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January 28, 2021

VIA ELECTRONIC MAIL

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Attention: Marija Tresoglavic, Acting Commission Secretary

Dear Sirs/Mesdames:

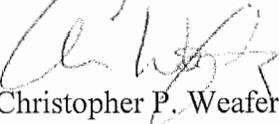
Re: FortisBC Energy Inc. (FEI) - Application for a Certificate of Public Convenience and Necessity (CPCN) for the Pattullo Gas Line Replacement Project dated August 31, 2020 ~ Project No. 1599129

We are counsel to the Commercial Energy Consumers Association of British Columbia (the "CEC"). Attached please find the CEC's second set of Information Requests with respect to the above-noted matter.

If you have any questions regarding the foregoing, please do not hesitate to contact the undersigned.

Yours truly,

OWEN BIRD LAW CORPORATION


Christopher P. Weafer

CPW/jj
cc: CEC
cc: FortisBC Energy Inc.
cc: Registered Interveners

**COMMERCIAL ENERGY CONSUMERS ASSOCIATION
OF BRITISH COLUMBIA (“CEC”)**

INTERVENER INFORMATION REQUEST NO. 2

**FortisBC Energy Inc. (“FEI”) - Application for a Certificate of Public Convenience
and Necessity (“CPCN”) for the Pattullo Gas Line Replacement Project dated
August 31, 2020**

Project No. 1599129

January 28, 2021

16. Reference: Exhibit B-6, BCUC 1.4.1.1 and 1.4.6

For context, FEI calculates UPC_{peak} values in sixty-six different local regions, each composed of one or more municipal districts. To smooth typical annual variances in the data, regional average UPC_{peak} values for each rate schedule are averaged with the results of the preceding two years’ annual load gather assessment values producing a three year “rolling average” UPC_{peak} for each rate class within the region. These three-year rolling average UPC_{peak} values are combined with current accounts and account addition forecasts to produce peak-hour load forecasts over a forecast period.

FEI prepares new forecasts annually, based on the newest consumption information, and does not modify the UPC_{peak} values over the forecast period to account for any changes in customer consumption patterns.

- 16.1 Please explain what FEI uses this UPC_{peak} for, with respect any longer-term planning decisions for the future, which may need to be made in the nearer term.
- 16.2 Does FEI’s peak demand forecasting consider the potential impact of climate change over the next 20 years?
- 16.2.1 If yes, please explain how.
- 16.2.2 If no, please explain why not.
- 16.3 Does FEI have evidence to suggest that its peak demand has or could change significantly with climate change? Please explain

17. Reference: Exhibit B-9, CEC 1.4.1 and B-6, BCUC 1.3.1 and 1.4.6

Please refer to the response to BCUC IR1 3.1 for a discussion of the capacity of the Pattullo Gas Line.

For illustrative purposes, the table provides a comparison to the estimated peak day flow in the Pattullo Gas Line expected in 2020.

Winter	Coldest Day	Mean daily Temperature (°C)	Peak hourly Pattullo Gas Line Demand (m ³ /hr.)	Estimated 2020 Peak Day Demand (m ³ /hr.)
2007-08	1-Dec-07	-1.2	54,050	86,060
2008-09	20-Dec-08	-10.3	63,340	
2009-10	19-Dec-09	-2.8	58,080	
2010-11	23-Nov-10	-6.4	42,190	
2011-12	18-Jan-12	-5.7	69,910	
2012-13	13-Jan-13	-2.8	52,830	
2013-14	7-Dec-13	-5.9	58,540	
2014-15	30-Nov-14	-4.5	56,190	
2015-16	2-Jan-16	-2	45,920	
2017-18	21-Feb-18	-3.4	53,800	
2018-19	10-Feb-19	-5.2	54,510	
2019-20	14-Jan-20	-7.1	60,900	

3.1 Please provide the system capacity of the Pattullo Gas Line.

Response:

As illustrated in Figure 3-1 of the Application, the Pattullo Gas Line is one of four feeds into the Metro Vancouver 700 kPa trunk distribution system. When considered in isolation, the Pattullo Gas Line cannot be measured in terms of “system capacity” as there are multiple simultaneous gas supplies to this trunk distribution system. This is because the capacity (or support capability) provided by each feed is dependent on how the load within the trunk distribution system is distributed and how the supplies interact together to support the system.

To illustrate the comparative capacities of the trunk distribution system with or without the Pattullo Gas Line, FEI completed an analysis which proportionally and incrementally increased the load on all the stations in this system until the pressure dropped below levels necessary for at least one of the stations to deliver sufficient gas to downstream customers. This system condition represents the threshold beyond which customer outages would start to occur.

The results of this analysis indicate that with the Pattullo Gas Line in place, the ultimate capacity of the trunk distribution system is approximately 250,800 m³/hr. This measure is the theoretical peak load that could be supplied to the stations distributed along its length. The current 2020/21 forecast peak demand of the trunk distribution system is approximately 168,800 m³/hr.

