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October 26, 2021

Commercial Energy Consumers Association of British Columbia
c/o Owen Bird Law Corporation
P.O. Box 49130
Three Bentall Centre
2900 – 595 Burrard Street
Vancouver, BC
V7X 1J5

Attention: Mr. Christopher P. Weafer

Dear Mr. Weafer:

Re: FortisBC Energy Inc. (FEI)

Project No. 1599211

Application for a Certificate of Public Convenience and Necessity (CPCN) for Approval of the Advanced Metering Infrastructure (AMI) Project (Application)

Response to the Commercial Energy Consumers Association of British Columbia (CEC) Information Request (IR) No. 1

On May 5, 2021, FEI filed the Application referenced above. In accordance with the regulatory timetable established in British Columbia Utilities Commission Order G-302-21 for the review of the Application, FEI respectfully submits the attached response to CEC IR No. 1.

FEI is filing the responses to CEC IR1 38.2 on a confidential basis pursuant to Section 18 of the BCUC's Rules of Practice and Procedure regarding confidential documents, as set out in Order G-15-19, to preserve security sensitive information which, if disclosed, could jeopardize the safety, security, and operation of FEI's distribution system.

If further information is required, please contact the undersigned.

Sincerely,

FORTISBC ENERGY INC.

Original signed:

Diane Roy

Attachments

cc (email only): Commission Secretary
Registered Parties

A. PROJECT NEED

1. Reference: Exhibit B-1, Page 1

> FEI has determined a need to automate its meter reading process for all FEI customers. FEI's current meter reading practices are highly manual, vulnerable to errors and can be inconvenient for customers; further, the utility industry is overwhelmingly moving towards some form of meter automation, leading to changes in both market conditions and customer expectations. Automation is more accurate and convenient for customers, will alleviate the cost and service risks of manual meter reading and provides a cost-effective, long-term solution. Automation will also provide additional customer benefits as well as operational opportunities that support the safety, resiliency and efficient operation of the gas distribution system.

1.1 Please describe all the types of errors experienced related to meter reading, recording the meter read in FEI's systems and processing of meter readings to generate billings to customer and revenue for FEI.

Response:

FEI notes that the preamble to the question (and to CEC IR1 1.2 through 5.9 that follow) reference the Executive Summary of the Application. The Executive Summary provides a brief summary of each of the sections of the Application. Further detail on each of the topics included in the Executive Summary is provided in later sections of the Application. In each of the responses to these IRs, FEI has indicated the section of the Application that contains the detail being requested, and where additional context and detail can be added, FEI has done so.

FEI does not have an exhaustive list of all of the types of errors experienced; however, there are two main categories of errors that tend to occur in relation to all aspects of manual meter reading. The first type, and generally the most common, is human error. This category includes, but is not limited to:

- miskeying (i.e., pressing the wrong buttons on the handheld device);
- misreads (reading numbers incorrectly or guessing if unable to see clearly); and
- issues with not verifying that the correct meter is being read.

The other main category of error is technical or system-related. This category includes, but is not limited to, errors such as:

- invalid dates on the incoming file to the billing system (this generally happens when batteries are exchanged in the handheld device);
- system difficulties with the file transfer (e.g., blank or missing data files); and
- mislabeled estimates that are not captured properly in the billing system.

Any of these errors can lead to billing discrepancies and/or delays, which in turn create inconveniences and potential payment challenges for customers.

1.2 Please provide the error rates for each for the meter reading, recording and processing of meter readings.

Response:

The average error rate for reading and recording of meter readings is approximately 1.1 percent of all monthly readings. Issues related to the processing of meter readings are typically identified and rectified immediately; therefore, FEI does not record an error rate for this type of error. The frequency at which these meter reading processing issues occur is one per year on average.

While these error rates may appear low, the effort required to correct errors can be significant as well as have negative impacts on customers.

1.3 Please quantify the costs to the utility related to error correction throughout the processes of meter reading, recording and processing meter readings.

Response:

FEI does not separately track the costs associated with error correction; however, based on average case load requirements and current labour costs, FEI estimates that approximately $90 thousand per month is incurred in relation to the investigation of meter reading related cases. This work includes, but is not limited to, the identification and resolution of errors.

The expected benefits and savings associated with reduced meter reading errors and cases for investigation associated with the AMI Project have been factored into the financial analysis in Section 6.2.2.5.

1.4 What are the inconveniences to customers related to meter reading and what, if any, types of costs or other consequences do customers experience from these inconveniences?

Response:

Please refer to the response to CEC IR1 1.1.

Section 3.1.3 of the Application provides a summary of the inconveniences that customers experience from manual meter reading, the consequences of those inconveniences, and how automation of the meter reading function will improve those experiences. Some customers could also face direct or indirect costs to arrange for access to the meter; however, FEI is unable to identify and quantify these costs.

1.5 Please describe the types of meter automation the utility industry is adopting and the related changes in market conditions and customer expectations.

Response:

Please refer to the response to CEC IR1 1.1.

Section 3.2 and related subsections of the Application provide a description of the types of meter automation the utility industry is adopting and the related changes in market conditions and customer expectations. In particular, please refer to Appendix A to the Application, the Util-Assist Report.

1.6 Please describe each of the cost risks and the service risks related to manual meter reading.

Response:

Please refer to the response to CEC IR1 1.1.

Section 3 of the Application provides a discussion of the cost and service risks related to manual meter reading. In particular, please refer to Sections 3.1, 3.3 and 3.4.

1.7 Please describe the operational opportunities and customer benefits provided by automation.

Response:

Please refer to the response to CEC IR1 1.1.

The operational opportunities and customer benefits provided by automation are described in detail in Sections 3.1, 3.4, and 4.2 of the Application.

1.8 Please further describe the safety benefits, the resiliency benefits and the efficient operation benefits for the natural gas distribution system.

Response:

Please refer to the response to CEC IR1 1.1.

Section 3.4 of the Application provides an overview of how automation provides safety, resiliency, and efficient operation benefits. Section 4.3.2.4 of the Application explains how AMI will provide these benefits.

2. Reference: Exhibit B-1, Page 2 and page 23

> **Meter automation is more accurate and convenient for customers than manual meter reading practices**
>
> Nearly all of FEI's over 1,000,000 meters are read manually each month, with only a small number of meters that communicate remotely due to customer requirements. FEI's current meter reading practices are highly manual and vulnerable to errors, and can be inconvenient to customers. The limitations of manual meter reading can be resolved through automation, which results in a lower number of bill estimates, provides greater bill accuracy, and requires minimal access to customer premises. All of these work together to improve the customer experience as compared to manual meter reading.

> Inaccurate bills, whether due to human error or estimates, often result in customer confusion on their actual energy use, resulting in payment issues, dissatisfaction, and inquiries in the form of calls, emails or chat requests into the contact centre. Although FEI does not separately track meter reading-related contacts by communications channel from customers, it estimates that of monthly meter reading-related inquiries there are approximately 2,800 interactions via telephone, email and chat requests.[18]

2.1 What is the required rate of re-reading for meter reads determined to be inaccurate or contested by a customer?

Response:

The required number of meter re-reads (known as off-cycle reads) related to meter reading inaccuracies varies from month to month and year to year.

The total number of off-cycle reads related to meter reading inaccuracies for the years 2017 to 2020 and 2021 YTD are shown in the table below.

2017	2018	2019	2020	2021 YTD
6,395	5,421	4,336	10,801	4,093

2.2 Please describe the "bill estimating" process and how it is done.

Response:

The bill estimating process has both automated and manual aspects.

Generally speaking, estimates are generated automatically by the billing system based on historical consumption for a customer at the premises. If there is no previous history available at the premises, estimates are based on a regional average.

Each billing cycle some estimates result in cases that require manual review by billing staff. Upon receipt of a case, billing staff review the premises' historical consumption to determine if the estimate falls in line with the history or recent consumption patterns to confirm whether the system has calculated a reasonable estimate. If the billing system estimate is confirmed, the estimated meter read is released for billing. If the system-calculated estimate does not appear to be correct, billing staff will manually estimate the read based on their calculations.

Please also refer to the response to BCOAPO IR1 2.1.

2.3 Please describe customer reactions to bill estimates such as in regard to making bill payments and/or making calls to customer service.

Response:

Generally speaking, customer reactions to bill estimates are dependent on the circumstances. That is, some customers may not have concerns with estimates to the extent there is minimal impact on their bill or payment circumstances; however, bill estimates can create a challenging and dissatisfying experience for many customers. Because estimated meter readings are based on historical consumption, changes to the normal consumption patterns at a premises can lead to customers having high bills from the estimated meter readings or from an actual reading after an estimated reading. This can create a negative reaction to the estimated meter reads and the customer may contact FEI for an explanation of the unexpected charges.

With respect to making bill payments, FEI does not have analysis on whether customers exhibit different bill payment behaviour if their bill is based on an estimated or actual meter read. However, challenging bill payment circumstances may arise from estimates to the extent that multiple estimates occur and/or significant variances in the billed amounts occur once the actual read is completed. Customers in this circumstance may experience negative reactions, including confusion, anger, and frustration as a result.

2.4 Please provide quantitative data on customer service phone calls regarding bill estimating and/or bill complaints that go toward causes related to meter reading, or confirm that the figure on Page 23, 2800 per month, would be the applicable figure.

2.4.1 Please confirm that this is an average rate which would therefore be applicable throughout the year.

Response:

Please refer to the response to CEC IR1 1.1.

FEI estimates that there are approximately 2,800 monthly interactions, and approximately 34,000 each year, related to customers questioning the accuracy of their bills. As discussed in Section 3.1.2 of the Application, this monthly average applies throughout the year and is based on reason code identifiers for the years 2018, 2019, and 2020. Interactions include telephone calls, emails, and chat requests.

