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April 16, 2020

Sent via efile on the BCUC Website

British Columbia Utilities Commission
Suite 410, 900 Howe Street
Vancouver, BC V6Z 2N3

ATTENTION: Mr. Patrick Wruck, Commission Secretary

Dear Sir:

Re: FortisBC Energy Inc. Revelstoke Propane Portfolio Cost Amalgamation

Application – BCUC Project No. 1599033

Canadian Biomass Energy Research Ltd. (CBER) Responses to Information Request No. 1 of the BCUC

In accordance with Order G-52-20, I respectfully submit the enclosed the responses of CBER to the information requests of the BCUC regarding the intervener evidence filed by Cornelius Suchy on behalf of CBER.

If further information is required, please contact the undersigned.

Yours truly,



Matthew J. Jackson
Barrister & Solicitor
Legal Counsel for CBER

enclosures

BCUC Application: FortisBC Energy Inc. Revelstoke Propane Portfolio Cost Amalgamation Application, Project No. 1599033

Hearing Document: Responses of CBER to the Information Requests No. 1 of the BCUC regarding the intervener evidence filed by Cornelius Suchy on behalf of CBER

Date Submitted: April 16, 2020

A. ECONOMIC ANALYSIS AND ALTERNATIVE FUELS

**1.0 Reference: ECONOMIC CONSIDERATIONS
Exhibit C1-4, Section A, pp. 3–4, footnotes 1, 2; Section B, p. 8 Economic Analysis and Alternative Fuels**

On page 3 of Exhibit C1-4, Canadian Biomass Energy Research Ltd.'s (CBER) submission states:

6. Revelstoke is located in climate zone 4 while the majority of Fortis BC's natural gas clients are located in the Lower Mainland which is climate zone 2. ¹

7. According to long-term weather normals there are 2,775 heating degree days in Vancouver and 4,611 heating degree-days in Revelstoke, i.e. 66% more than in Vancouver.²

Where footnotes 1 and 2 read:

¹ BC Building Code 2018, "Appendix C- Climatic and Seismic Information for Building Design in British Columbia", downloaded on Feb 2, 2020 at http://free.bcpublications.ca/civix/document/id/public/bcbc2018/bcbc_2018dbac.

² Heating Degree days for Vancouver and for Revelstoke, Canadian Climate Atlas, "1981-2010 Climate Normals & Averages"

- 1.1 Please provide specific locations in the 2 referenced sources which support CBER's information on climate zones and heating degree-days.

Response:

The Canadian Climate Atlas states "Vancouver" (2,775 heating degree-days) and "Revelstoke" (4,611 degree-days), see https://climateatlas.ca/map/canada/hdd_2060_85#city=455^

Table C-2 of Appendix C to the 2018 BC Building Code lists "Vancouver (City Hall)" (2,825 degree-days) and "Revelstoke" (4,000 degree-days)

Environment Canada's long term (1981 – 2010) climate normal states "Vancouver Int'l A*" (2,818 degree-days below 18°C)

On pages 3–4 of Exhibit C1-4, CBER's submission states:

A typical residential natural gas customer in the FEI Mainland and Vancouver Island service area uses on average 90 GJ and a typical residential propane customer in Revelstoke uses on average 50 GJ, i.e. 56% less. 3 Because the climate is harsher in Revelstoke than in FEI Mainland and Vancouver Island, and because the building stock in Revelstoke is older than in those areas, insulation standards and energy efficiency cannot explain this difference.

- 1.2 Please discuss whether there are differences in the ratio of full-time to part-time occupied homes or occupied to empty homes in Revelstoke and Vancouver.

Response:

The Census 2016 states 3,531 total private dwellings and 3,252 private dwellings occupied by usual residents, i.e. 7.9% unoccupied private dwellings in Revelstoke.¹ The same census yields a ratio of 6.5% unoccupied private dwellings in "Vancouver [Census metropolitan area]" and 8.8% for all of British Columbia. There is little to no difference in the share of unoccupied private dwellings in Revelstoke compared to other parts of the province. The small difference is not large enough to explain the large difference in gas use.