Year	Peak Demand (10 ³ m ³ /hr)	Capacity of the Trunk Distribution System with the Pattullo Gas Line (10 ³ m ³ /hr)	Capacity of the Trunk Distribution System without the Pattullo Gas Line (10 ³ m ³ /hr)	Customers at risk of outage
2023	174.0	250.8	160	Up to 10,700
2024	175.7	250.8	160	
2025	177.4	250.8	160	
2026	179.2	250.8	160	
2027	181.0	250.8	160	
2028	182.9	250.8	160	10,700 to 18,000
2029	184.7	250.8	160	
2030	186.5	250.8	160	
2031	188.2	250.8	160	
2032	190.0	250.8	160	18,000 to 25,500
2033	191.8	250.8	160	25,500 to 32,500
2034	193.5	250.8	160	
2035	195.2	250.8	160	
2036	196.9	250.8	160	
2037	198.5	250.8	160	
2038	200.1	250.8	160	
2039	201.7	250.8	160	
2040	203.3	250.8	160	
2041	204.8	250.8	160	
2042	206.4	250.8	160	
2043	208.0	250.8	160	

1

17.1 In BCUC 1.3.1 FEI indicates that the forecast peak demand for the trunk distribution system is approximately 168,800 m³/hr for 20/21, while in CEC 1.4.1 FEI states that the estimated Peak day demand for the Pattullo gas line is 86,060 m³/hr. Is it fair to say that the Pattullo gas line accounts for about half the trunk distribution peak day demand? Please explain why or why not.

18. Reference: Exhibit B-9, CEC 1.2.2 and Exhibit B-1-1 page 54 and 55

2.1 Please describe how the Class 4 level of estimate differs from the Class 3.

Response:

The following response also addresses CEC IR1 3.2.

There are a number of characteristics used in assigning an AACE estimate class to a project estimate. The primary characteristic is the maturity level of project definition deliverables which

	<i>Primary Characteristic</i>	<i>Secondary Characteristic</i>			
ESTIMATE CLASS	MATURITY LEVEL OF PROJECT DEFINITION DELIVERABLES Expressed as % of complete definition	END USAGE Typical purpose of estimate	METHODOLOGY Typical estimating method	EXPECTED ACCURACY RANGE Typical +/- range relative to index of 1 (i.e. Class 1 estimate) ^[a]	PREPARATION EFFORT Typical degree of effort relative to least cost index of 1 ^[b]
Class 5	0% to 2%	Screening or feasibility	Stochastic (factors and/or models) or judgment	4 to 20	1
Class 4	1% to 15%	Concept study or feasibility	Primarily stochastic	3 to 12	2 to 4
Class 3	10% to 40%	Budget authorization or control	Mixed but primarily stochastic	2 to 6	3 to 10
Class 2	30% to 75%	Control or bid/tender	Primarily deterministic	1 to 3	5 to 20
Class 1	65% to 100%	Check estimate or bid/tender	Deterministic	1	10 to 100

Notes:

[a] If the range index value of "1" represents +10/-5%, then an index value of 10 represents +100/-50% (at an 80% confidence interval).

[b] If the cost index value of "1" represents 0.005% of project costs, then an index value of 100 represents 0.5%.

Table 1 – Generic Cost Estimate Classification Matrix

4.4.4.4.2 FINANCIAL EVALUATION OF ALTERNATIVES 6A AND 6D

Alternative 6A (Gaglardi Route) and Alternative 6D (Sperling Route) were developed to an AACE Class 4 cost estimate. The refined cost estimate took into consideration the development activities of each route from the technical progression as well as feedback from engagement and consultation with stakeholders, landowners and the community.

Table 4-9: Financial Evaluation Summary

	Alternative 6A: Gaglardi Route (Class 4)	Alternative 6D: Sperling Route (Class 4)
Total Capital Costs, AACE Class 4, 2020 (\$ millions)	173.313	175.354
PV of Incremental Revenue Requirement²² over 68 years (\$ millions)	176.881	178.560
Levelized Delivery Rate Impact over 68 years (in %)	1.13%	1.14%
Levelized Delivery Rate Impact over 68 years (in \$/GJ)	0.0510	0.0515
Average Residential UPC (in GJ/yr)	90.00	90.00
Average Residential Bill Impact per year over 68 years (in \$)	4.59	4.64
Financial Evaluation Score	3	3

18.1 FEI’s AACE Class 4 capital cost estimate is nearly \$200 million with a 1% to 15% project maturity. Please provide a \$ based accuracy range for the Total capital costs.

18.1.1 If FEI is not able to do so, please explain why not.

19. Reference: Exhibit B-1-1 page 53

Table 4-8: Non-Financial Evaluation Summary of Alternatives 6A and 6D

Criterion	Alternative 6A: Gaglardi Route (Class 4)	Alternative 6D: Sperling Route (Class 4)
Schedule Impacts (Weighting – 60%)	2	3
	<ul style="list-style-type: none"> • Permitting required from two municipalities, with strong opposition • Requires negotiations with a few private landowners for RoW and temporary access • Low level of congestion of third party utilities in route corridor • Potential coordination conflict with the Trans Mountain Expansion Project 	<ul style="list-style-type: none"> • Project does not cross private land; no private land SRW negotiations are required. Land discussions with various permitting agencies required. • Permitting required from one municipality, that is supportive • Highest level of construction productivity • Overall least congested alternative, fewest number of utility crossings
Community, Indigenous and Stakeholder Impacts (Weighting – 25%)	2	3
	<ul style="list-style-type: none"> • Significant traffic impacts, including cumulative impacts from other previous (LMIPSU) and planned (non-FEI) projects in proximity to the Gaglardi Route • Multiple schools, churches and care facilities potentially impacted • Less than 10 businesses potentially impacted • Minimal impact to private lands 	<ul style="list-style-type: none"> • Less than 10 businesses potentially impacted • Minimal impact to private lands • Impacts to access to community and recreation centres • Localized traffic impacts only
Environmental and Archaeological Impacts	3	2
	<ul style="list-style-type: none"> • Critical habitat for several at-risk species; however mitigation available through project design 	<ul style="list-style-type: none"> • Critical habitat for several at-risk species; however mitigation available through project design

Criterion	Alternative 6A: Gaglardi Route (Class 4)	Alternative 6D: Sperling Route (Class 4)
(Weighting – 15%)	<ul style="list-style-type: none"> • Several fish-bearing watercourses, including the Brunette River • Known archaeological site; however mitigation available through project design 	<ul style="list-style-type: none"> • Several fish-bearing watercourses, including Still Creek • Water management concerns (dewatering and disposal) • Crosses, or is located within close proximity to, wetlands and riparian areas • Potential for encountering contaminated soil, or water • No known archaeological or heritage sites
Weighted Total¹	2.15	2.85
<p><i>Note:</i> ¹ Weighted total is calculated for each alternative by multiplying the score for each criterion with its associated weighting and then summing the scores. The maximum possible weighted total is 3.</p>		

19.1 Are the Environmental and Archaeological impacts able to be fully mitigated in Alternative D, or will there potentially be unresolved issues? Please explain.