3. Reference: Exhibit B-1, Page 2

> **Automation is becoming the industry standard, thereby changing both market conditions and customer expectations**
>
> Utilities serving gas and electric customers across North America, including within Canada and British Columbia itself, have transitioned away from manual meter reading and implemented different forms of meter automation. The technology is available for natural gas, electricity, and water, as well as multi-commodity utilities. As a result, advanced metering technology is now commonplace across North America and is no longer considered new or cutting edge.
>
> In British Columbia, customers in FEI's service territory have access to the type of information that newer metering technology provides through their electricity providers, including BC Hydro and Power Authority (BC Hydro) and FortisBC Inc. (FBC). Maintaining a manual meter reading process will result in FEI lagging behind its peers. This has implications in both customer expectations and market availability of meter reading contractors.

3.1 Does FEI have any compilation of data on the costs and benefits experienced by other utilities moving their meter reading to automation? If so, please provide a summary of the experience reported.

Response:

Please refer to the response to CEC IR1 1.1.

As noted in Section 3.2.1 of the Application, FEI commissioned Util-Assist Inc. (Util-Assist) to complete a report detailing the gas utility automation projects in North America, including the drivers for moving to automation and the related costs. The Util-Assist Report is filed as Appendix A to the Application (Exhibit B-1-1).

3.2 Please describe and quantify the implications of FEI lagging behind in its meter reading technology and the implications regarding meter reading contractors.

Response:

Please refer to the response to CEC IR1 1.1.

FEI has described in detail the need for the AMI Project in Section 3 of the Application, which includes the implications of continuing with manual meter reading contractors and ultimately lagging behind its utility peers that have gone to some form of automation.

4. Reference: Exhibit B-1, Page 2

> **Automation alleviates cost and service risks and provides a cost-effective, long-term solution**
>
> The transition to automation addresses cost and service risks presented by manual meter reading, including:
>
> - *Meter reader retention issues and safety risks:* FEI's meter reading process is highly manual, requiring a meter reader to visit each meter installation, read the meter, and then manually enter digits into a hand-held device. The nature of meter reading makes it difficult to retain meter readers, which creates a risk to customer service.
>
> - *Supply and cost of manually read meters:* Due to the industry trend towards automated meter reading, suppliers of both products and services that support manual meter reading have gradually been faced with changing markets. In response to the continued automation of meter reading by utilities, members of the industries that support manually read meters and manual meter reading are shifting their business models.
>
> - *Rising cost and uncertainty of third party manual read providers:* As utilities continue to automate their meter reading processes, the decline in the number of meters requiring manual reading is reducing the economies of scale that customers and service providers enjoyed in the past, and decreasing service providers' ability to generate revenue to cover their fixed costs while offering competitive meter reading rates.

4.1 Please describe the reasons for the difficulty in retaining meter readers and/or acquiring new meter readers.

Response:

Please refer to the response to CEC IR1 1.1.

As described in Section 3.3.1 of the Application, meter readers are difficult to recruit and retain due to the nature of the work. More specifically, the work is highly repetitive and physically demanding, readers are subject to varying weather conditions throughout the year, they face multiple hazards, and they are paid on a piece-work basis.

4.2 Please describe the risk to customer service in regard to retention of meter readers.

Response:

Please refer to the response to CEC IR1 1.1.

As described in Section 3.3.1 of the Application, difficulties in retaining meter readers result in increased numbers of estimates, which leads to reduced billing efficiency and potential customer dissatisfaction.

4.3 Please provide projections for the eventual demise of supply for manually read meters at the scale FEI would require for the next 20 years.

Response:

As discussed in the response to BCOAPO IR1 5.1, one of the three approved residential meter manufacturers has discontinued production of 200 series residential meters to focus their efforts on ultrasonic meter development; all three manufacturers either have, or are developing, ultrasonic replacements for residential diaphragm meters. For clarity, both ultrasonic and diaphragm meters can continue to be manually read.

4.4 Please describe and quantify the economies of scale for manual meter reading and the degree and size of financial impact this would create for FEI over time.

Response:

FEI has not completed an analysis or quantification of the economies of scale of manual meter reading; however, in principle, the financial impact for FEI customers is a decrease in the economies of scale which results in higher costs. The higher cost of providing the service in house versus the current outsourced costs results in an estimated incremental levelized delivery rate impact over the 26 year analysis period of 0.2 percent as shown in Table 6-12.[1]

Please also refer to the response to BCUC IR1 22.1 for a discussion on the viability of manual meter reading, which is related to the economies of scale for the outsourced service.

[1] As calculated by baseline impact column, Line 2 (future in-house low cost scenario) minus Linus 1 (current embedded cost scenario).

5. Reference: Exhibit B-1, Page 3

> **Automation provides customer benefits and operational opportunities that support the safety, resiliency and efficient operation of the gas distribution system**
>
> The automation of meter reading is an opportunity to provide transformational change to key components of the utility customer experience, creating a platform for future opportunities for customer experience enhancements and providing operational opportunities that support the safety, resiliency[2] and efficient operation of the gas distribution system.
>
> Automation provides an opportunity to better meet evolving customer expectations. While meter automation resolves the inconvenience of manual meter reading at the customer's property and improves the accuracy of customer bills, reducing any need for the customer to make efforts to resolve concerns with accuracy, it also provides the opportunity to meet current and evolving customer expectations with respect to having access to energy use information.
>
> Finally, depending on the form of automation, there are potential benefits for customers in the long term as well as immediate opportunities in the operation of the gas distribution system. Some of these opportunities and benefits include improved emergency response to gas odours and leaks, better availability of data for operational and project use, and improved integrity[3] management. In particular, Automation provides the opportunity to improve the resiliency of FEI's gas system in the event of a gas supply emergency. Increasing the resiliency of FEI's gas system is a key need that Automation would support in three distinct ways: by allowing near real-time visibility of the load on the system; by providing FEI the ability to strategically disconnect gas remotely in an emergency situation; and by providing the ability to keep pressure in the system to minimize time for customer reconnections.

5.1 Please confirm that once FEI adopts an automation process for a function like meter reading the process is extremely unlikely to revert to a manual process.

Response:

Confirmed.

5.2 Would it be reasonable to expect that the automated meter reading processes once adopted would continue to improve technologically and in their performance over time as successive generations of meter reading technology are developed and implemented as meters are replaced?

5.2.1 If no, please explain why not.

Response:

Please refer to the response to CEC IR1 1.1.

As discussed in Section 4.3.2.3.2 of the Application, FEI expects that implementation of an AMI solution will mitigate the risk of technological obsolescence. Because AMI technology is based on a fully functioning two-way network, FEI and its customers will benefit from future innovations such as potential enhancements to the meter capabilities through remote firmware upgrades, development and connection of new types of field devices to the network, and increased capabilities through data analytics.

Conversely, potential improvements to AMR technology are much more limited. As noted in Section 4.2.2.3 of the Application, meter manufacturers are investing most of their product development efforts into AMI since AMR has limited ability to accept technical enhancements. Therefore, as new innovations are developed within the gas metering industry, AMR would provide minimal opportunity to realize future benefits either for customers or for FEI. An investment in AMR would leave FEI committed for over 20 years to a technology that is currently trending toward obsolescence in the long term.

5.3 Please describe the future opportunities for customer experience enhancement and quantify their potential benefits.

Response:

Please refer to the response to CEC IR1 1.1.

FEI has identified future opportunities for customer experience enhancement enabled by advanced meters in Section 4.3.2 of the Application.

5.4 Please quantify the potential safety benefits, resiliency benefits and efficient operation benefits for the gas distribution system upon adoption of automated meter reading.

Response:

All the expected benefits associated with the AMI Project are listed and detailed in Section 4.3 of the Application. All of the benefits that can be numerically quantified have been detailed in Section 4.3.3 and included in the financial model (as detailed in Sections 6.2 and 6.3). Please also refer to the response to CEC IR1 69.1.

5.5 Please quantify the potential values for each type of benefit customers could achieve for the customers having increased access to energy use information from a customer perspective separate from the utility benefits (e.g. comfort, affordability and bill reduction).

Response:

All of the expected benefits associated with the AMI Project are listed and detailed in Section 4.3 of the Application. All of the benefits that can be numerically quantified have been detailed in Section 4.3.3 and included in the financial model (as detailed in Sections 6.2 and 6.3). Please also refer to the response to CEC IR1 69.1.

5.6 Please quantify the potential benefits to the utility for each type of benefit to the utility with respect to assisting customers with opportunities from the utility perspective separate from the customer perspective (e.g. cost savings, capacity savings, system performance benefits).

Response:

All the expected benefits associated with the Project are listed and detailed in Section 4.3 of the Application. All of the benefits that can be numerically quantified have been detailed in Section 4.3.3 and included in the financial model (as detailed in Sections 6.2 and 6.3). Please also refer to the response to CEC IR1 69.1.

5.7 Please quantify the benefits of better emergency response to gas odours and leaks.

Response:

All the expected benefits associated with the Project are listed and detailed in Section 4.3 of the Application. All of the benefits that can be numerically quantified have been detailed in Section 4.3.3 and included in the financial model (as detailed in Sections 6.2 and 6.3). Please also refer to the response to CEC IR1 69.1.

5.8 Please quantify the benefits of improved integrity management for the gas system.

Response:

All the expected benefits associated with the Project are listed and detailed in Section 4.3 of the Application. All of the benefits that can be numerically quantified have been detailed in Section 4.3.3 and included in the financial model (as detailed in Sections 6.2 and 6.3). Please also refer to the response to CEC IR1 69.1.