Secondly, even unoccupied buildings need heating to avoid damage to the building, e.g. from mold. Unoccupied or partially occupied house may be kept at a lower inside temperature though. A house kept at 15°C uses approximately 30% less energy than being kept at 20°C. A slightly larger share of unoccupied buildings combined with the limited amount of gas savings from unoccupied buildings can only be a small contributing factor to the large difference in gas consumption.

- 1.3 Please explain how unoccupied or part-time occupied homes were considered in CBER's analysis.

Response:

For reasons stated in 1.2 above unoccupied and part-time occupied homes have not been considered in the analysis.

¹ 'Private dwelling occupied by usual residents' refers to a private dwelling in which a person or a group of persons is permanently residing. Also included are private dwellings whose usual residents are temporarily absent on May 10, 2016.

- 1.4 Please explain how the percentage of residents without natural gas or propane heating varies between FEI's Revelstoke and Mainland/Vancouver Island service areas.

Response:

It is respectfully submitted that FEI would be in a much better position to answer this information request.

In a presentation to the BCSEA Joe English of Fortis BC stated 1,300 residential clients in Revelstoke.² The Community Energy and Emission Inventory 2017 states 1,488 residential clients. Using Census 2016 data this would be 40% and 46%, respectively, of the number of private occupied dwellings.

On its webpage FEI states 1.2 million natural gas AND electricity customers.³ Wikipedia states that "FortisBC (natural gas) serves approximately 1,030,000 customers in over 125 communities".⁴ This number likely includes non-residential accounts. Assuming 20% are non-residential accounts and using Census 2016 data for ALL British Columbia results in 44% of private occupied dwellings being served by natural gas sold by FEI.

The percentage of Revelstoke residents without access to piped gas is either slightly lower or slightly higher than in the rest of BC, depending on which source for the number of accounts is used. In both cases the difference would be small.

- 1.5 Please discuss the merits of using residential propane/natural gas usage per capita for comparison between the two service territories instead of the usage per FEI customer, and explain any expected differences between the two methods

Response:

A comparison by resident is likely less accurate than by household, partly because population numbers are fluctuating seasonally in Revelstoke. Secondly, in a northern climate much more heat is used for space heating than for domestic hot water. The former is mainly linked to the size and insulation standard and heating system of the buildings, the latter to numbers of users in the household.

I assume that FEI's supply area of "Mainland and Vancouver Island Service Area" consists of the following regional districts: Alberni-Clayoquot, Capital, Comox Valley, Cowichan Valley, Fraser Valley, Metro Vancouver, and Nanaimo. According to the 2016 Census these districts comprise a

² Joe English, Business Development, Fortis BC, "Revelstoke NG Conversion" – "Presentation to BCSEA", Mar 1, 2016

³ <https://www.fortisbc.com/about-us>

⁴ <https://en.wikipedia.org/wiki/FortisBC>

total of 3,497,670 or 75% of BC's population. The same Census states a population of 7,547 for Revelstoke in 2016.

In its application FEI forecast residential gas consumption of 82,158,200 GJ for the Mainland and Vancouver Island Service Area and 87,600 GJ for Revelstoke for 2020.⁵ The per capita consumption in FEI's Mainland and Vancouver Island Service Area would then be 23.5 GJ per person, twice as much as the per capita forecast of 11.6 GJ/person in Revelstoke.

The numbers of Revelstoke's permanent or semi-permanent inhabitants are likely significantly higher than the Census 2016 reports. Estimating residential population from mobile phone data suggest twice the population.⁶ Revelstoke residents would then use a quarter of the gas residents in the Mainland and Vancouver Island Service Area use.

- 1.6 Please discuss whether it is likely that the average customer in Revelstoke uses more than 900kWh/month for non-heating electricity, considering the average size and age of homes in Revelstoke and usage rates of electric appliances.