20. Reference: Exhibit B-1-1 page 54 and Exhibit B-9, CEC 1.2.1 and 1.2.1

4.4.4.4.2 FINANCIAL EVALUATION OF ALTERNATIVES 6A AND 6D

Alternative 6A (Gaglardi Route) and Alternative 6D (Sperling Route) were developed to an AACE Class 4 cost estimate. The refined cost estimate took into consideration the development activities of each route from the technical progression as well as feedback from engagement and consultation with stakeholders, landowners and the community.

	ESTIMATE CLASSIFICATION				
	CLASS 5	CLASS 4	CLASS 3	CLASS 2	CLASS 1
MATURITY LEVEL OF PROJECT DEFINITION DELIVERABLES	0% to 2%	1% to 15%	10% to 40%	30% to 75%	65% to 100%
General Project Data:					
Project Scope Description	Preliminary	Preliminary	Defined	Defined	Defined
Commodity Characteristics and Capacity	Preliminary	Preliminary	Defined	Defined	Defined
Station, Terminal and Tie-in Locations	Preliminary	Preliminary	Defined	Defined	Defined
Right-of Way (ROW) Strategy	Not Required	Preliminary	Defined	Defined	Defined
Soils, Hydrology, Subsea	Not Required	Preliminary	Defined	Defined	Defined
Integrated Project Plan	Not Required	Preliminary	Defined	Defined	Defined
Stakeholder Management Plan	Not Required	Preliminary	Defined	Defined	Defined
Stakeholder Consultation/Requirements	Not Required	Preliminary	Defined	Defined	Defined
Project Master Schedule	Not Required	Preliminary	Defined	Defined	Defined
Escalation Strategy	Not Required	Preliminary	Defined	Defined	Defined
Work Breakdown Structure	Not Required	Preliminary	Defined	Defined	Defined
Project Code of Accounts	Not Required	Preliminary	Defined	Defined	Defined
Procurement/Contracting Strategy	Not Required	Preliminary	Defined	Defined	Defined
Engineering and ROW Deliverables:					
Hydraulic Design	S	P	C	C	C
Route Mapping/Survey/Topography/Alignment Sheets	S/P	P/C	C	C	C
Land/ROW Title Negotiation	NR	S/P	P/C	C	C
Piping/Mechanical Discipline Drawings (including valving and pigging)	S	P	P	C	C
Instrumentation/Control and Monitoring/SCADA System Discipline Drawings	NR	S/P	P	C	C
Civil/Site Preparation/Structural Discipline Drawings	NR	S/P	P	C	C
Crossings and Borings Designs and Drawings	NR	S/P	P	C	C
Station/Terminal Interface Design	NR	S/P	P	C	C
Specifications and Datasheets	NR	S	P	C	C

1 Table 3 – Estimate Input Checklist and Maturity Matrix (Primary Classification Determinate)

Engineering and ROW Deliverables:

- **Not Required (NR):** Deliverable may not be required for all estimates of the specified class, but specific project estimates may require at least preliminary development.
- **Started (S):** Work on the deliverable has begun. Development is typically limited to sketches, rough outlines, or similar levels of early completion.
- **Preliminary (P):** Work on the deliverable is advanced. Interim, cross-functional reviews have usually been conducted. Development may be near completion except for final reviews and approvals.
- **Complete (C):** The deliverable has been reviewed and approved as appropriate.

To improve the certainty of the cost estimate and schedule without incurring the delay associated with preparing a full class 3 estimate, FEI is completing additional activities to improve the maturity level of project definition deliverables beyond that of a typical AACE Class 4 cost estimate. These additional items include:

- **General Project Data**
 - Station, Terminal and Tie-in locations
 - Right-of-Way (ROW) Strategy
 - Stakeholder Consultation /Requirements
 - Procurement/Contracting Strategy
- **Engineering and ROW Deliverables**
 - Hydraulic Design
 - Crossings and Boring Design and Drawings
 - Specifications and Datasheets

20.1 FEI indicated in its original application that it would conduct additional analysis to improve the Class 4 cost estimate in certain areas. Did FEI conduct the additional analysis identified in the application? Please explain.

20.1.1 If no, please explain why not.

20.2 For those areas that FEI was completing additional activities beyond that of a typical AACE Class 4 estimate, did FEI take the analysis up to the Class 3 level, or just make certain improvements? Please explain. I.e. if the Station, Terminal and Tie-in locations would move from 'Preliminary' to 'Defined'.

20.3 Will FEI need to develop a Class 3 estimate before it contracts out work, or will it be able to begin contracting based on a Class 4 estimate? Please explain.