5.9 Please quantify the benefits of improved resiliency of the gas system as a consequence of automation.

Response:

All the expected benefits associated with the Project are listed and detailed in Section 4.3 of the Application. All of the benefits that can be numerically quantified have been detailed in Section 4.3.3 and included in the financial model (as detailed in Sections 6.2 and 6.3). Please also refer to the response to CEC IR1 69.1.

6. Reference: Exhibit B-1, Page 19 & 20

> Table 3-2 below shows the number of regular and off-cycle reads that were completed by the Company's meter reading services contractor (Olameter Inc. (Olameter)) in the 2016-2020 period. As shown below, FEI's meter reading needs have been gradually increasing to the point where FEI now requires over 12,000,000 reads per year, averaging over 1,000,000 manual meter reads per month.
>
> **Table 3-2: Manual Meter Reads Completed 2016-2020**

Year	Regular Reads	Off-Cycle Reads	Total Manual Meter Reads
2016	12,073,896	85,874	12,159,770
2017	11,265,816	73,297	11,339,113
2018	12,407,474	66,303	12,473,777
2019	12,568,170	61,563	12,629,733
2020	12,820,149	66,922	12,887,071

> On average, a meter reader drives 35,000 km per year to perform their work in FEI's service territory. Taking into account the need for 150 meter readers to cover FEI's service territory, this is the equivalent of 1,100 metric tonnes of carbon dioxide equivalent (tCO2e), or the same as heating approximately 250 homes for a year.

6.1 Please provide the quantity of vehicles required to support the meter reading group.

Response:

FEI contracts its manual meter reading services to Olameter, and Olameter employs the workforce to carry out these services; as such, FEI does not have specific information in this regard. However, it is FEI's understanding that Olameter does not provide vehicles to meter readers; rather, meter readers use their own personal vehicles to complete their assigned routes.

6.2 Please provide the expected life expectance for such vehicles and the consequent replacement rate.

Response:

Please refer to the response to CEC IR1 6.1.

6.3 Please provide the operating and maintenance costs for the meter reading fleet.

Response:

Please refer to the response to CEC IR1 6.1.

6.4 What is the average number of meter reads per day for the 150 meter readers?

Response:

Please refer to the response to CEC IR1 6.1. FEI contracts the meter reading function to Olameter, which employs the meter reading workforce. Therefore, FEI has limited information and does not have specific information such as the actual average number of reads that a meter reader completes per day. However, based on an average of 150 meter readers and 1 million reads per month, an average number of reads per day per meter reader would equate to approximately 300.[2]

It should be noted, however, that the number of reads per meter reader can vary greatly based on geographic location and meter density. Meter readers in urban areas who can walk between meter locations will read more meters per day than meter readers who need to drive between premises.

[2] As calculated by 1,000,000 monthly average reads divided by average of 22 work days each month divided by 150 average meter readers.

7. Reference: Exhibit B-1, Page 23

Table 3-4: Total Estimated FEI Meter Reads 2016-2020

Year	# of Estimates	# of Meter Read Requests	Estimates as % of Total
2016	380,398	12,159,770	3.13%
2017	463,564	12,313,865	3.76%
2018	579,997	12,502,206	4.64%
2019	613,849	12,696,599	4.83%
2020	1,398,982	12,894,341	10.85%

7.1 Please provide the total payment for meter reads for each of the years 2016 to 2020.

Response:

The total payments that FEI has made to Olameter for manual meter reading for each of the years 2016 to 2020 are shown in the table below. These are invoiced amounts and are not adjusted for performance penalties paid by Olameter.

Year	Amount ($ millions)
2016	$ 11.344
2017	$ 11.415
2018	$ 11.416
2019	$ 11.874
2020	$ 11.862

8. Reference: Exhibit B-1, Page 23 - no question here

Table 3-5: Olameter Estimated Meter Reads by Reason 2016-2020

Summary by Reason	2016	2017	2018	2019	2020	Total
Dog	14,187	16,775	18,021	34,370	29,732	**127,937**
	4.11%	3.63%	3.15%	5.67%	2.14%	**3.50%**
Customer Prevented Access	51,781	61,003	58,623	56,003	58,804	**334,757**
	15.01%	13.20%	10.23%	9.24%	4.23%	**9.16%**
Supervisory Estimates (Lack of Available Readers)	172,669	252,269	342,275	367,190	692,140	**1,952,945**
	50.06%	54.59%	59.75%	60.57%	49.82%	**53.46%**
Seasonal Conditions/Obscured by Vegetation	39,553	65,789	78,090	68,193	101,429	**383,893**
	11.47%	14.24%	13.63%	11.25%	7.30%	**10.51%**
COVID-19 Exposure Risk					418,793	**418,793**
					30.15%	**11.46%**
Other	66,732	66,244	75,839	80,449	88,328	**434,560**
	19.35%	14.34%	13.24%	13.27%	6.36%	**11.90%**
Total Estimated Meter Reads	**344,922**	**462,080**	**572,848**	**606,205**	**1,389,226**	**3,652,885**

8.1 Please explain why COVID-19 Exposure was a risk for meter readers such that they were not able to make a reading, and explain why the quantity is so large.

Response:

As noted in Section 3.1.3 of the Application, in March of 2020, with the start of the COVID-19 pandemic, Olameter introduced safety measures in alignment with provincial physical distancing recommendations. British Columbia was under a provincial state of emergency from March 18, 2020 until the end of day on June 22, 2021; however, physical distancing practices remained in place through 2020 and are still in place and recommended by the BC Centre for Disease Control.

More specifically, physical distancing guidelines put in place by Olameter for meter readers limit access to meters that are located indoors. Accessing these meters requires the meter readers to access common indoor areas and confined spaces in apartments and townhouses. Physical distancing and public health guidelines also limit access to outdoor meters that are located behind a gate. With more customers working from home, the number of locked gates and outdoor pets also increased which further limited access to meters located outside.

When these meters are not able to be read, they are tracked with a COVID reason code, and estimated for that billing cycle. The quantity is as large as it is because Olameter maintained this safety measure for the remaining nine months of 2020.

8.2 Please explain why dog issues nearly doubled from 2018 to 2019 & 2020.

Response:

FEI understands that Olameter instituted a new dog policy in June of 2019 to address the threat from the animal hazard that meter readers face. Under this policy, meter readers are not to enter a yard that has a dog in it. To support the completion of a read, the meter reader is to attempt to find someone to take the dog indoors while they read the meter. If this does not occur then the meter is skipped and the meter read is estimated.

Since its rollout, this overall policy change has resulted in a significant increase to the number of estimated meter reads attributed to dogs.

8.3 Please explain why meter readers who are largely operating from a car to travel and outdoors for meter reading were so unavailable (e.g. was there an impact from government support during 2020 that reduced interest in employment?).

Response:

Please refer to the response to CEC IR1 6.1. FEI contracts the meter reading function to Olameter, which employs the meter reading workforce and as such, FEI does not have detailed information on staffing matters. However, based on high level information from Olameter and specific to 2020, the impacts of meter readers exhibiting symptoms or self-isolating and unable to attend work due to COVID-19 would be a factor in the decrease in available readers in 2020. However, a separate reason code for this was not created and as such, FEI does not have detailed information that can be attributed to this.

Please also refer to the response to CEC IR1 4.1 regarding the general challenges related to recruiting and retaining meter readers.

8.4 Please explain how seasonal conditions like vegetation have such a significant increase in quantity.

Response:

FEI clarifies that the reason for estimated meter reads titled “Seasonal Conditions / Obscured by Vegetation” combines two situations: seasonal weather conditions and meters obscured by vegetation. FEI was not implying that vegetation was a seasonal condition.

The number of meter reads estimated for reasons relating to seasonal weather conditions increases in years with extreme weather conditions, such as floods, extreme cold, and significant

snowfall. Meters that are estimated due to forest fire conditions are also captured under this heading. Weather conditions like these can make it impossible to access certain customer meters for periods of time and can also create safety hazards for the meter readers. In January 2020, temperatures in the province were well below normal, with record snowfall in the Lower Mainland. These factors contributed to the increase in estimated meter reads related to this category.

While the number of estimated meter reads due to seasonal weather conditions and vegetation did increase in 2020, the overall rate remained consistent with previous years. After removing the number of estimated reads due to COVID-19, 10.45 percent of all estimated reads in 2020 were attributed to seasonal weather conditions and vegetation. This is in line with the rates from previous years. This rate is calculated by dividing the number of estimated reads due to seasonal weather conditions and vegetation (101,429), by the difference between total estimated meter reads for 2020 (1,389,226) and number of estimated reads attributed to COVID-19 (418,793).

9. Reference: Exhibit B-1, Page 23

> Inaccurate bills, whether due to human error or estimates, often result in customer confusion on their actual energy use, resulting in payment issues, dissatisfaction, and inquiries in the form of calls, emails or chat requests into the contact centre. Although FEI does not separately track meter reading-related contacts by communications channel from customers, it estimates that of monthly meter reading-related inquiries there are approximately 2,800 interactions via telephone, email and chat requests.[18]

9.1 Please provide the average cost for FEI to respond to communications of this nature from customers.

Response:

The average cost for FEI to respond to communications related to customer concerns that bills may be inaccurate is estimated to be approximately $250 thousand per year.[3]

[3] As calculated by 2,800 interaction per month x 12 x cost per interaction as used for intercompany cross charge purposes.

10. Reference: Exhibit B-1, Page 24

> With Automation, FEI expects that its estimates would be in a similar range as FBC as a percentage of meter read requests, and fall within the range of one to two percent per year. As such, FEI estimates this would improve the accuracy of approximately 260,000 to 390,000 bills each year, all else being equal, resulting in an improved experience for a large number of customers each year.[20]

10.1 Please provide a quantitative estimate of the benefits for the utility and the customer for a bill being accurate versus needing bill estimating for the bill.