Response:

Because the CEEI only states total residential electricity consumption for Revelstoke, I subtracted the average non-heating electricity use from the total electricity use to determine the amount of electricity used exclusively for heating. According to BC Hydro "*Households in BC Hydro's service area average just over 900 kWh [of electricity use] per month*".⁷ This number INCLUDES electricity consumption for heating purposes and might overestimate the amount of non-heating electricity used in Revelstoke. Overestimating the amount of non-heating electricity leads to underestimating heating electricity use.

Because Revelstoke's building stock is older than that of the rest of BC appliances might also be older and less efficient. This might INCREASE the amount of non-heating electricity and reduce the amount of heating electricity.

Residential end use surveys undertaken by BC Hydro suggest that households that do not use electricity for heating consume 9,000 kWh per year (715 kWh/month) whereas those using electricity for heating use 11,000 kWh per year (917 kWh/month).⁸ The study states that usage is highly variable between households surveyed. For the purpose of determining the use of

⁵ FEI rate application, Appendix A, Line 1 MCRA Demand

⁶ Revelstoke Mountaineer, "How many people really live in Revelstoke?", Apr 12, 2019, accessed on Apr 12, 2020 at <https://revelstokemountaineer.com/how-many-people-really-live-in-revelstoke/>

⁷ BC Hydro, "What is the average power usage for a residential customer?", accessed on Apr 12, 2020 at https://www.bchydro.com/search.html?site=bchydro-com&client=bchydro-com&proxystylesheet=bchydro-com&output=xml_no_dtd&q=average+apartment+bill

⁸ BC Hydro, "Review of Methodology and Application of the Residential End-Use Survey (REUS) in Rate Design", Nov 25 2014, downloaded on Apr 13, 2020 at <https://www.bchydro.com/content/dam/BCHydro/customer-portal/documents/corporate/regulatory-planning-documents/regulatory-matters/2014-11-25-presentation.pdf>.

electricity for heating purposes 900 kWh per month have been replaced with 715 kWh per month.

On page 8 of Exhibit C1-4, CBER provides Table 4 as shown below:

Table 4: Residential energy use for heating in Revelstoke

Average 2012 to 2017	Secondary energy use	
	GJ per year	
Electricity	170,153	
Electricity for heating	28,215	8% ¹
Piped propane	70,179	21%
Estimated oil	63,819	19%
Estimate bottled propane	47,113	14%
Estimate wood	124,712	37%
Estimate district heat	600	0.2% ²
TOTAL	334,638	100%
Total per dwelling	103	³

¹ Assumption that every household uses 900 kWh/month for non-heating electricity, see https://www.bchydro.com/search.html?site=bchydro-com&client=bchydro-com&proxystylesheet=bchydro-com&output=xml_no_dtd&q=average+apartment+bill

² One bed and breakfast at 200 GJ/year and one apartment building with 8 units each 50 GJ/year

³ 3,250 occupied dwellings according to Census 2016 data

1.6 Please discuss whether it is likely that the average customer in Revelstoke uses more than 900kWh/month for non-heating electricity, considering the average size and age of homes in Revelstoke and usage rates of electric appliances.

1.6.1 Please explain what impacts the accuracy of this estimate has on CBER's calculations for electricity used for heating and resultant GHG emission increases.

Response:

In response to FEI Request 4.1, CBER corrected and updated the data for residential heat energy use in Revelstoke. With the new data the following emissions are calculated:

Energy source / appliance type	Emission factor kg/GJ F_{GHG}	Usage GJ/year U	Total GHG emissions t of CO ₂ -eq /yr. $GHG = F_{GHG} \times U$	GHG-emissions if all convert to propane		
				Total t of CO ₂ -eq /yr.	Change t of CO ₂ -eq /yr.	
Electric heat pump	3.0	2,056	6	126	+120	1938%
RCEC biomass district heat	2.2	1,700	4	104	+100	2630%
Electric resistance heat	3.0	53,523	161	3,273	+3,112	1938%
Wood pellets	19.1	41,750	796	2,553	+1,757	221%
Cordwood	19.1	41,750	796	2,553	+1,757	221%
Propane (Fortis BC)	61.2	87,600	5,357	5,357	+0	0%
Distributed propane	61.2	0	0	0	+0	0%
Heating oil	68.4	19,400	1,326	1,186	-140	-11%
TOTAL		247,779	8,446	15,152	+6,706	79%

According to this data converting all of Revelstoke to propane would increase GHG-emission by 79% of current emissions (up from 46% in the previous calculation). The reason is the greater share of renewable energy (electricity and wood) in the fuel portfolio.