21. Reference: Exhibit B-1-1 page 55 and Exhibit B-9, CEC 1.15.1

Table 4-9: Financial Evaluation Summary

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Levelized Delivery Rate Impact over 68 years (in \$/GJ)	0.0510	0.0515
Average Residential UPC (in GJ/yr)	90.00	90.00
Average Residential Bill Impact per year over 68 years (in \$)	4.59	4.64
Financial Evaluation Score	3	3

Average Bill Impact (\$)	Avg. Use per Customer (UPC) in GJ	Alternative 6A: Broadway and Gaglardi Way Corridor	Alternative 6B: Cape Horn Gate Corridor	Alternative 6C: Fraser Gate Corridor
Levelized Delivery Rate Impact Over 73 years (\$/GJ)		\$ 0.036	\$ 0.054	\$ 0.048
Residential				
Rate Schedule 1	90	\$ 3.2	\$ 4.8	\$ 4.4
Commercial				
Rate Schedule 2	340	\$ 12.1	\$ 18.2	\$ 16.5
Rate Schedule 3	3,770	133.8	202.1	182.5
Industrial				
Rate Schedule 4	9,050	\$ 321.3	\$ 485.1	\$ 438.0
Rate Schedule 5	16,240	576.5	870.5	786.0
Rate Schedule 6	2,060	73.1	110.4	99.7
Rate Schedule 7	177,950	6,317.2	9,538.1	8,612.8

21.1 Please provide a table similar to that found in CEC 1.15.1 for Alternative 6A and 6D.

21.2 Please include % impacts for each rate class.

22. Reference: Exhibit B-1-1 page 60 and 61

5.3.2.1 Assessment of Feasible Route Options

Following the identification of feasible route options, evaluation criteria were established to select a preferred route. FEI evaluated each route option using both quantitative and qualitative criteria.

5.3.2.2 Evaluation Criteria

The three broad categories of principles and considerations that were taken into account during the route options evaluation are listed and defined in Table 5-1 below.

Table 5-1: Gas Line Route Evaluation Criteria Definitions

Category 1: Community and Stakeholder Considerations	
Health and Safety	Considers the risks to the community, stakeholders, employees, and contractors during construction and during the life of the gas line.
Traffic Impacts	Considers the direct and indirect effects of the Project on traffic and commercial/residential access during construction of the gas line.
Socio-Economic	Considers the effect of the Project on the cultural values, economic well-being, and daily life for local stakeholders and citizens during construction and during the life of the gas line.
Category 2: Environmental Considerations	
Ecology	Considers the impact during construction and during the life of the gas line to the environment including environmentally sensitive areas along the project corridor.
Cultural Heritage	Considers the impact during construction and during the life of the gas line to known archaeology and culturally sensitive areas at the project site.
Human Environment	Considers the impact of the Project to the human environment including noise, local emissions, aesthetics, nuisance factor and the short and long-term effects that may be observed by residents and visitors in the project area.
Category 3: Technical Considerations	
Construction	Considers the existing above and belowground constraints in terms of gas line construction activities, pipe-laying productivity, requirements for non-standard higher risk construction techniques, and construction footprint.
Operation	Considers long-term impacts including those to employees and contractors to maintain the gas line integrity and complete maintenance and repairs. Also considers impacts to adjacent development and third party land ownership and use.
Adjacent Infrastructure	Considers the potential impacts on adjacent (existing and planned) facilities and buried/above ground utility infrastructure and risk to longevity and safe operation of the gas line and facilities from adjacent infrastructure.
Project Execution Certainty	Considers the impact of compounding risks associated with the criteria in Categories 1, 2 and 3.

Table 5-3: Route Evaluation Scoring

Score	Impact Evaluation
5	Very low (negligible) impact, best choice
4	Low impact, better choice
3	Moderate impact, good choice
2	High negative impact, poor choice
1	Very high negative (unacceptable) impact, not feasible

FEI implicitly considered cost within the Community and Stakeholder, Environmental and Technical evaluation criteria. In general, routing that minimizes impacts to all criteria without adding extensive length would result in the lowest cost.

Table 5-2: Gas Line Route Evaluation Weighting²³

Criterion	Weighting	Evaluation
Community and Stakeholder Considerations Weighting		
Health and Safety	10	Assessment of the construction zone environment, nature of the planned construction activities and proximity to vulnerable entities.
Traffic Impacts	12.5	Roadway usage impacts, number of intersections impacted, number of commercial accesses impacted, etc.
Socio-Economic	7.5	Properties and businesses directly impacted during construction and nature of impacts, community infrastructure impacted (e.g. schools, hospitals, recreation centers, etc.)
Sub-total:	<u>30</u>	
Environmental Considerations Weighting		
Ecology	5	Natural and environmentally sensitive areas impacted.
Cultural heritage	5	Culturally sensitive areas impacted.
Human Environment	12.5	Nature and proximity of visual, noise and vibration impacts, residential accesses impeded, etc.
Sub-total:	<u>22.5</u>	
Technical Considerations Weighting		
Construction	15	Type of construction required, pipe installation productivity, length of gas line, and overall construction footprint, etc.
Operation	10	Areas of potential operational difficulty identified.
Adjacent infrastructure	10	Type of adjacent infrastructure, proximity and spacing, planned infrastructure, ability to manage sufficient clearances, etc.
Project Execution Certainty	12.5	An evaluation of impacts such items as regulatory permitting, timeline/schedule, budget certainty, scope certainty, environmental and archaeological impacts, geotechnical conditions and various constructability considerations (including resources).
Sub-total:	<u>47.5</u>	
Total	100	

- 22.1 FEI states that it ‘implicitly considered costs’ in each of the categories. Why did FEI not consider least cost as a route evaluation criterion on its own, or at least identify least cost as an evaluation criterion within the groupings?
- 22.2 Is FEI able to definitively say that the selected route was the least cost route or, at a minimum, the most cost-effective route?
- 22.2.1 If yes, please provide a percentage and dollar estimate of how much lower the cost would be.
- 22.2.2 If no, please explain why not.