Response:

As discussed in the response to CEC IR1 35.1, all of the benefits that can be numerically quantified have been provided in Section 4.3.3 of the Application and included in the financial model (as detailed in Sections 6.2 and 6.3). Please also refer to the response to CEC IR1 69.1.

11. Reference: Exhibit B-1, Page 25 & 26

Table 3-7: Number of FEI Customer Complaints Received for Manual Meter Reading (2016-2020)

Complaint Category	2016	2017	2018	2019	2020
Meter Readers[22]	441	512	518	576	545
Vehicle[23]	13	16	22	23	17
Total	**454**	**528**	**540**	**599**	**562**

Table 3-8: Number of FBC Customer Complaints Received for Manual Meter Reading (2013-2020)

Complaint Category	Manual Reading		Automation					
	2013	2014	2015	2016	2017	2018	2019	2020
Meter Reading	10	24	22	5	1	3	0	0

11.1 Please provide a quantitative estimate for FEI's average cost for handling a customer complaint.

Response:

As discussed in Section 3.1.3 of the Application, complaints associated with manual meter reading activities are reviewed and investigated by Olameter with a response back to the customer in accordance with the performance standards set out in the contract.

Because these complaints are handled by Olameter, there is no incremental cost to FEI over and above the costs FEI is already paying to Olameter under the contract.

11.2 Please confirm that there is a reasonable expectation that the FBC experience with complaint reduction in regard to meter reading would be a good proxy for expected performance for an FEI implementation of AMI in regard to complaint reduction.

11.2.1 If not confirmed, please explain why not.

Response:

Confirmed.

12. Reference: Exhibit B-1, Page 28

Table 3-9: Summary of Established and Emerging Meter Reading Automation Drivers in North America[29]

	Established	Emerging
Summary of Drivers for Automation Projects	• Operational efficiencies such as remote reading and shut-off needs, timely and efficient maintenance, revenue protection, and reduced gas lost • Enhanced usage data for bill alerts, pricing, and supply monitoring • Increased customer bill accuracy • Improved customer experience	• Conservation and demand side management enabler • Data analytics opportunities (proactive issue identification) • Leak detection and pipeline monitoring • Emission reduction target enabler and associated societal benefits

12.1 Please confirm that FEI is expecting to benefit from each of the established drivers and each of the emerging drivers for its AMI project.

Response:

FEI expects that the AMI Project will deliver the established drivers identified in Table 3-9.

For the emerging drivers, FEI has identified leak detection and data analytics benefits. FEI will require experience operating the AMI system before confirming emissions reductions, and the extent of conservation and demand side management benefits.

12.2 Please provide quantification of each of the benefits included in Table 3-9 as they would apply to FEI's implementation of AMI, other than the quantifications previously asked for in the preceding CEC IRs.

Response:

All the expected benefits associated with the Project are listed and detailed in Section 4.3 of the Application. All of the benefits that can be numerically quantified have been detailed in Section 4.3.3 and included in the financial model (as detailed in Sections 6.2 and 6.3). Please also refer to the response to CEC IR1 69.1.

13. Reference: Exhibit B-1, Page 29 & Page 30

> gas meters in Canada have already been migrated to some form of Automation. The remaining approximately 5,000,000 meters that are not automated are attributable to FEI and two other utilities – Enbridge and Manitoba Hydro – both of which are cited in the study to be currently investigating the installation of some form of Automation in the near future.
>
> Once PNG(NE) has completed the deployment of automation technology, FEI will be the only remaining large regulated utility within British Columbia where meter reading is not automated.

13.1 Please explain why FEI has been nearly last in the country to adopt automation, where others have seen the benefits earlier and regulators have approved such investments earlier.

Response:

FEI has been investigating the adoption of automation of some form for many years.

In the past, FEI has always determined the benefits for customers and the Company offered by the available technology, combined with the relative cost of automation compared to the cost of existing operations, did not support the move to adopt automation.

However, as described in Section 3.2 of the Application, FEI is now facing increasing uncertainty in costs and availability within existing gas measurement markets that support manual meter reading as utilities trend toward automation across North America. In addition, recent innovations in gas measurement technology would now allow FEI to address evolving customer expectations and advance key areas of the Company's operation related to safety, resiliency and system integrity. These drivers, combined with the declining costs of automation technology, have led FEI to determine that moving to automation is now the best path forward for customers and the Company.

14. Reference: Exhibit B-1, Page 32

location), and that cost factors into customer rates. FEI does not have the data to provide an exact monetary amount based on safety incidents; however, in total, FEI is invoiced an average of $334,000[35] per year for meter reads that are estimated where an attempt to read has been made by Olameter.

Table 3-10: 2020 Safety Statistics for Manual Meter Reading

2020 Safety Incidents	Number of Incidents	Total Number of Days Missed
Animal/Insect Bite/Attack	7	0
Contusion	1	0
Extreme Weather	2	5
Eye Injury	1	1
Puncture/Laceration	2	0
Slip, Trip, Fall	17	288
Sprain, Strain	13	13
Grand Total	43	307

14.1 Please confirm that with AMI in place, the $334,000 cost for meter reads attempted but yet resulting in estimated billings would be saved and be a benefit of the AMI project.

Response:

Overall, with the AMI Project the costs of manual meter reading will be avoided and as such, have been reflected as a benefit in the financial analysis.[4] This includes the embedded costs of attempted reads that are estimated; however, this component of avoided costs has not been explicitly isolated. The total estimated value of the avoided cost for manual meter reading, inclusive of attempted reads that are estimated, is approximately $22 million per year, as shown in lines 4 and 5 of Table 6-5.

14.2 Please confirm this is in addition to the non-utility benefit of 86 fewer safety incidents for individual workers in the year.

Response:

FEI confirms that the avoided cost of manual reading is in addition to the benefit of fewer safety incidents for individual workers in the year. FEI clarifies that the total number of safety incidents in 2020 relating to manual meter reading in Table 3-10 is 43 (not 86).

[4] As noted in the Application, there is a small portion of meters that may still be required to be manually read; however, the costs of this have also been reflected in the financial analysis.

15. Reference: Exhibit B-1, Page 32

> • New meter readers (or meter readers who are new to a particular route) work less efficiently; they are unfamiliar with the routes and spend more time locating the meter on the premises. This also leads to a greater number of meter readings being estimated until the meter reader is familiar with the route; and

15.1 Please provide the turnover rate for meter readers that Olameter experienced in 2020.

Response:

Since meter reading is an outsourced function, FEI does not have detailed meter reader staffing information and as such, does not have the turnover rate for meter readers for any year. However, based on anecdotal information shared from Olameter throughout the course of the contract on the high level staffing challenges they face, FEI is aware that recruitment and retention of meter readers are challenging and have an impact on overall levels of estimated reads. As demonstrated in Table 3-5, supervisory estimates due to resource challenges is consistently the cause of over half of the estimated reads each year.

Please also refer to the response to CEC IR1 8.3.

16. Reference: Exhibit B-1, Page 36

> In that regard, FEI considers repatriation of the meter reading function in-house as the only manual meter reading solution that could be viable in the long term. In practice, this approach would give FEI direct control of the function and more influence over costs and quality. In-house meter reading would be more costly than the current outsourced model but would bring with it certainty over levels of service and future expenses.

16.1 Please provide the cost estimate for in-house meter reading that would be comparable to the cost for the Olameter services in 2020 and provide the Olameter cost for 2020 and confirm that this difference would be a future avoided cost achieved by adopting the AMI project.

Response:

The following table provides the 2020 cost estimate for in-house meter reading.

Meter Reading Capital and Costs - $millions	2020
Technology Setup Costs	1.4
Mobile Computing Tablets - 5YR Refresh	0.2
Vehicles - 9YR Refresh	3.0
Total Meter Reading Capital	**$ 4.6**
Cost of Service on Meter Reading Capital	1.1
Meter Reading Labour	12.7
Meter Reading Non Labour	3.4
Total Meter Reading Costs	**$ 17.2**

In 2020, the forecast capital cost to bring meter reading in house would be $4.6 million. The annual operating cost in 2020 would have been $17.2 million. That amount includes $1.1 million cost of service on the meter reading capital, $12.7 million for labour, and $3.4 million for non-labour expenses.

The total amount paid to Olameter in 2020 was $11.9 million. FEI notes price increases are expected for Olameter in 2021 and beyond.

FEI confirms the difference between Olameter's costs and the future cost of in-house meter reading would be a future avoided cost achieved by implementing the AMI Project. However, as discussed in the response to BCUC IR1 22.2, FEI anticipates that the cost of providing manual meter reading in house will become more comparable to third party costs in the future and as such, this difference is expected to lessen over time.

17. Reference: Exhibit B-1, Page 40 & 41

> There are expectations from customers for better information regarding their energy use and Automation is a critical component to meeting this need. In addition, and as further described in Section 8.2, both FEI and the Province have set significant targets for energy conservation in the coming decade.[43] Without Automation, the detailed data to support customer information needs is not available and FEI will find it increasingly challenging to keep up with customer expectations that continue to evolve. Similarly, without Automation customers will find it increasingly challenging to make informed energy choices that support customers, FEI and the Province in meeting long-term energy conservation goals.

17.1 Please estimate the additional customer conservation and efficiency which can be achieved under AMI versus what might be achieved under manual meter reading and continued analog metering.

Response:

At this time FEI is not able to quantify how much additional customer conservation and efficiency might be achieved if AMI is implemented. Please refer to the response to BCUC IR1 6.1 for further explanation.

17.2 Please provide the increased targets for GHG reduction that FEI is committing to alongside the Province of BC goals and contrast them to FEI's prior targets.