A sensitivity analysis of the model yields higher GHG emission (**99%** of current emissions) when reducing the amount of non-heating electricity by 25% (536 kWh instead of 715 kWh per month per household) and correspondingly lower GHG emissions (**60%** of the current emissions) when increasing the amount of non-heating electricity by 25% (from 715 to 894 kWh/month). In either case, GHG emission would go UP if the average Revelstoke household converts to propane.

On page 8 of Exhibit C1-4, CBER's submission states:

Because 8% of Revelstoke's heat energy comes from low GHG-emitting hydropower and 37% comes from low GHG-emitting wood, GHG emissions will go up by 46% if all of Revelstoke heat energy were provided by propane, see Table 5 below. Likewise, if the current share of nonpropane heated buildings were to convert to propane, then GHG emissions will go up, on average by 46%.

- 1.7 Please discuss the impacts of particulate emissions from wood heating on residents of Revelstoke.

Response:

Revelstoke used to have air quality issues with PM 2.5 concentration levels exceeding the BC MoE threshold of 25 µg/Nm³ on several occasions during the year. These high air pollution levels were partly linked to two wood incinerators located at two sawmills. These so-called ‘Olivine’ or stack burners were decommissioned around 2005 and air quality has improved tremendously since then. Unfortunately, the monitoring station located at the local firehall and financed by MoE has been removed after 2008 since air quality has improved.⁹ The biggest source of exceeding prescribed levels of PM 2.5 concentrations are now forest fires in the summer. There is no up-to-date air quality monitoring data available and a request of City Council that a monitoring system be re-installed was denied.¹⁰

Wood-fired heating appliances generally have higher particulate matter emissions than oil fired or gas-fired appliances. This is especially true for old, non-CSA or non-EPA approved stoves. These may no longer be sold. As old stoves are replaced with new ones, particulate matter emissions are reduced. Houseowners replace old appliances because insurance companies either increase premiums or will not insure buildings with unapproved stoves.

The Solid Fuel Burning Domestic Appliance Regulation (SFB DAR), a regulation under BC’s *Environmental Management Act*, regulates the sale of new wood burning appliances in BC. Under the SFB DAR, appliances must meet emissions levels of either the EPA 2015 NSPS or of CSA B415.1 in order to be sold in BC.

CSA B-415 (2010, reaffirmed 2015) limits particulate matter (PM) emission of catalytic and non-catalytic wood burning devices and of outdoor wood boilers to 0.137 g per MJ of heat output. A household using 50 GJ of wood heat a year may then emit no more than 6.85 kg of PM per year. This is a threshold. Actual emissions should be lower.

The SFB DAR also has standards pertaining to the installation of appliances. A pellet-fueled outdoor boiler must be installed at least 10 metres setback from the property lines of the parcel of land it is installed on. Any other outdoor boiler must be set back 40 metres. Finally, any appliance falling under the SFB DAR may only burn solid fuel as defined in the regulation.

Fuel type, especially moisture content of the fuel, has an impact on the actual amount of PM emitted. Seasoned wood results in a far cleaner burn than green wood. Likewise, wood pellets burn far cleaner than seasoned cord wood. I estimate that roughly half of all wood burning appliances in Revelstoke are pellet stoves.