23. Reference: Exhibit B-1-1 page 68

5.4.2.5 In-line Inspection

ILI is a process that utilizes the pipeline gas flow and pressure to propel an inspection tool within the gas line. There are a number of types of ILI tools that can be used to detect and size a variety of gas line anomalies, including corrosion, mechanical damage, and cracking.

Due to the longevity of steel gas lines, it is appropriate to design the new gas line with provisions for ILI capability. This will enable the cost effective and targeted mitigation of specific gas line hazards (i.e. corrosion) over the service life of the new asset. For further details, see the Preliminary Pipeline Design Basis Memorandum, P-00758-PIP-DBM-0003, in the Appendix C-1.

To facilitate ILI, the PGR Project gas line design must incorporate certain features and mechanical components such as avoiding use of tight radius pipe bends, wall thickness transitions, and ensuring that all fittings and appurtenances (e.g. valves, tees) allow for consistent and reliable passage of ILI tools to maximize data collection.

- 23.1 Please confirm or otherwise explain that the In-line inspection capability preparation is technologically consistent with the in-line inspection capability that FEI is installing in other areas of its pipeline.

24. Reference: Exhibit B-1-1 page 72

5.4.5 Decommissioning and Abandonment

A section of approximately 2.0 km of the existing Pattullo Gas Line Crossing will be abandoned between the Pattullo Gate Station in the City of Surrey to the intersection of McBride Boulevard and Royal Avenue in the City of New Westminster. The section of gas line located on the existing Pattullo Bridge will be abandoned and removed during bridge demolition. Sections located on either end of the bridge will be abandoned in place, grout filled and capped every 200m. The abandonment process will follow applicable FEI specifications.

- 24.1 Does FEI have approval from, or a satisfactory agreement with, the City of Surrey to abandon its pipeline in place?
- 24.1.1 If no, please explain why not.
- 24.1.2 If no, what consultation has FEI undertaken with the City of Surrey related to the abandonment of the pipeline?

25. Reference: Exhibit B-1-1, page 74

Table 5-10: Project Schedule and Milestones

Activity	Milestone Date
Consultant / Contractor Selection	
Procure Detailed Engineering Services	Dec 2020
Procure Contractor Services	Nov 2020
Detailed Design and Constructability Reviews	
30% Design Package	Feb 2021
60% Design Package	March 2021
90% Design Package	May 2021
Issued for Construction Package	July 2021
Obtain Permit Approvals	
BCOGC Permits – Early Works	Sept 2021
BCOGC Permits – Mainline and Facilities	Jan 2022
Federal Permits (Department of Fisheries and Oceans, Species at Risk Act)	Jan 2022
Activity	
Milestone Date	
Ministry of Transportation and Infrastructure Permits	Jan 2022
Municipal Permits	Jan 2022
Third Party Utility Permits	Jan 2022
Environmental and Archaeological Permits	Jan 2022
Procurement	
Procure Line Pipe	Mar 2021
Construction Contract Award	
30% Design – Cost Estimate Submission	March 2021
60% Design – Cost Estimate Submission	April 2021
90% Design – Cost Estimate Submission	June 2021
Award Mainline Construction Contract	Sept 2021
Mobilization to Site	
Mobilization for Early Works	Oct 2021
Mainline and Facilities Construction	
Mainline and Facilities Construction	Apr 2022 - Sept 2022
Mechanical Completion	Oct 2022
Commissioning	Oct 2022 – Dec 2022
Restoration and Demobilization	Sep 2022 - Dec 2022
Decommissioning and Abandonment	
Decommissioning of Pattullo Gas Line	Jan 2023 - Mar 2023
Abandonment of Pattullo Gas Line	Jan 2023 - Mar 2023
Infrastructure Modifications	Apr 2023 – July 2023
Project Close Out	Oct 2022 – July 2023

25.1 Has FEI completed the Milestones related to the Consultant/Contractor selection?

25.1.1 If no, please explain why not and identify when FEI expects that to occur.

25.1.2 If no, to what extent will that delay the remaining milestones?

26. Reference: Exhibit B-1-1 page 75 and 76

5.6.1 Project Delivery Method/Contract Pricing

FEI will use a Construction Manager at Risk (CMAR) project delivery method to deliver the Project. This delivery method is a form of early contractor involvement where a contractor is engaged under a services contract that takes an integrated team approach to the planning, design and construction of the project. The integrated team will consist of FEI, the engineering design firm and a contractor working collaboratively to deliver the Project for the lowest cost and completion prior to the schedule constraint. The aim of this project delivery method is to engage the construction expertise early in the design process to provide constructability input and manage project execution risk. As part of the competitive contractor selection process, FEI and the contractor have agreed on key commercial terms for overhead and profit margin.

To help ensure that the Project is delivered at the lowest reasonable cost, a transparent and progressive "open book" cost estimating process will be used as the design advances from 30 percent design milestone through the 60 to 90 percent design completion milestones. At each

milestone, the contractor will be required to provide a risk adjusted cost estimate. Risk will be allocated collaboratively between FEI and the contractor using the principles that a party shall bear a risk that it can control and is best able to manage. At the 90 percent design milestone, the contractor and FEI will seek to agree on a lump sum fixed price, which includes an amount in the estimate for the risks allocated to the contractor, to complete the Project. The lump sum fixed price effectively means that the contractor holds all of the Project's construction and execution risks assigned to the contractor during the risk allocation process.

