Sarah Walsh
Director, 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: (778) 578-3861
Cell: (604) 230-7874
Fax: (604) 576-7074
www.fortisbc.com

April 18, 2023

British Columbia Utilities Commission
Suite 410, 900 Howe Street
Vancouver, B.C.
V6Z 2N3

Attention: Patrick Wruck, Commission Secretary

Dear Patrick Wruck:

Re: FortisBC Energy Inc. (FEI)

Revised Renewable Gas Program Application – Stage 2 (Application)

Response to the British Columbia Utilities Commission (BCUC) Information Request (IR) No. 1 on FEI's Rebuttal Evidence to the Brattle Group (Brattle)

On December 17, 2021, FEI filed the Application referenced above. In accordance with the amended regulatory timetable established in Exhibit A-47, FEI respectfully submits the attached response to BCUC IR1 on FEI's Rebuttal Evidence to Brattle.

If further information is required, please contact the undersigned.

Sincerely,

FORTISBC ENERGY INC.

Original signed:

Sarah Walsh

Attachments

cc (email only): Registered Parties

1.0 Reference: STUDIES ON RENEWABLE NATURAL GAS (RNG) SUPPLY IN BC

Exhibit B-11 (Application), Section 3.4.1.1, p. 29; Exhibit B-17, BCUC IR 7.2;

Exhibit A2-4, Section II. B., p. 11; Exhibit B-63, A7, pp. 4–5

Short-Term RNG Production Potential

On page 11 of Exhibit A2-4 Section II.B, Brattle references the 2017 Hallbar Consulting (Hallbar) study titled *Resource Supply Potential for Renewable Natural Gas in BC*, which states that, assuming a market price of $28/gigajoule (GJ) for the short-term (defined as the next few years), the theoretical RNG production potential in BC was estimated to be 7.6 petajoule (PJ)/year and the achievable RNG production potential was estimated to be 4.4 PJ/year. Of the 4.4 PJ of feasible RNG potential, urban organic feedstock and landfill account for 1.9 PJ and 1.4 PJ, respectively. The remaining 1.1 PJ comes from livestock manure and wastewater feedstocks.

On pages 4 to 5 of Exhibit B-63, FEI references the 2022 ENVINT, CBER & Associates (ENVINT & CBER) study titled *BC Renewable and Low-Carbon Gas Supply Potential Study*, which includes the following two figures and states that the minimum scenario for RNG production in BC by 2030 would be 5.7 PJ/year, assuming a production cost below $31/GJ and the maximum scenario for RNG production in BC by 2030 would be 6.6 PJ/year, assuming a production cost below $50/PJ:

Table 29 Assumptions for Gas Production in 2030 and 2050, in PJ/yr (Minimum Scenario)

Gas Type	2030	2050	Rationale
Green hydrogen (large on-grid)	0.0	8.3	Slower ramp-up than Maximum scenario
Green hydrogen (small on-grid)	0.8	1.9	Slower ramp-up than Maximum scenario
Green hydrogen (large off-grid)	0.0	2.4	A single 300 MW off-grid wind farm after 2030
Blue hydrogen	14.2	46.8	Limited by permitting and regulatory restraints
Turquoise hydrogen	1.5	15.4	Slower ramp-up than Maximum scenario
Waste hydrogen	0.9	0.9	Identical to Maximum scenario
Syngas in lime kilns	1.4	5.9	Identical to Maximum scenario
Lignin in lime kilns	0.0	0.0	Lignin a more expensive fuel than syngas
Syngas to hydrogen	0.3	13.4	No change to forestry practices. BC Hydro PPAs are extended. No use of wood pellet feedstock. Only low-cost residue used.
Syngas to RNG	0.0	0.0	Technology not advancing as expected
Agricultural RNG	0.9	1.2	Potential for production cost below $31/GJ; 70% of 2030 technical potential (90% of 2050 potential).
Municipal RNG	2.3	4.0	
Waste water treatment gas	0.4	0.6	
Landfill gas	2.1	2.7	
TOTAL	24.7	103.8	