⁹ Ministry of Environment, Kootenay Region, “Ambient Air Quality Monitoring Report Revelstoke, British Columbia Particulate Matter - 1993 to 2008”, Sep 2009, downloaded on Apr 15, 2020 at www2.gov.bc.ca › environment › air-land-water › air › reports-pub

¹⁰ Revelstoke Times Review, “Ministry denies request for air quality monitoring in Revelstoke”, Aug 17, 2018, accessed on Apr 15, 2020 at <https://www.revelstokereview.com/news/ministry-denies-request-for-air-quality-monitoring-in-revelstoke/>

- 1.8 Please discuss how particulate matter or other non-accounted emissions from wood heating usage should be considered in addition to GHG emissions when evaluating which heating mixture is in the public interest.

Response:

GHG emissions from the combustion of wood fuel are included in the comparison made in Table 5: “GHG emissions from various heating sources in Revelstoke”.

Wood combustion emits small amounts of methane (CH₄) and of nitrogen oxides (NO_x), both greenhouse gases. The BC MoE’s manual for accounting GHG emissions takes these emissions into account, weighing them with an equivalency factor compared to CO₂.¹¹ These emissions are accounted for.

In summary, increased used of wood fuel will likely result in increased PM emissions during the heating season and reduced GHG emissions. In the past years particulate concentrations exceeding prescribed thresholds mostly happened due to forest fires during the summer (Aug 2017 and Aug 2018).

PM emissions are a local issue, GHG emissions a global problem. It is in the public’s interest to reduce both. Improved wood stoves, filters and clean burning wood fuel help achieving both objectives.

B. SOCIO-ECONOMIC IMPACTS AND CBER PROPOSED ALTERNATIVES
2.0 SOCIO-ECONOMIC IMPACTS

Exhibit C1-4, Section C, p. 12, footnote 18, p. 14 Socio-economic Impacts and CBER Proposed Alternatives

On page 12 of Exhibit C1-4, CBER’s submission states: “Few apartment buildings in Revelstoke are serviced by FEI propane.¹⁸”

Where footnote 18 on page 12 reads: “¹⁸ Visible by the absence of smoke stacks or gas meters at apartment buildings.”

- 2.1 Please discuss whether CBER obtained any quantitative data regarding prevalence of FEI propane services at apartment buildings in Revelstoke.

Response:

There are about 5 to 6 multi-story apartment buildings in Revelstoke. Mr. Suchy has driven by and looked at most of the apartment complexes and talked to tenants of some of these buildings.

¹¹ BC Ministry of the Environment and Climate Change Strategy, “2017 B.C. Best Practices Methodology for Quantifying Greenhouse Gas Emissions”, Feb 2018, downloaded on Feb 02, 2019 at <https://www2.gov.bc.ca/assets/gov/environment/climate-change/cng/methodology/2017-psomethodology.pdf>

- 2.2 Please explain any steps that were taken to verify the accuracy of CBER's observations on prevalence of FEI propane services at apartment buildings in Revelstoke.

Response:

Please see response to 2.1 above.

It is respectfully submitted that FEI is in a better position to provide information regarding the prevalence of FEI propane services at apartment buildings in Revelstoke, as FEI should have this information readily available.

It should be noted that while some of the apartment buildings have propane connections, the apartments are still heated electrically. This is mainly for billing and bill collection purposes, because each apartment has its own electric meter, but not its own gas meter. There might also be fire safety issues that favour the use of electricity over gas in apartment buildings. Gas might still be used to heat public spaces, such as hallways or garages.

FEI would have to provide evidence on how many gas meters there are per apartment complex. The amount of gas sold may be another indicator to gauge if gas is used for heating apartments.

On page 14 of Exhibit C1-4, CBER's submission states:

The FEI amalgamated propane rate proposes a cross-subsidy of approximately \$1.8 million per year, paid for by FEI natural gas rate payers in other parts of BC to FEI propane customers in Revelstoke. The primary recipients of the subsidy would be commercial customers, with small commercial customers at \$601,649 (33%), large commercial customers at \$494,927 (28%) and residential users at \$713,064 (39%)

...it is likely that only a small number of low income residents would benefit from the subsidized amalgamated rate; most of the approximately \$713,000 of the residential portion of the subsidy (see Figure 6 and Table 6 above) would likely be paid to middle and high income residential FEI propane customers. Revelstoke residents of all incomes who heat their homes with other sources of energy will receive no part of the subsidy.