26.1 Please provide a more detailed overview of the Construction Manager at Risk ("CMAR") methodology.

26.2 Please identify any alternative delivery methodologies that FEI considered and explain why FEI selected the CMAR methodology.

26.3 Please provide a Pro/Con list of the CMAR methodology.

26.4 Has FEI used a CMAR project delivery method in the past, or is this a new methodology for the company? Please explain.

26.4.1 If FEI has used this methodology in the past, please cite some examples and identify any issues that have arisen in the past.

26.4.1.1 Please explain how FEI will address the issues it has experienced in the past with this method of project delivery.

- 26.4.2 If FEI has not used the project delivery methodology in the past, please explain why not.
- 26.5 Please provide a list of the key commercial terms that are agreed upon.
- 26.6 Is the project design at 30% already?
- 26.6.1 If not, when will FEI reach the 30% design milestone?
- 26.6.2 If no, how will the cost estimating process be done before the 30% design milestone, and how will the lowest reasonable cost be assured?
- 26.7 How will the parties resolve disputes with regard to bearing risks? Please explain.

27. Reference: Exhibit B-1-1 page 76

To establish price competitiveness, the contractor will be required at the onset to provide a document that thoroughly defines all pricing assumptions, shows all cost elements that will be used to estimate all aspects of the work, and provide the steps to show how the estimated total project costs will be derived. FEI will conduct independent cost estimation and estimate validation to determine market competitiveness. FEI will also engage the services of an Owner's engineer to review the contractor's submittals and complete a check estimate review. In addition, a comprehensive cost reconciliation process will be conducted to address any significant differences between the independent estimate and the contractor's. Should FEI and the contractor be unable to reach an agreement on price, schedule or risk allocation, anywhere from 60 percent design onwards, FEI can take an "off ramp" and terminate the services contract for convenience, prepare a tender package and tender the construction.

- 27.1 How did FEI select its contractor? Please explain and identify how many companies were considered in the process.
- 27.2 How did FEI select its Owner's engineer? Please explain and identify how many companies were considered in the process.

28. Reference: Exhibit B-1-1, page 79

Throughout the Project, FEI will track the following socio-economic indicators: Project investment in local Indigenous communities, in local municipalities, and in the region.

Based on FEI's experience assessing and delivering previous projects of this scope, the Project is not expected to have any long-term negative effects on the socio-economic conditions in the area and will have some positive effects for the Indigenous and local supply chain.

- 28.1 Is FEI undertaking any specific activities to promote project investment in local indigenous communities or in the area? Please explain.
- 28.2 Will FEI be reporting on the socio-economic indicators at a later date? Please explain.

28.2.1 If no, why not.

28.2.2 If yes, when and how will this occur?

29. Reference: Exhibit B-1-1 page 84

5.10.3 Cost Estimate Validation

Cost estimate quality assurance and validation were completed as follows:

- Internal reviews that included peer reviews, document quality checks, and independent review of project documents;
- Validation reviews involving both Mott MacDonald and FEI team members throughout the estimate development process to confirm that the estimate assumptions were valid;
- An external independent review to verify and validate that the estimate, as well as schedule, met the AACE Class 4 criteria and requirements and that a well-documented, reasonable and defensible estimate was developed; and
- Internal and external reviews related to constructability and productivity.

29.1 Which groups/positions were involved in the internal peer reviews, document quality check and independent review of project documents?

29.2 Please describe the types of activities included in a validation review.

29.3 Please identify which company conducted the external independent review to verify and validate the estimate, and the defensibility of the estimate.

30. Reference: Exhibit B-1-1 page 84 and 85 and 86

5.10.4 Risk Analysis and Contingency Determination

FEI engaged Yohannes Project Consulting Inc. (YPCI), a company specializing in project risk management, to conduct a qualitative risk analysis to identify and assess all of the risks associated with the Project. YPCI conducted multiple workshops with the Project team to develop a risk register for the Project to identify risks that could likely occur. As the engineering advances on the Project, the probability or the consequence of several identified risks were either mitigated entirely or reduced. All of the risks associated with the Project are contained within the Pattullo Gas Line Replacement (PGR) Sperling Avenue Route – Qualitative Risk Assessment Report Class 4, which is attached as Confidential Appendix E-1.

FEI also retained Validation Estimating LLC, USA (Validation Estimating), a company that provides services in estimate validation, risk analysis, contingency and estimation. Validation Estimating completed the contingency estimation using a quantitative analysis by applying an integrated parametric and expected value methodology that is aligned with AACE International Recommended Practice 42R-08: *Risk Analysis and Contingency Determination Using Parametric Estimating* and 65R-11: *Integrated Cost and Schedule Risk Analysis and Contingency Determination Using Expected Value*. This analysis is described in the report titled "Pattullo Gas Line Replacement (PGR) Project Sperling Avenue Options Capital Cost and Schedule Risk Analysis and Contingency Estimate", attached as Confidential Appendix E-2.

The risk likelihood and consequence matrix scale used for the Project are based on the 5 by 5 risk assessment matrix recommended in AACE 62R-11, as illustrated in Figure 5-4 below.

Figure 5-4: Risk Assessment Matrix

Likelihood (Probability)	Risk Impact Category (Cost, Schedule, Performance/Quality/Scope)				
	IMPACT				
	Very Low	Low	Medium	High	Very High
Very High (>50%)	Moderate	Moderate	Major	Major	Major
High (5 - 50%)	Minor	Moderate	Major	Major	Major
Medium (1-5%)	Minor	Moderate	Moderate	Major	Major
Low (0.1-1.0%)	Minor	Minor	Moderate	Moderate	Moderate
Very Low <0.1%	Minor	Minor	Minor	Minor	Moderate

5.10.4.2 Risk Register, Qualitative Assessment and Action Plan

The risk identification process identified a number of risks, which YPCI tabulated in the risk register included in Appendix A to YPCI’s Risk Report (Confidential Appendix E-1). YPCI also recorded the risk response actions to deal with the identified risks in the risk register. The Project Team completed a qualitative assessment to prioritize or rank the risks so that the Project team could focus on risk response actions and mitigation for the high priority risks. As part of this qualitative process, the Project team assigned a likelihood and consequence rating to each identified risk using the risk assessment matrix noted above.