Response:

The provincial CleanBC[5] plan outlines GHG reduction goals[6] and, specifically for buildings, the plan projects to achieve 1.5 million tonnes (Mt) of GHG reductions through the 15 percent renewable gas mandate and a 0.5 Mt GHG reduction by supporting better and more energy efficient buildings.

As part of its commitment to helping the province achieve its climate objectives, FortisBC announced in 2019 a target, which aims to achieve a 30 percent reduction in its customers' GHG emissions by 2030 (referred to as 30BY30[7]). This is the only GHG reduction target FortisBC has set to date and aligns with the province's CleanBC plan, which provided a plan to get to a 30

[5] https://cleanbc.gov.bc.ca/.

[6] CleanBC emission reduction goals from a 2007 baseline include: 16% reduction by 2025, 40% reduction by 2030, 60% reduction by 2040 and 80% reduction by 2050. The provincial government has recently increased its climate ambition by stating it strives to be carbon neutral by 2050.

[7] https://www.fortisbc.com/about-us/climate-leadership/rethinking-bc-low-carbon-future#:~:text=30BY30%3A%20Reducing%20our%20customers'%20GHG%20emissions&text=Then%2C%20in%202019%2C%20we%20set,We%20call%20this%2030BY30.

percent reduction by 2030, using 2007 as the baseline year. FortisBC is also evaluating further opportunities to reduce GHG emissions to align with the province's 40 percent reduction target by 2030. The provincial government is expected to roll out additional policy measures later in 2021 to reach this target. In FortisBC's Clean Growth Pathway to 2050[8], four key areas are outlined that show our plan to support BC's vision to reduce GHG emissions aligned with the long-term deep GHG reduction targets to 2050.

As part of the 30BY30 target and aligning with the CleanBC plan, FEI has committed to a minimum Renewable Natural Gas (RNG) blend of 15 percent of all gas it delivers by 2030 in line with the 15 percent target set in CleanBC. Similarly, FEI's energy conservation program is a significant aspect of its 30BY30 commitment.

17.3 Please provide the approximate bill saving for a unit reduction in GHG as a consequence of conservation and efficiency investments and customer behavioural response to better information.

Response:

At this time FEI is not able to quantify the direct energy savings, and hence GHG reductions, due to the impact of customer behavioural response to more detailed energy use information. Please refer to the response to BCUC IR1 6.1 for further explanation.

[8] https://www.cdn.fortisbc.com/libraries/docs/default-source/about-us-documents/clean-growth-pathway-brochure.pdf?sfvrsn=1a4b811f_2.

18. Reference: Exhibit B-1, Page 41

Table 3-11: Potential Additional Benefits and Operational Opportunities of Meter Automation

Customer Benefits	Operational Opportunities
Better consumption data for customer use	Reductions in GHG emissions
The ability to offer enhanced DSM opportunities	A meter technology that is going to be available the next twenty years
The ability to offer enhanced billing options	Increased system resiliency
	Improved system planning abilities
	Better availability of data for operational and project use
	Better theft detection abilities
	Improved emergency response to gas odours and leaks
	Increased distribution system monitoring and alarms
	Improved integrity[45] management of the system
	Leak detection downstream of the meter

For a comprehensive description and summary of all benefits and opportunities of Automation, please refer to Section 4.

18.1 Please provide FEI's estimate of the GHG emissions reduction potential and describe any issues FEI has encountered in estimating this benefit and the solutions sought in order to complete such evaluation.

Response:

As discussed in Section 3.1.1.5 of the Application, the potential for GHG emissions reductions was calculated based solely on the reduction in the manual meter readings required for the FEI system. This accounts for approximately 1,100 tonnes of CO2e-related GHG emissions per year.

Additional potential GHG emissions savings, including fugitive leak detection downstream of the meter, reduction in truck rolls associated with customer shutoffs, and improved integrity management of the system, were not accounted for. The frequency of such events is highly variable and difficult to predict. As such, FEI expects that the estimated GHG savings provided in the Application constitute a conservative low-end estimate of potential GHG emissions savings. Data gathering post implementation of the AMI program is expected to identify the added GHG emissions savings.

18.2 Does FEI mean that its operational opportunities will enable it to offer enhanced DSM opportunities and that the customer benefit will be to reduce its energy use

bills and increase energy affordability as a consequence of added DSM opportunities, or do customers benefit directly? Please explain.

18.2.1 Please describe how customers benefit from gaining the ability to offer enhanced DSM opportunities.

Response:

FEI means that customers should be able to realize DSM related benefits from AMI due to more frequent and detailed information about their energy consumption enabling them to make more informed decisions about their energy usage and needs. AMI will also open up new opportunities for DSM programs, as outlined in Section 4.3.2.2 of the Application, potentially resulting in reduced energy use on bills and increased energy affordability for customers. Examples of customer benefits realized from this enhanced DSM programming include near real-time consumption reports to enhance commercial and industrial energy assessments and to enhance home energy reports for residential customers.

18.3 Please recast this table with columns for AMI Technology Attribute (what causes the benefit) the FEI Functional Ability (what FEI can do that it could not before because of the technology) and the Customer Benefit (what the customer sees as a benefit from what FEI can now do) or please provide a better comprehensive summary of benefits and quantify estimates of the customer benefits values (an example table is provided).

CUSTOMER BENEFIT	FEI ENHANCED FUNCTION	AMI TECHNOLOGY ATTRIBUTE
Lower Costs of Meter Reading	Autonomous Meter Reading	Digital Data & Communication
Lower Costs of Meter Reading	Elimination of Safety Risks	Digital Data & Communication
Enhanced DSM Bill Reduction	Accurate Data on Consumption	Digital Data & Communication
Behaviour Capture of FEI Offers	Accurate Data on Consumption	Digital Data & Communication
Reduced Customer Annoyance	Accurate Data on Consumption	Digital Data & Communication
Lower Meter Change Interruption	Ability to Determine Meter Accuracy	Digital Data & Communication
Lower Costs for Meters	Ability to Determine Meter Accuracy	Hourly Consumption Data
Behaviour Capture of FEI Offers	Real Time Understanding of Load	Hourly Consumption Data
Capture of FEI Billing Options	Real Time Understanding of Load	Hourly Consumption Data
Added Costs/Benefit of System	Improved Planning for System	Hourly Consumption Data
Added Costs/Benefit of System	Improved Project Planning	Hourly Consumption Data
Lower Costs of Theft	Improved Theft Detection	Hourly Consumption Data

Lower Costs of Gas	Gas Losses Detection - Reduced Loss	Hourly Consumption Data
Increased Societal Climate Benefit	Targeted GHG Reduction	Hourly Consumption Data
Reduced Risks of Pressure Loss	Real Time Control of Load	Automatic Shut Down of Use
Reduced Exposure to Shut Down	Real Time Control of Load Resilience	Automatic Shut Down of Use
Reduced Risk of Fire & Explosion	Emergency response to Leaks	Automatic Shut Down of Use

Response:

FEI provides the following updated Table 3-11 from the Application which provides a comprehensive summary of the benefits and opportunities referenced throughout the Application and the information requests to date. With respect to CEC's request to quantify the benefits, FEI notes that all the benefits that can be quantified are included in the financial analysis provided in Section 6 of the Application.

Customer Benefit	Application Reference	IR Reference
Better consumption data for customer use	Section 4.3.2.2	BCUC IR1 11.1 and 11.2 BCSEA IR1 15.1 and 15.3
The ability to offer enhanced DSM opportunities	Section 4.3.2.2	BCUC IR1 6.1 and 8.1 CEC IR1 18.2, 18.4, 84.1, 86.2 BCSEA IR1 8.1 and 8.3
The ability to offer enhanced billing options	Section 4.3.2.4.9	BCUC IR1 8.1 CEC IR1 18.5

Operational Opportunities	Application Reference	IR Reference
Reductions in GHG emissions	Section 4.3.2.1	BCSEA IR1 30.1 CEC IR1 17.2 and 18.1
A meter technology that is going to be available the next twenty years	Section 4.3.2.3.2	RCIA IR1 31.6
Increased system resiliency	Section 4.3.2.4.1	BCUC IR1 1.5 BCSEA IR1 9.1 and 17.2 CEC IR1 18.7 and 38.1
Improved system planning abilities	Section 4.3.2.4.2	CEC IR1 89.1
Better availability of data for operational and project use		CEC IR1 18.7 and 89.1
Better theft detection	Section 4.3.2.4.4	BCUC IR1 13.7 BCSEA IR1 18.1 RCIA IR1 23.3

Operational Opportunities	Application Reference	IR Reference
Improved emergency response to gas odours and leaks	Section 4.3.2.4.5	BCUC IR1 2.1 BCSEA IR1 18.1
Increased distribution system monitoring and alarms	Section 4.3.2.4.7	BCSEA IR1 9.1 and 9.2 CEC IR1 44.1 and 44.3
Improved integrity management of the system	Section 4.3.2.4.8	BCSEA IR1 9.1 and 9.2 CEC IR1 44.1 and 44.3
Leak detection downstream of meter	Section 4.3.2.4.6	BCUC IR1 2.1, 3.1.1 and 3.4

18.4 Please provide FEI's estimate of additional and enhanced DSM opportunities as a consequence of the AMI Project and FEI's evaluation of the participating customer benefits and the overall customer DSM benefits from the AMI Project's meter technology and the expected enduring nature of the digitization, automation and data benefits.

Response:

AMI infrastructure can enhance DSM program design and implementation. All of the expected DSM benefits associated with the AMI Project are listed and detailed in Section 4.3.2.2 of the Application. Some examples of potential DSM programming that could be leveraged by automation and the data collection and analytics opportunities of AMI include home energy reports, demand response type programs, and pay-for-performance programs.