- 2.3 Please discuss whether CBER expects that reducing costs to commercial customers in Revelstoke will result in benefits to low income Revelstoke customers through lower costs of goods and services, increased employment opportunities, or otherwise.

Response:

The three main sectors of employment in Revelstoke are (a) forestry and forest products (Downie Timber being the biggest employer), (b) freight transport (CP Rail), and (c) tourism. Lower prices of goods and services provided by (a) and (b) will unlikely benefit low income Revelstoke customers.

Since becoming a resort municipality, real estate prices in Revelstoke have soared to a point that housing has become unaffordable for low income families.¹² This in turn has an impact of businesses that have had more difficulties finding employees. The cost of housing is determined by the high demand for accommodation and real estate.

- 2.4 Please discuss whether any consultation was completed with low income residents to support CBER's assertion that only a small number of low-income residents would benefit from the subsidized amalgamated rate.

Response:

Cornelius Suchy discussed matters with one apartment owner, two owners of trailers in mobile home parks and one former resident of an apartment building. He also discussed matters with Jill Zacharias, the Social Development Coordinator of the City of Revelstoke, with Caitlin Hinton, the Climate Change Coordinator of Revelstoke and with Alex Cooper, a journalist for a local newspaper. These were not formal consultations.

The feedback Mr. Suchy obtained was that some trailers are connected to the propane distribution and therefore would indeed benefit from reduced rates. The State of Poverty report produced by the City of Revelstoke, however, states that most households that experience unaffordable housing (households that spent more than 30% of their income on housing - a threshold for affordability) are renters, not owners. Most renters live in apartment buildings.

The tenant of the apartment building interviewed agreed that he would not have benefitted because the apartment is heated electrically.

- 2.5 Please discuss whether providing a single customer class a greater portion of the proposed subsidy relative to their propane usage aligns with FEI's obligation to ensure that public utility rates are not unduly discriminatory or preferential under section 59(1) of the *Utilities Commission Act*.

Response:

Because the proposed rate reduction only applies to the variable share of the bill, customers with little propane use (and a higher share of fixed monthly or basic charge) will see proportionally less savings than those with a high propane use.

There are also differences between the three consumer groups in Revelstoke. According to Table 5-1 of FEI's rate application Residential customers would see a 45% average annual bill reduction as opposed to 49% for Small Commercial and 56% for Large Commercial customers.

¹² City of Revelstoke, Columbia Basin Rural Development Institute, "A Statistical Snapshot on the State of Poverty in Revelstoke, BC", Feb 2018, accessed on Apr 13, 2020 at <https://www.revelstokesocialdevelopment.org/wp-content/uploads/2018/03/Snapshot-on-State-of-Poverty-in-Revelstoke-FINAL.pdf>

On page 14 of Exhibit C1-4, CBER's submission states:

An alternative use of an annual \$1.8 million subsidy that would create positive economic impacts for Revelstoke would be to invest that money in a wood to renewable gas facility.

- 2.6 Please confirm, or explain otherwise, that CBER's submission is suggesting a subsidy to a renewable natural gas (RNG) production facility in Revelstoke to be recovered from FEI's natural gas customers outside of Revelstoke.

Response:

The subsidy could be recovered from (a) voluntary payments for renewable gas^{13,14}, (b) from a portion of B.C.'s carbon tax (e.g. the CleanBC Industry Fund) or (c) from FEI's gas customers (similar to the recovery of investments of the project for conversion from propane to LNG).

FEI will have to purchase more renewable gas to meet the CleanBC mandated 15% requirement by 2030. A renewable gas facility at Revelstoke would help FEI meet its mandatory targets. The question is thus less who will pay for renewable gas, but what projects meets the regulatory requirements set forth at the lowest cost.