5.11 CONCLUSION

In this section, FEI described the PGR Project in detail, including information on the Project components, route selection process, basis of design and engineering, project schedule and resource requirements, project impacts, and permitting and approval requirements. FEI has provided the basis of project cost estimate and has appropriately completed cost validation and

project risk assessment. FEI’s has identified risk mitigation activities to mitigate the overall cost and schedule risk of the Project.

- 30.1 Please confirm that FEI adhered to standard risk analyses which were conducted by external parties.
 - 30.1.1 If not, please identify all areas in which FEI did not conform to standard risk analysis practices, or identify those that were not conducted by external parties.
 - 30.1.1.1 If not, please explain why not for each area identified.
 - 30.1.2 If yes, have such practices been previously approved by the BCUC for projects over \$100 million? Please explain.

31. Reference: Exhibit B-1-1 page 90 and 91

The PGR Project estimated capital cost, provided in the table above, is based on the following:

- The base cost estimate of \$124.333 million in 2020 dollars developed by FEI and Mott MacDonald as described in Section 5.10.1 of the Application, and \$5.612 million of actual Project development costs incurred between February and November 2020;
- A contingency estimate of \$30.100 million in 2020 dollars (approximately 24 percent) of the base cost estimate (\$124.333 million in 2020 dollars) provides a total Project capital budget at a P50 confidence level as discussed in Section 5.10.4.4 of the Application;
- A P50 escalation value of \$7.733 million during the construction period from 2021 to 2023 as discussed in Section 5.10.4.5 of the Application applied to both the base capital cost and contingency. The escalation is used to convert the Project capital cost from 2020 dollars to as-spent dollars;
- Deferred costs of \$2.857 million (as-spent) for the Application and Preliminary Stage Development Costs discussed in Section 6.4.3 below; and
- AFUDC, estimated based on FEI's 2021 approved AFUDC rate of 5.47 percent, which is equal to FEI's after-tax weighted average cost of capital.²⁷

- 31.1 Please confirm that ratepayers will be responsible for the actual costs of the project, not the estimated costs.
- 31.2 Assuming approval of the CPCN, what options do ratepayers have in the event that certain costs were not judged to be prudent in hindsight? Please explain.
- 31.3 When might an assessment of prudence be undertaken and what information would be available to the Commission at that time?

32. Reference: Exhibit B-1-1 page 91 and Exhibit B-6, CEC 1.12.3

1. **Levelized Delivery Rate Impact:** Ability for an alternative to be completed with the lowest possible delivery rate impact over the approximate financial life of the asset (i.e., 73-year analysis period) for the PGR Project. Alternatives that minimize the levelized delivery rate impact to FEI's non-bypass customers score the highest. [Emphasis retained]

12.3 Please provide the useful life and depreciation rate(s) FEI proposes to use in its revenue requirements for the PGR Project.

Response:

Upon BCUC approval of the PGR Project and once construction has been completed, each individual asset of the PGR Project will enter rate base on January 1 the following year and begin depreciating at the approved depreciation rate for each asset. The current approved depreciation rates for FEI's assets in rate base are based on FEI's 2017 Depreciation Study, approved by BCUC Order G-165-20 as part of FEI's 2020-2024 Multi-Year Rate Plan (MRP) Application and included in the table below. Additionally, included in the aforementioned depreciation study was the average service life (ASL) for each of the assets which FEI has also included in the table below.

PRG Project Components	FEI Asset Account No.	FEI Asset Account Name	Approved Depreciation Rate (%)	Average Service Life ASL (yrs)
Intermediate Pressure (IP) Pipeline	475-00	Distribution Plant – Main	1.35 %	65
PRS Building Structure	472-00	Distribution Plant – Structures & Improvements	2.15 %	38
PRS Equipment	477-10	Distribution Plant – Measuring & Regulating Equipment	2.51 %	33
PRS Land in Fee Simple	470-00	Distribution Plant – Land in Fee Simple	0.00 %	n/a
IP Pipeline Statutory Right of Way (SRW)	471-01	Distribution Land Rights	0.00 %	n/a

The approved depreciation rate is not equivalent to the average service life estimated by the depreciation study of each asset as shown in the table above. Under group asset accounting, the asset depreciation rate also includes the accumulated gains/losses within the same asset group at the time of the depreciation study. The depreciation rates of each asset account are reviewed and updated periodically with new studies that are filed to BCUC for approval.

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32.1 Why did FEI switch from a 73-year analysis period to a 68-year analysis period? Please explain.

