The authors of the article in Confidential Attachment 4.3 estimated that LNG from Tilbury going to Chinese industrial applications or to district heating would reduce lifecycle GHGs by between 55 and 68 percent. The paper used sensitivity analysis to evaluate how high GHG emissions associated with the extraction and liquefaction of natural gas would have to be to eliminate the emissions benefits. The paper estimates that these emissions could be 300 percent higher than estimated and still produce lifecycle GHG reductions if displacing coal consumption in textile mills, and 500 percent

---

[8] IGU Responds on Methane | IGU.

[9] Median value from FEI review of independently developed life cycle assessment values for LNG export to China.

higher if displacing coal for district heating. In other words, the analysis is clear that, unless there are very substantial unrecorded emissions, LNG will lead to lower global GHG emissions.

FEI is filing Attachment 4.3 on a confidential basis, pursuant to section 19 of the BCUC's Rules of Practice and Procedure regarding confidential documents as set out in Order G-178-22. As FEI only has access to the article through a paid subscription service and does not have a licence to provide it to third parties, FEI is filing the report confidentially under separate cover to the BCUC only for the purposes of this proceeding, and requests that it not be provided to other parties.

An abstract of the article is available for free and the article may be purchased online at: https://www.sciencedirect.com/science/article/abs/pii/S0959652620307484.

5.0 Topic: Deep Electrification Scenario

Reference: 4.6.1

Section 4.6.1.1, page 4-28 Lower Bound and Deep Electrification Scenarios for Residential, Commercial and Industrial Demand not Plausible

FEI cites several studies showing that an electrification pathway to decarbonization is more costly and riskier than a diversified pathway.

5.1 Discuss whether FEI included recent Canadian studies of deep electrification, showing how Canada can meet electrification targets through intensification of solar and wind infrastructure.[10]

Response:

FEI did utilize recent studies that discuss the electrification pathway, including those providing analysis on the cost and resiliency of a pure electrification pathway in BC,[11] and one study specifically focusing on the region of Metro Vancouver.[12] The David Suzuki Foundation Shifting Power Report was not included in the analysis of Deep Electrification Scenario, as it was released after the Application was already filed with the BCUC. Further, a Canada-wide focus of solar and wind infrastructure was out of scope of the Deep Electrification Scenario in the Application. Please refer to the response to BCUC IR1 30.3 for further discussion supporting the conclusion that the Lower Bound and Deep Electrification Scenarios are not plausible.

---

10 Shifting Power: Zero-Emissions Electricity Across Canada by 2035. 2022, David Suzuki Foundation. The Big Switch: Powering Canada's net zero future. Canadian Climate Institute. Jason Dion et al.

11 See, for example: Exhibit B-1, Appendix A-2, Pathways for British Columbia to Achieve its GHG Reduction Goals; Appendix A-9.6, Clean Energy Pathways to Meet British Columbia's Decarbonization Targets.

12 Kevin Palmer-Wilson et al, "Cost and capacity requirements of electrification or renewable gas transition options that decarbonize building heating in Metro Vancouver, British Columbia" (June 13, 2022) Energy Strategy Reviews: Vol. 42 No. 100882, online at: https://www.sciencedirect.com/science/article/pii/S2211467X22000803.

6.0 Topic: Human Health Impacts of a Diversified Pathway compared to a Deep Electrification pathway.

References: Appendix A-2, Appendix F-4.

Both the “Pan-Canadian Framework: Canada's Plan to Address Climate Change and Grow the Economy”, and “Pathways for British Columbia to Achieve its GHG Reduction Goals” refer to the human and environmental health benefits of reducing emissions.

Appendix F-4, Forward. “As Canada transitions to a low-carbon future, energy will play an integral role in meeting our collective commitment, given that energy production and use account for over 80 percent of Canada's GHG emissions. This means using clean energy to power our homes, workplaces, vehicles, and industries, and using energy more efficiently. It means convenient transportation systems that run on cleaner fuels, that move more people by public transit and zero-emission vehicles, and that have streamlined trade corridors. It means healthier and more comfortable homes that can generate as much power as they use.”

6.1 Please summarize human and environmental health risks associated with a diversified energy pathway that relies on continuing methane use for home heating and cooking, versus switching to electrical energy for residential and commercial buildings.

Response:

The diversified energy pathway represents an environmental benefit for British Columbians based on a rapid and expansive transition to renewable and low-carbon gases. As discussed throughout the Application, FEI believes a diversified approach to decarbonization is a more feasible and beneficial pathway.

FEI did not conduct an assessment of potential human health impacts of different pathways as a part of the Application. FEI notes that the regulatory oversight of the use and combustion of natural gas and indoors in residential space is provided by both provincial and federal agencies. FEI continues to monitor and follow guidance from federal sources such as Health Canada.

Attachment 4.3

FILED CONFIDENTIALLY