Table 30 Assumptions for Gas Production in 2030 and 2050, in PJ/yr (Maximum Scenario)

Gas Type	2030	2050	Rationale
Green hydrogen (large on-grid)	8.4	21.0	Converted to petajoules from Table 18
Green hydrogen (small on-grid)	0.8	6.3	Converted to petajoules from Table 18
Green hydrogen (large off-grid)	1.7	12.6	Converted to petajoules from Table 18
Blue hydrogen	14.2	156	From ZEN (2019) report, Figure 28 (in 2050)
Turquoise hydrogen	15.4	92.2	From ZEN (2019) report, Figure 28 (in 2050)
Waste hydrogen	0.9	0.9	From ZEN (2019) report, Figure 28
Syngas in lime kilns	1.4	5.9	100% of lime kilns are converted to syngas by 2050. BC Hydro contracts are not extended.
Lignin in lime kilns	0.0	0.0	Lignin a more expensive fuel than syngas
Syngas to hydrogen	0.3	64.9	Increased forest residue recovery. BC Hydro contracts are not extended. Pellet feedstock transitions towards gas production. 36 plants (or less if larger plant size), also using standing trees
Syngas to RNG	0.3	74.2	One demo by 2030. 26 full-size plants by 2050. Use of some roundwood
Agricultural RNG	1.4	2.0	Potential for production cost below $50/GJ. 70% of 2030 technical potential (90% of 2050 potential).
Municipal RNG	2.4	4.2	
Waste water treatment gas	0.4	0.6	
Landfill gas	2.1	2.8	
TOTAL	49.7	444	

Below is a summary recreated from Table 29 and Table 30 above of BC's potential RNG supply based on select feedstocks as at 2030:

Feedstock-Specific	Minimum Scenario at Production Cost Below $31/GJ (PJ/Year)	Maximum Scenario at Production Cost Below $50/GJ (PJ/Year)
Municipal RNG	2.3	2.4
Landfill Gas	2.1	2.1
Agricultural RNG	0.9	1.4
Waste Water Treatment Gas	0.4	0.4
Syngas to RNG	0.0	0.3
Total	**5.7**	**6.6**

1.1 Please confirm that the summary table above is accurate. If not confirmed, please adjust accordingly.

Response:

While the table presented above is an accurate summary of the Minimum and Maximum scenarios to 2030 set out in the *BC Renewable and Low-Carbon Gas Supply Potential Study*, it only focuses on RNG and excludes additional pathways to produce renewable and low carbon gases. In particular, Table 27 in the *BC Renewable and Low-Carbon Gas Supply Potential Study* includes the broader potential of feedstock supply that could be used for the production of RNG, hydrogen and syngas. With the inclusion of these other gases, as is shown in Tables 29 and 30 above, the supply of renewable and low carbon gases ranges from between approximately 25 and 50 PJ by 2030.

1.2 Please clarify what FEI estimates BC's RNG production will be by 2030 with references to the ranges provided by the Hallbar study (4.4 PJ to 7.6 PJ per year) and the ENVINT & CBER study (5.7 PJ to 6.6 PJ per year).

Response:

The ENVINT and CBER studies, which project between 5.7 PJ and 6.6 PJ of RNG production per year in BC by 2030, are the most recent and relevant assessments of the RNG potential in the Province, updating the work conducted by Hallbar. This does not include additional potential renewable gas supplies such as wood waste from the forestry sector in the form of lignin, syngas and hydrogen.

While FEI is committed to growing BC's supply of RNG as quickly as possible, the amount of RNG produced in BC will ultimately depend on a range of factors, including the enabling policy frameworks, project economics and technological developments. As such, FEI is unable to provide an estimate of what BC's RNG production will be in 2030 beyond what has been provided in the above studies.

In Section 3.4.1.1 of the Application, FEI states:

> The 2018 CleanBC Plan enabled gas utilities to reduce emissions by increasing the renewable content of their gas stream to 15 percent renewable content by

2030. Displacing 15 percent of the gas supply with Renewable Gas would increase the annual supply of Renewable Gas in FEI's system to approximately 30 PJs.