33. Reference: Exhibit B-1-1 page 92 and Exhibit B-6, CEC 1.15.2 Attachment, PDF page 159 of 179

The financial evaluation of the PGR Project includes the following assumptions:

- **Inflation:** Two percent annually for incremental O&M, property tax, and future capital replacement costs during the post-Project analysis period. This is comparable to the

historical 5-year average BC CPI from 2015 to 2019 which is also approximately two percent²⁸;

Class 3 (Define)

Required Documentation

- | | |
|---|--|
| <ul style="list-style-type: none"><input type="checkbox"/> Approved Planning Scope<ul style="list-style-type: none">- Operations signoff- SCC sign-off (as required)<input type="checkbox"/> Approved Work Plan<ul style="list-style-type: none">- Work Plan to be signed as reviewed by Operations, Engineering and SCC (if required)- Site access- Crane requirements and access- On site facilities- Management and labour resources- Security<input type="checkbox"/> Drawings and Lists<ul style="list-style-type: none">- Documentation will vary depending on project type, and engineering discipline.- Document to be signed as approved by engineering discipline.Minimum Drawing Requirement:<ul style="list-style-type: none">• Equipment layout, Site Plan• Equipment lists, material quantities, long term delivery items identified• Equipment sizing, Single Line Drawing | <ul style="list-style-type: none"><input type="checkbox"/> Preliminary Specifications<ul style="list-style-type: none">- Operations signoff- Engineering signoff<input type="checkbox"/> Approved Schedule<ul style="list-style-type: none">- Completed using MS Project- Signoff by PMO- Signoff by Project Engineer- Signoff by SCC- Signoff by Operations<input type="checkbox"/> Class 3 Estimate<ul style="list-style-type: none">- Produced from Generation Estimate Sheet- SAP Historical Cost Information, inflation review- Written Vendor quotes based on preliminary specification- Confirmation of Contracting Out status<input type="checkbox"/> Preliminary Budget Set<input type="checkbox"/> Business case completed |
|---|--|

- 33.1 Please provide the annual inflation rate from the BC CPI from 2015 to 2020 inclusive.
- 33.2 Please provide any evidence that FEI has available as to expected changes in inflation rates in the next five years.
- 33.3 For Generation Project Cost Classification System, a Class 3 estimate appears to include an inflation review. Will FEI be conducting such a review? Please explain why or why not.

34. Reference: Exhibit B-1-1 page 95 and 96

6.5 RATE IMPACT

The PGR Project will have incremental delivery rate impacts from 2022 to 2025. The causes of the delivery rate impacts in each year are explained below:

- **2022 to 2024:** Delivery rates will be impacted in these years by the amortization of the PGR Application and Preliminary Stage Development Costs deferral account as discussed in Section 6.4.3 above;
- **2023 and 2024:** Delivery rates will be impacted in these years as the assets for the new IP pipeline and PRS in the City of Burnaby are scheduled to be placed in-service in 2022 and 2023,³⁴ which will be transferred to rate base on January 1 of 2023 and 2024, respectively (as discussed in Section 6.4.1 above); and
- **2024 and 2025:** Delivery rates will be impacted in these years as the decommission/abandonment costs for the Pattullo Gas Line are scheduled to occur in 2023 and 2024,³⁵ after which the costs will be transferred to FEI's Net Salvage deferral account on January 1st of 2024 and 2025, respectively (as discussed in Section 6.4.2 above). The estimated delivery rate impact in 2025 due to the decommissioning and abandonment costs is offset by the elimination of the amortization of the PGR Application and Preliminary Stage Development Costs deferral account, resulting in a delivery rate credit in 2025.

Table 6-6 below shows the annual delivery rate impact in percentage terms compared to FEI's 2021 approved non-bypass revenue requirement³⁶ and the incremental annual delivery rate impact in percentage terms (year-over-year) from 2022 to 2025.

Table 6-6: Summary of Delivery Rate Impact for the PGR Project

	2022	2023	2024	2025
Annual Delivery Margin, Incremental to 2021 Approved, Non-Bypass (\$ millions)	0.288	5.715	13.890	13.773
% Increase to 2021 Approved Delivery Margin, Non-bypass	0.03%	0.65%	1.58%	1.57%
Incremental % Delivery Rate Impact (Year-over-Year)	0.03%	0.62%	0.92%	(0.01%)
Average Annual % Delivery Rate Impact (4 years, 2022 - 2025)	0.39%			
Average Annual Delivery Rate Impact (4 years, 2022 - 2025), \$/GJ	0.018			
Cumulative % Delivery Rate Impact (4 years, 2022 - 2025)	1.57%			
Cumulative Delivery Rate Impact (4 years, 2022 - 2025), \$/GJ	0.071			

The Project will result in an estimated delivery rate impact of 1.57 percent in 2025 when all construction, including the decommissioning and abandonment, is completed and all capital costs have entered FEI's rate base. The average annual delivery rate impact over the four years from 2022 to 2025 is estimated to be 0.39 percent annually or \$0.018 per GJ annually. For a typical FEI residential customer consuming 90 GJ per year, this would equate to an average bill increase of approximately \$1.62 per year over the four years, or cumulatively \$6.39 over the four years.

34.1 Is the CEC's understanding correct that there will be no additional delivery rate increase impacts past 2025 and no changes other than potential decreases?

34.1.1 If no, please explain why not.

35. **Reference: Exhibit B-1-1 page 97**

7. ENVIRONMENT AND ARCHAEOLOGY

7.1 INTRODUCTION

FEI is committed to delivering safe, reliable energy in an environmentally responsible manner. Based on the preliminary environmental and archaeological assessments completed by its consultants, FEI expects that the Project will have minimal environmental and archaeological impacts. The environmental and archeological assessments considered the potential impacts of the Project as divided into the following two components:

- the replacement gas line in the Sperling Avenue Corridor (Sperling Route); and
- the decommissioning of the Pattullo Gas Line.

35.1 Is it correct to state that FEI has or will undertake all required environmental and archaeological activities throughout the project execution time frame?

35.2 Please identify any areas of environmental or archaeological concern where FEI has relied on internal assessments instead of third party professional assessments.

35.2.1 For any areas identified, please explain why FEI did not rely on third party assessments.