18.5 Please describe the enhanced billing offering potentials for FEI and quantify their potential benefits for customers.

Response:

As described in Section 4.3.2.4.9 of the Application, enhanced billing options include consolidated billing for multiple locations and the ability for FEI to offer customers a choice of their billing date. FEI is not able to quantify these benefits at this time as the forecast of these benefits is dependent on customer interest and enrollment in such options. Generally, lower print and payment processing costs may result from consolidated billing and customers may benefit from lower late payment charges and improved experience with the ability to choose a billing schedule that best supports their household budget.

18.6 Please describe and quantify the extent of theft and current detection as well as the potential for detecting this and protecting the FEI revenues and the customers' rates.

18.6.1 Please relate this expectation to the FBC experience in reducing theft with AMI.

Response:

The majority of theft discovered by FEI is a result of meter tampers and unauthorized reactivations of meter lock-offs. Consequently, the amount of gas for which FEI is unable to recover payment from the associated customers is relatively low. For example, in 2020, gas thefts with an annual impact of less than 500 GJ were discovered, with the majority of investigative and gas charges recovered from those parties. FEI's advanced meters contain new theft deterrent features. Advanced meters will transmit an alarm to FEI when they detect air in the meter, which would occur if someone is tampering with the meter set. Also, advanced meters will send an alarm to FEI when reverse flow is occurring through the meter. Reverse flow is a result of someone attempting to reinstall the meter backwards at their premises, in order to reduce their metered consumption. FEI is unable to quantify how much theft is occurring today from these two scenarios but expects the advanced meters will lower gas theft both through deterrence and detection.

Although FEI has discovered larger gas thefts upstream of customer meter sets, these are relatively infrequent. Based on the results of the AMI pilot and evaluation of the use of upstream metering to identify potential theft, as discussed in the response to BCUC IR1 13.6, no enhanced ability to identify these types of larger, more infrequent thefts is expected to result from the Project.

In contrast, the thefts experienced by FBC prior to the deployment of its AMI project were primarily related to marijuana grow-operations as detailed in FBC's AMI CPCN application. The use of energy-balancing strategies enabled by upstream metering and electric AMI metering improved FBC's theft detection and deterrence rate. Ultimately, however, the legalization and regulation of marijuana production have helped to reduce these types of theft.

18.7 Please describe the impacts on system resiliency, gas system planning and the project planning uses for the improved information from the AMI on specific loads.

Response:

Please refer to Section 4.3.2.4.1 of the Application for a discussion of the system resiliency impacts. System planning impacts are provided in Section 4.3.2.4.2 of the Application.

The additional data provided by the AMI system will be helpful during project planning and execution. During the planning phase, AMI data can be used to confirm the expected demand on the section of the gas system that will be out of service during the project. This will allow FEI to ensure available alternative gas system feeds will meet the expected demand. During the project execution phase, the AMI data can be used to monitor system performance and by doing so, limit the possibility of a gas system outage.

B. PROJECT ALTERNATIVES

19. Reference: Exhibit B-1, Page 43

> To address the Project need for Automation as described in Section 3, FEI compared the two Automation technologies available in the gas metering industry. Those are:
>
> - Partial Automation of meter reading using AMR technology to enable drive-by meter reading; and
> - Full Automation of meter reading using AMI technology characterized by a fixed two-way communication network.

19.1 Please confirm that FEI selected its alternative analysis based on competing automation technologies because they have concluded that the "business-as-usual" alternative will become infeasible in the future, in FEI's view.

19.1.1 Please confirm that in substitute FEI has included the "baseline" as a continuation without approval of the AMI Project.

Response:

Confirmed.

19.2 Did FEI consider any sub-alternatives with regard to AMI technology implementation or did FEI conclude initially that there would be just one view of AMI implementation? Please explain and identify any sub-alternatives that FEI considered.

19.2.1 If no, please explain why not.

19.2.2 If FEI did consider any sub-alternatives, please explain why each was not pursued.

Response:

Please refer to the response to CEC IR1 69.3 for the AMI deployment alternatives FEI considered and for an explanation of why these options are not viable.

20. Reference: Exhibit B-1, Page 43

Table 4-1: Overview of Alternatives

Alternatives: Project Need Analysis

EVALUATION	SCORE		
FULLY: Project need is fully met	✓		
PARTIALLY: Project need is partially met	!		
NOT: Project need is not met	✗		
	AMI	AMR	BASELINE
Automation is more accurate and convenient for customers than FEI's current meter reading practices, which are highly manual, are vulnerable to errors and can be inconvenient for customers	✓	!	✗
Automation is becoming the industry standard, thereby changing both market conditions and customer expectations	✓	✗	✗
Automation alleviates the cost and service risks of manual reading and provides a long-term cost effective alternative	✓	!	✗
Automation provides additional customer benefits as well as operational opportunities that support the safety, resiliency and efficient operation of the gas distribution system	✓	✗	✗

20.1 Please confirm that FEI's simple comparison of the features of AMI and of AMR leads to the conclusion that AMI is the only option that can deliver all of the automation benefits, which FEI believes are needed for future customer service.

Response:

The intent of Table 4.1 is to provide the reader with a visual summary of the AMR and AMI alternatives' ability to meet the Project need.

A detailed analysis of the AMR alternative's ability to meet the project need is provided in Section 4.2 of the Application and Section 4.3 contains the AMI analysis. These detailed analyses explain why FEI believes AMI is the only alternative that meets all of the Project needs.

20.1.1 Effectively, does this result mean that FEI is analyzing its proposed project against a straw dog alternative, which cannot be considered a real alternative from FEI's perspective?

Response:

FEI is unclear of the meaning of a "straw dog alternative" in this context. FEI can confirm that it has identified and evaluated all viable automation technologies as part of the Application and in accordance with the BCUC's CPCN Guidelines[9]. However, as noted in the Application, FEI identified early in its evaluation of AMR that it would not address all four drivers of the Project

[9] Appendix A to Order G-20-15.

need and therefore AMR is not a viable alternative to the AMI Project. Please also refer to the response to CEC IR1 20.1.

21. Reference: Exhibit B-1, Page 45

> For the AMR alternative, FEI investigated a drive-by solution in which a single meter read would be collected from each meter once per billing cycle on a monthly basis. Each work day, meter readers would drive through parts of the service territory along routes designed to read every meter each billing cycle. At the end of each day, the vehicular-based mobile meter reading base station would be connected to FEI's network and the customer readings would be transmitted to FEI's billing systems as described above. Finally, this approach to meter reading is assumed to be in place for over 20 years, which is the expected service life of AMR technology based largely upon the capacity of the battery within the communication module attached to each meter.

21.1 Please indicate whether or not the battery within the communication module attached to each meter was capable of change out replacement, such that 20 years would not necessarily be a limitation for this technology option.

Response:

Please refer to the response to BCSEA IR1 33.1.

21.2 Please indicate the timeframes for the meter data collected once per billing cycle (i.e. would FEI have daily and/or hourly data).

Response:

In an AMR scenario, FEI would collect one read per billing cycle which corresponds to the cumulative consumption that has flowed through the meter since it was first deployed. After subtracting the previous month's reading from this register read, the monthly consumption is the result. FEI would not have daily or hourly data in the AMR alternative.

22. Reference: Exhibit B-1, Page 47

> - The inability to complete "on-demand" reads would mean off-cycle manual reads would continue to be required for service disconnections, reconnections, vacant premises, service interruptions or other reasons that necessitate a meter read; and
> - The resolution of inquiries raised by customers or FEI would continue to require time and expense as special visits would need to continue outside of the regular meter reading schedule.

22.1 Please explain why the AMR solution FEI obtained was not able to provide data on a drive-by communication basis and whether or not any of the other potential AMR solutions could do this and/or whether or not the provider of the AMR solutions has been or will be working on a solution to enable this.

Response:

The AMR solution identified by FEI as the proposed AMR alternative is capable of drive-by reading. However the drive-by reading process considered in that alternative is a mass collection process where many meters are programmed into a collection device and a large volume of reads are received all at once while driving by customer premises.

In contrast, when an off-cycle read of the type referenced in this question is required, it is considered a manual read due to the requirement to program a collection device to receive one specific meter read, followed by a site visit with the intention of reading that single meter. The device used to collect the manual read is likely a simple handheld rather than a vehicle-mounted AMR mass reading system.

22.2 Would AMI resolution of some inquires raised by customers similar to the AMR solution continue to need visits to customer sites and, if so, is the AMR solution more constrained and why is it more constrained?

Response:

With the deployment of an AMI solution, the resolution to customer inquiries related to the advanced meter would only require a visit to the customer's meter if the meter is not connected to the network due to being out of the coverage area, the customer requested having it radio-off, or if the meter was malfunctioning. Alternatively, with the deployment of an AMR solution, in order to resolve the majority of meter-related inquiries, FEI will continue to incur the time and expense necessary to complete a special meter reading visit to the customer's gas meter outside the meter reading schedule.

23. Reference: Exhibit B-1, Page 48

> AMR offers no improvement to the amount, timing or availability of consumption data for customers to use in informing their energy choices, as meter readings would still be obtained and recorded monthly for billing purposes. In addition, FEI would continue to be unable to offer enhanced Demand Side Management (DSM) programs to further support customers with opportunities to support energy conservation and save money. In the long-term, as customers continue to expect access to the detailed information to make fully informed energy use decisions, the AMR alternative would leave FEI to face a growing risk of failing to meet those expectations.

23.1 Please describe the AMR limitation in this regard (for instance, is the meter technology constrained in its reading frequency and/or its reading storage capability and, if so, could AMR operate with meters having better reading frequencies and reading storage capabilities and does the AMR provider have any intention of enabling better data).