1.3 Assuming FEI can obtain all the BC-sourced RNG as summarized in the recreated table above, please confirm whether FEI will need to acquire 22.4 PJ to 25.6 PJ (30 PJ less BC's minimum and maximum RNG potential) of renewable gas to meet the 2018 CleanBC Plan target of 15 percent renewable content by 2030.

1.3.1 If confirmed, please clarify how FEI plans to meet the remaining 22.4 PJ to 25.6 PJ (e.g. RNG sourced outside of BC, with a combination thereof hydrogen, lignin, and synthesis gas sourced within BC, or with a combination thereof hydrogen, lignin, and synthesis gas sourced outside BC).

Response:

Confirmed. Please refer to the response to BCUC IR1 3.1 (Exhibit B-17) for a breakdown of anticipated Renewable Gas supply mix until 2030. While FEI anticipates primarily acquiring out-of-province supply in order to reach the total anticipated volume of RNG, it also supports the long-term development of as much RNG from within BC as possible. Under the GGRR, FEI is allowed to supply RNG from both within and outside of the Province.

Please note that while the mix of Renewable Gas may vary depending on the actual timing of availability of each resource, FEI intends to use all available options under the GGRR to meet the CleanBC objectives.

In response to BCUC IR 7.2 in Exhibit B-17, FEI states:

> For RNG, FEI used a weighted average price based on the following inputs: existing supply contracts, ongoing commercial negotiations, and market intelligence and anticipated future supply contracts. As the table below shows, FEI projects that the average portfolio price of RNG will increase to approximately $28 per GJ by 2032.

Table 1: Forecast Average Acquisition Cost for RNG, Hydrogen, Syngas and Lignin ($/GJ)

		2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
RNG	$/GJ	22.13	22.60	23.07	23.55	24.05	24.55	25.07	25.60	26.13	26.68	27.24	27.82
Hydrogen	$/GJ	-	-	-	30.50	30.50	30.50	30.50	15.00	15.00	15.00	15.00	15.00
Syngas	$/GJ	-	-	-	-	22.00	22.25	22.50	22.75	23.00	23.25	23.50	23.75
Lignin	$/GJ	-	-	-	-	22.00	22.25	22.50	22.75	23.00	23.25	23.50	23.75

1.4 If available, please provide FEI's estimated acquisition cost per GJ for RNG over each of the next five years and/or through 2030, including the cumulative average for RNG sourced from:

a) Within BC

b) In Canada

c) Outside Canada

In your response, please include the total RNG sourced from each location for each year.

Response:

In Table 1 below, based on the most current information and using 2023 as a starting year, FEI provides an estimated comparison of aggregate RNG prices for projects within BC versus those outside of BC but within Canada, and those outside Canada.

FEI calculated the approximate estimated future costs by using the known starting prices of the agreements today (March 2023) and applying similar assumptions used in the creation of the original table referenced in the preamble. FEI used the aggregate weighted average starting prices and applied an inflation factor of 1 percent as a proxy. The starting prices were then inflated based on their respective starting prices and multiplied by the expected volume using the totals in the BCUC-accepted agreements. The total aggregate amount of each price is divided by the total volume to derive a weighted average price.

Table 1: Comparison of Aggregate RNG Prices

$/GJ	2023	2024	2025	2026	2027	2028	2029	2030
RNG In BC	24.34	24.58	24.83	25.08	25.33	25.58	25.84	26.10
RNG In Canada (Not BC)	21.76	21.98	22.20	22.42	22.64	22.87	23.10	23.33
RNG In USA	21.24	21.45	21.67	21.88	22.10	22.32	22.55	22.77
Weighted Average	**21.84**	**22.06**	**22.28**	**22.51**	**22.73**	**22.96**	**23.19**	**23.42**

In general, if using the starting prices of the existing agreements, the cost of out-of-province RNG is approximately $3 per GJ lower than in-province RNG. FEI has estimated that 15 percent of supply is from within BC and 85 percent is from outside of BC. The out-of-province RNG can be further broken down to approximately 50 percent from outside of Canada and 35 percent from within Canada.