- 2.7 Please confirm, or explain otherwise, that FEI customers outside of Revelstoke would not receive RNG from a facility in Revelstoke due to the lack of a natural gas pipeline connection to Revelstoke.

Response:

FEI customers can already purchase renewable gas from projects that are feeding renewable gas into the Province's natural gas transmission system. This does not guarantee that the actual 'green' molecule will be burned at the customer's premises.

The federal Clean Fuel Standard (CFS) requires fuel suppliers, including utilities like FEI, to lower the carbon intensity of the fuel they are selling. This can be achieved, for example, by investing into lower carbon technologies, purchasing renewable gas, or by buying credits on a CFS credit market. There are considerations to meet the Province's ambitious CleanBC targets of 15% renewable gas by 2030 by purchasing credits from projects not connected to the natural gas grid, from projects outside BC or even from outside Canada.

Revelstoke's isolated gas grid may then become an asset rather than a problem. A hydrogen demonstration was suggested for Revelstoke as part of the Hydrogen Report prepared by ZEN

¹³ Fortis BC, "Renewable Natural Gas", accessed on Apr 13, 2020 at <https://www.fortisbc.com/services/sustainable-energy-options/renewable-natural-gas>

¹⁴ Fortis BC is using "a financial model which considers the capital and operating costs associated with RNG upgrading and interconnection equipment", see <https://www.fortisbc.com/services/sustainable-energy-options/renewable-natural-gas/become-a-renewable-natural-gas-supplier>

Consultants for the BC Ministry of Energy. *"In that spirit, BC could adopt a "Big Bold Goal" to convert one of its communities to hydrogen. This could include local hydrogen production, distribution through a pipeline, zero carbon energy delivery to houses running fuel cell cogeneration systems, and a fully zero emission transportation system consisting of light duty FCEVs and transit buses. A smaller community such as Revelstoke, which has an isolated LPG grid, is one such option. A bolder option would be to convert Vancouver Island -- which is at the end of the BC's natural gas pipelines -- to 100% hydrogen by 2050."*¹⁵

On page 14 of Exhibit C1-4, CBER's submission states:

A wood to renewable gas plant consuming 1,000 to 2,000 bdt a year would cost around \$10 to \$20 million whereas a 40,000 bdt-plant would likely require around \$80 million in initial capital investment. ²² By comparison, FEI suggested a liquefied natural gas (LNG) plant in 2016 for Revelstoke at capital cost of \$25 million.²³

- 2.8 Please explain how many annual bone-dry-tonnes (bdt's) of biomass would be required to support FEI's current propane heating demand in Revelstoke.

Response:

Appendix A of FEI's rate application states the MCRA Demand for residential and commercial clients in Revelstoke (Line 1). The total propane demand stated adds up to 241,100 GJ/yr. The average calorific value (Lower Heating Value - LHV) of coniferous wood is 18.4 GJ per bdt. Assuming a conversion efficiency of 30% of the LHV results in a wood demand of 44,000 bdt a year.

Downie Timber exports around 70,000 to 100,000 tonnes of wood waste each year. A report written for the Revelstoke Community Forest Corporation in 2017 states that "Even at a conversion efficiency of less than 30%, the amount of pulpwood available would produce sufficient gas to replace Revelstoke's entire propane use."¹⁶

- 2.9 Please confirm, or explain otherwise, that FEI has proposed the Revelstoke propane portfolio cost amalgamation as a lower-cost alternative to a Revelstoke LNG plant.

Response:

It is respectfully submitted that this information request would be best answered by FEI.

¹⁵ Zen Consultants: "British Columbia Hydrogen Study", 2019, downloaded on Apr 13, 2020 at <https://www2.gov.bc.ca/assets/gov/government/ministries-organizations/zen-bcbn-hydrogen-study-final-v6.pdf>

Any comparison with alternatives will have to take the long-term cost of natural gas, propane, LNG or other alternative fuel into account. The LNG plant proposed in 2016 stopped making economic sense in 2017. The proposed rate amalgamation project is only viable if natural gas prices remain low due to a glut of fracked methane on the market. Regulatory changes, such as a ban or moratorium on fracking, as implemented by several states and provinces, will result in significantly higher natural gas prices. Likewise, financial difficulties of the generally debt-ridden fracking industry might result in reduced gas production and increased gas prices.