Response:

The limitations created by using an AMR solution are the direct result of the reading frequency of each device. Specifically, data can only be collected by the system when there is a mobile AMR reader in close proximity to each device (less than 250 metres). Additionally, drive-by AMR solutions are generally designed to collect one read per meter read cycle (monthly) across the entire meter fleet, as opposed to transmitting hourly energy consumption data for 30+ days all at once. In contrast, AMI-enabled devices collect hourly interval data and transmit the data to FEI every 4 hours.

Please refer to the response to CEC_CONF IR1 105.4 for further information regarding collection of interval data using AMR.

24. Reference: Exhibit B-1, Page 48

> Additionally, the deployment of AMR technology would mean the risk associated with procuring diaphragm meters at a reasonable price would continue to exist as the number of meter manufacturers is decreasing from three to two, as discussed in Section 3.3.2. This risk would be compounded as gas meter manufacturers are expected to continue transitioning toward ultrasonic meters. As such, an investment in AMR may leave FEI facing an escalating risk of being locked into a commitment to a technology for over 20 years that is currently trending toward obsolescence in the long term.

24.1 Please indicate whether or not FEI has any understanding from the potential AMR provider whether or not they may be in the future moving to ultrasonic gas meters and adapting their AMR platform, or any other measures to avoid obsolescence.

Response:

FEI's understanding is that all three of the approved gas residential meter vendors in Canada are moving towards ultrasonic meters, but two of the three vendors will, for the time being, continue to offer residential diaphragm meters that are compatible with existing AMR technology.

25. Reference: Exhibit B-1, Page 49

- Advancing the resiliency of the system, including the ability to monitor load on the system, conduct targeted temporary shutdowns to reduce load, and enable timely restoration of service;
- Improvements to system planning which requires granular gas usage and system pressure data to model customer usage patterns which help to define emerging capacity constraints;
- Improvement to the integrity management system in relation to the monitoring for pipeline corrosion;
- Availability of field data to support operational and project work;
- Detection of smaller leaks and unintended gas flows and timely response to larger leaks;
- Enhanced safety with the ability to shut off gas flow remotely;
- Improved safety for the meter reading function; and
- The ability to offer enhanced billing options for customers.

25.1 Please provide FEI's quantitative valuation estimate of each of the benefits in order to demonstrate that the difference between the technologies for this array of benefits is substantial and significant, and is not available from the AMR technology.

Response:

All the expected benefits associated with AMR are listed in Section 4.2 of the Application and all of the AMR benefits that can be numerically quantified are listed in Section 4.2.3.

All of the expected benefits from the Project are listed in Section 4.3 of the Application and all benefits that can be numerically quantified have been detailed in Section 4.3.3 and are included in the financial model (as detailed in Sections 6.2 and 6.3). Please also refer to the response to CEC IR1 69.1.

Finally, Table 4-4 of the Application demonstrates the difference in the benefits achieved by AMI versus AMR is substantial with a delivery rate impact that is less than half a percent higher.

26. Reference: Exhibit B-1, Page 51

Table 4-2: AMR Alternative: NPV of Capital and Operating Costs ($ millions)

Financial Summary	AMR
Capital Costs:	
Meter Capital	$458.9
Project Management	$26.2
Software Capital	$2.2
Network Capital	$0.3
Non-Meter Capital	$5.4
AFUDC	$3.6
Total Capital	**$496.6**
O&M Costs:	
Meter Reading Costs	$102.0
Operations, Contact Centre and Meter Shop O&M	$55.4
New O&M	$7.3
Total O&M (incl. Capitalized Overhead)	**$164.7**
Baseline Capital[1]	$372.8
Baseline O&M[2]	$323.5
AMR Incremental Capital[3]	**$123.8**
AMR Incremental O&M Savings[4]	**($158.8)**

Notes:
[1] Appendix G-1, Page 1, Line 13
[2] Appendix G-2, Page 1, Line 21 less 16 percent for capitalized overheads[17]
[3] AMR Capital, $496.6, Less Baseline Capital $372.8
[4] AMR O&M, $164.7, Less Baseline O&M $323.5

26.1 In addition to the utility perspective on a cost/benefit present value of revenue requirements basis, there is the perspective of the customer for the services from FEI as the utility. Please confirm that the ability for the meter reading alternative FEI selects to provide customer benefits over and above cost benefits is a reasonable additional perspective.

Response:

Although FEI considers the rate impacts that flow directly from revenue requirements to be of significant interest to customers, FEI can also confirm that it is important to consider all customer benefits, both qualitative and quantitative.

Please refer to Sections 3.4 and 4.2.2.4 of the Application for details regarding the customer benefits of automating the manual meter reading function. Please also refer to Section 4.3.2.4 for additional information regarding the customer benefits offered by AMI.

26.1.1 Please confirm that in the case of AMR and AMI there are many benefits providing direct service values to customers' quality of life, through reduced risks and beneficial outcomes.

Response:

Confirmed. Please refer to Section 4 of the Application for an assessment of the AMR and AMI alternatives and a discussion of the benefits associated with each.

Please also refer to Table 4-1 which summarizes how AMI fully meets each of the Project needs.

27. Reference: Exhibit B-1, Page 52

> Meter capital for the AMR alternative includes estimated costs of retrofitting each existing diaphragm meter with an electronic module. Therefore, the capital cost includes both the visit to each meter as well as the cost of the module to support AMR. The AMR equipment costs are estimated based on the results of the network vendor procurement process, described in Section 5.3.3.1, and are largely made up of the cost of the communication modules that would be attached to FEI's existing residential and commercial diaphragm meters. Deployment costs are estimated based upon RFP responses (Section 5.3.3).

27.1 Please explain whether or not the electronic module added to the existing diaphragm meter is removable and reusable when a meter is exchanged out and replaced.

27.1.1 If so, what is the expected life of the electronic module?

Response:

Electronic modules attached to diaphragm meters are re-useable and have an expected life of 20 years. The expected life of the module is directly tied to the battery life which is an integrated component of the module and not changeable.

27.2 Please provide the expected meter replacement occurring over 20 years in terms of the percentage of meters being turned over each year.

Response:

FEI estimates that an average of 5.6 percent (58,800) of the installed base of residential meters will need to be exchanged each year for the next 20 years.

28. Reference: Exhibit B-1, Page 52

> Under the AMR alternative, FEI's existing meter exchange, bypass valve, and regulator replacement programs would continue to be completed as part of FEI's existing sustainment capital program and have been included in capital spending to provide the full costs over the analysis period.

28.1 If the costs of these additional programs are being incurred over the timeframe, how are the benefits of these programs being factored in over the timeframe?

Response:

Both scheduled and unscheduled (due to failure) meter exchange programs are part of FEI's current (Baseline) meter management system and will remain unchanged under the AMR alternative path. Thus, the cost benefit analysis is the same as status quo. Please refer to section 4.2.3 of the AMI application for the AMR financial analysis.

For additional information on the bypass valve program, please refer to the response to RCIA IR1 3.2.

For additional information on the regulator replacement program, please refer to the response to BCUC IR1 21.1.

28.1.1 How long are these programs going to be running for implementation in the future and to what % completion across total meters will they reach?

Response:

The meter exchange program is mandated by Measurement Canada and will remain in place with no end date for as long as meters are in service.

The bypass valve program is approximately 20 percent complete and based on estimated meter exchange volumes, is expected to be substantially complete by 2035.

The regulator replacement program started in 2003 and will continue in parallel with the existing meter exchange program.

28.1.2 How far along (%) are these programs in implementation?

Response:

Please refer to the response to CEC IR1 28.1.1.

28.1.3 Does the implementation of these programs result in meters with shorter lifecycle left being upgraded?

Response:

Yes, for purposes of developing the AMR alternative FEI assumed meters with shorter lifecycles would be fitted with an AMR module.

The AMR alternative will add an AMR module to the existing meter irrespective of where the meter is in the lifecycle. The existing meter exchange program would proceed on the same schedule as the Baseline scenario and the AMR deployment would be coordinated where practical.

28.1.4 Do the benefits of this implementation continue after a meter with these upgrades is exchanged out and replaced?

Response:

Yes, the benefits of the bypass valves and regulator replacements will continue after future meter exchanges.

28.1.5 Do the replacement meters all have the attributes being added as part of the FEI sustainment capital program?

Response:

All costs associated with meter exchanges, including bypass valves and regulators if needed, are included in FEI's sustainment capital.

28.1.6 Have these programs been suspended given that an AMI project is potentially going to proceed?

Response:

No, FEI's existing meter exchange program, bypass valve, and regulator replacement programs have not been suspended as the AMI Project has not been approved yet. If the AMI Project is approved, FEI will then be requesting approval for meter exchange dispensation from Measurement Canada (MC) in order to suspend the qualified small commercial and residential meter exchange program. If MC approval for meter exchange dispensation is granted, the bypass valve and regulator replacement programs will also be temporarily suspended for those groups of meters until FEI starts the advanced meter deployment phase of the AMI project.

Please refer to the response to BCUC IR1 16.2 for the projected timing of MC dispensation approval and advanced meter deployment.

29. Reference: Exhibit B-1, Page 53

> This category of O&M costs relates to estimates for O&M expenses that would be impacted by deploying an AMR system, such as operations field work, customer contact centre costs, and compliance work in the meter shop. An AMR system would provide some benefits to FEI in these areas, including improved productivity and lower operating costs related to meter reading O&M. The prospect for bill errors resulting from manual entry errors would also be significantly

29.1 When FEI has estimated the reductions in the number of meter readers and in other parts of the operation, has FEI also included reductions in the human resources and management time required to recruit and train meter readers on an ongoing basis and included this in the benefits?