- 2.10 Please confirm, or explain otherwise, that a renewable gas plant is likely to be more costly to FEI customers than their current propane supply when considering the capital costs required to convert FEI's storage, distribution system and customer appliances to operate on natural gas.

Response:

Without subsidies the renewable gas plant will be more expensive than FEI's current propane supply cost.

- 2.11 Please discuss whether CBER is aware of any consultation with the public or municipality regarding a potential renewable gas plant in the Revelstoke area.

Response:

In 2016/17 the Revelstoke Community Forest Corporation commissioned a study on biofuel production in Revelstoke using unmerchantable timber.¹⁶ Mr. Suchy discussed the matter with Mike Copperthwaite, General Manager of the Revelstoke Community Forest Corporation at several occasions. Mr. Suchy also discussed the project with Penny Page-Britton, Environmental Sustainability Coordinator of the City of Revelstoke and with Nicole Fricot, Director of Economic Development of the City of Revelstoke. On Oct 10, 2017 I gave a presentation to City Council and afterwards discussed the concept with a councillor. The topic has also been published in a local newspaper.¹⁷

¹⁶ Revelstoke Community Forest Corporation, "Biofuel Study", downloaded on Apr 13, 2020 from http://rcfc.bc.ca/wordpress/wp-content/uploads/2020/03/RCFC_biofuelreport_final20170508.pdf

¹⁷ Revelstoke Times Review, "Inquiry into wood-to-fuel plant feasibility requested", Oct 20, 2017, accessed on Apr 13, 2020 at <https://www.revelstokereview.com/news/inquiry-into-wood-to-fuel-plant-feasibility-requested/>

- 2.12 Please discuss what environmental approvals would be required for a renewable gas plant and discuss whether CBER is aware of any progress to-date on environmental approvals.

Response:

This would need to be discussed with the BC Ministry of Environment. Renewable gas facilities have been commissioned in other parts of the province, including nearby Salmon Arm.

The established projects are producing gas from agricultural waste streams using anaerobic digestion rather than gasification of woody feedstock. Wood-to-gas technology is relatively new to BC other some installations in the wood processing sector. The main effluent will likely be wastewater from wet scrubbers cleaning wood gases from tars and particulates. Because of the high gas purity required particulate matter air emissions are unlikely to become an issue.

- 2.13 Please discuss whether CBER is aware of any proposed development or construction of biomass facilities in the Revelstoke area.

Response:

In 2014 the City of Revelstoke issue a Request for Expression of Interest for a biomass facility.¹⁸ In 2016/17 the Revelstoke Community Forest Corporation commissioned a study on biofuel production in Revelstoke using unmerchantable timber.¹⁶ Mr. Suchy has proposed wood chip heating projects to several entities, including the City of Revelstoke, the Revelstoke Mountain Resort (RMR), Downie Timber, the Revelstoke Community Energy Corporation, and the Revelstoke Visual Art Centre. None of these projects are in an advanced planning or at a construction stage, though.

The *possibility* of subsidized propane has stalled many initiatives and projects aimed at reducing cost and GHG emissions, including but not constrained to biomass energy.¹⁹

¹⁸ Canadian Biomass Magazine, "Revelstoke biomass gets huge response", Aug 20, 2014, accessed on Apr 13, 2020 at <https://www.canadianbiomassmagazine.ca/revelstoke-biomass-gets-huge-response-4672/>

¹⁹ Alex Cooper, Revelstoke Mountaineer, "Can Revelstoke afford lower propane rates?", Oct 4, 2019, accessed on Apr 13, 2020 at <https://revelstokemountaineer.com/can-revelstoke-afford-lower-propane-rates/>