29.1.1 If so, please provide quantification of the reductions in human resources and management time.

Response:

Currently, FEI does not contribute human resources and management time to train meter readers on an ongoing basis because the meter reading workforce is presently employed by Olameter.

However, the costs associated with the administration of the manual meter reading function are included in the total avoided operating costs of the Baseline and as such, are included in the calculation of the Project benefits.

30. Reference: Exhibit B-1, Page 54

> 37 incorporate a remotely operated gas shut off valve. Finally, similar to AMR, the AMI technology
> 38 is expected to offer a 20-year service life limited largely by the capacity of the battery.

30.1 Please provide details on the battery which has this service life limiting attribute.

30.1.1 Is it the same battery as the one used in the AMR technology?

30.1.2 Can the battery be changed out?

30.1.3 Does the manufacturer have plans for providing a battery upgrade capability?

30.1.4 Does FEI have any plans for developing life extension options for this AMI?

Response:

Please refer to the response to BCSEA IR1 33.1. The advanced meter has an expected service life of 20 years, which is dictated by the battery life. FEI is unaware of any life extension options for advanced meters.

31. Reference: Exhibit B-1, Page 55

> FEI investigated the AMI alternative that replaces existing residential and commercial diaphragm meters with advanced meters and retrofits communication modules within the remaining meters including larger commercial and industrial meters. This approach would allow all meters in the fleet to be connected to the AMI network. FEI chose the advanced meter option for the AMI alternative because the AMI module approach would provide a limited ability to meet the Project need compared to the advanced meter. For instance, the deployment of AMI modules retrofitted onto diaphragm meters would lead to:

31.1 Does FEI's decision to choose the advanced meter option mean that all FEI meters will need to be changed out in the future?

Response:

FEI's decision to choose advanced meters means exchanging nearly all existing meters to advanced meters in the near future (2023 to 2026) as described in the Application. All meters have a finite life and will need to be changed out at some point in the future. This is not a specific outcome of FEI's decision to choose the advanced meter option as the life expectancy for FEI's current diaphragm meters is 18 years.

31.2 Please confirm that this choice is primarily predicated on the advanced meter capabilities of having a remotely activated shut off valve.

Response:

The remotely activated shut off valve was not the primary driver for choosing the AMI Project over an AMR alternative. As explained in Section 4.4 and shown in Table 4-4 of the Application, FEI identified AMI technology as being the most appropriate solution for best addressing all of the Project drivers. The remotely activated shutoff valve is only one of the capabilities that makes an AMI system most suitable for meeting FEI's needs.

31.3 Please provide the quantification of the benefit of the shut off valve.

Response:

FEI confirms that the shutoff valve benefits that can be quantified have been included in the AMI financial analysis contained in Sections 4.3 and 6 of the Application. Please also refer to the response to CEC IR1 69.1.

32. Reference: Exhibit B-1, Page 55

> FEI's AMI alternative would include the installation of two-way network infrastructure to support wireless delivery of data between both the advanced meters and other field devices and FEI's existing enterprise information systems. Each advanced meter includes a shut-off valve to support remote control of the gas flow to each customer meter.

32.1 Does the FEI choice of advanced meter support potential communication with on-site appliances such as hot water heaters or furnaces?

Response:

Please refer to the response to CEC IR1 59.2.

32.2 Please discuss the cost difference, if any, in having a two-way network communication infrastructure versus a one-way communication infrastructure.

Response:

FEI assumes that this question is referring to a one-way fixed communications infrastructure as opposed to a one-way mobile communications infrastructure which is the AMR alternative already discussed in the Application.

The difference in cost between one-way and a two-way communications infrastructure is not likely to be substantially different for a gas AMI network.

In an AMI network, whether one-way or two-way, each meter will still need a similar transmitter; therefore, this cost will not change substantially. Also, and especially for gas meters because they are powered by a battery, the power level of the transmitter is constrained. The low power of the meter essentially means that the total number and location of base station sites required will not be reduced for a one-way network compared to a two-way network.

The cost of a network is highly dependent on the cost of the transmitters and the number of sites required. Since neither the number of transmitters, the meter radio properties, nor the number of sites required is materially different between the one-way or two-way scenarios, the costs for building and maintaining the two networks would be similar.

33. Reference: Exhibit B-1, Page 56

> An AMI alternative would allow FEI to fully automate the manual meter reading function by enabling the Company to collect hourly meter reads six or more times per day over a fixed communication network. Although a small number of reads would still need be collected manually to accommodate customers that choose to have their advanced meter read manually (estimated to be 2 percent) or for those meters that are located in areas where it is not economically feasible to install a fixed network (estimated to be 1.5 percent), AMI would significantly reduce the need for manual meter reading services.

33.1 Please confirm that the manual meter reading could still have the full granularity of data, and that it could be digital data so that analysis regarding the system could be close to 100%, although not in real time.

Response:

Assuming the proposed AMI project as described in the Application is approved and completed, there are three scenarios that will require ongoing, manual reading.

1. The customer meter is not within the coverage area of the AMI network;
2. The customer has requested radio off; or
3. Wireless communications to the customer meter is temporarily malfunctioning and it cannot be read by the fixed network system.

For the first scenario, as discussed in the response to BCUC IR1 9.3, meters would be read by a drive-by system. For this scenario, only the latest register read at time of collection is retrieved, no interval data is available.

For scenarios 2 and 3, meters would be read by a technician physically connecting to the meter with a portable optical probe. In this way, meter readings (including interval data) would be collected.

33.2 Is the primary concern of customers wanting manual meter reading maintained that they do not want RF communication related to meter communication around the outside of their home, or is it based on something else? Please explain.

Response:

Please refer to the response to BCUC IR1 10.1.

33.3 Could FEI install metering for a customer's gas service at a location in public space where the customer's interconnection to the distribution system take off is located?

Response:

No, FEI is not permitted by municipalities to install gas meters on municipal property in the public road allowance. Gas meters in municipal road allowances would impede the intended land use and are considered a safety hazard as they could become tripping hazards and are subject to damage from vehicles. In addition, piping downstream of the meter outlet is typically customer-owned and would require the customer to maintain the piping.

33.4 Would it become more feasible in the future for the locations where fixed communications infrastructure would be prohibitively expensive to link communications through the emerging space satellite communications infrastructure? Please explain why or why not.

33.4.1 If it would be feasible, would FEI consider such an option in the future? Please explain.

Response:

FEI does not expect space satellite communications infrastructure will become a feasible option for gas meters in the foreseeable future, at least not as a direct to meter communications option for two main reasons:

- A relatively high transmit power is needed to allow two-way communications to a satellite in orbit and would significantly decrease battery life; and
- Satellite communications require a large, well-aimed antenna. While technically possible, logistically it would be very challenging to affix such a device to customer premises.

Currently, space satellite communications infrastructure is used as backhaul for AMI fixed base stations in locations where more cost-effective options like wireless cellular are not available. Using satellite backhaul will be a feasible option for FEI during deployment of the proposed AMI Project for this application.

34. Reference: Exhibit B-1, Page 57

> Finally, AMI would provide environmental benefits by reducing vehicle usage. Overall, vehicle usage would decrease by approximately 90 percent as meter readers driving to collect regular meter reads and off-cycle reads would be replaced with the collection of meter reads through a fixed network. This reduction in vehicle usage is estimated to create a net reduction in GHG emissions by 1,100 tCO2e.

34.1 Please confirm or otherwise explain that this 1,100 tCO2e is an annual number and not a billing cycle number.

Response:

Confirmed. Please refer to the response to BCSEA IR1 14.4.

35. Reference: Exhibit B-1, Page 57

- Near real-time consumption reports to enhance commercial and industrial energy assessments, home energy reports for residential customers, measurement and verification activities and DSM program evaluation;
- Increased customer awareness of energy consumption on an end-use or time-of-day perspective may cause them to use less energy;
- Providing customers with the ability to identify their estimated usage for the billing cycle in advance would enable proactive opportunities to reduce use;
- Providing FEI with data to better characterize customer segments in order to make even more informed decisions when planning for future DSM programs. For instance, this data would help better inform the Residential End Use Study, Commercial End Use Study and Conservation Potential Review; and
- Gas AMI devices may be used to gather real-time data when conducting pilots and demonstrations for new natural gas saving technologies rather than FEI being required to purchase separate data loggers for this purpose.

35.1 Please provide a quantification of each of the benefits listed above.

Response:

All of the benefits that can be numerically quantified have been detailed in Section 4.3.3 of the Application and included in the financial model (as detailed in Sections 6.2 and 6.3).

Please also refer to the response to CEC IR1 69.1.

36. Reference: Exhibit B-1, Page 58

> Providing adequate information in a timely manner combined with offering DSM programs that give customers the ability to make effective energy use decisions in support of energy conservation and saving money, would enable FEI to meet the evolving expectations of customers in the long-term. In addition, AMI will provide better information for use by FEI in its COS Analyses for the purposes of rate design.
>
> AMI technology is scalable for customer growth, and therefore would support the same services and functions for more meters and other field devices in the future. In addition, the network is designed with the capability to carry data for other utilities within FEI's service area, which may create revenue opportunities for FEI and its customers in the future.

36.1 Will FEI and FBC be providing combined energy use information to their joint customers?

Response:

Customers in the shared service territories of FEI and FBC have self-service access to their total energy consumption information via the customer portal, Account Online. While consolidated energy use information is not available because the two companies are unable to share customer information in accordance with privacy obligations, the portal does provide access to complete energy consumption information in a single place for customers. With enhanced gas energy use information available as a result of AMI, joint service territory customers will have the benefit of more easily comparable information between the two energy sources than they have today.

36.2 Would FEI consider working jointly with BC Hydro to provide combined energy use information to their joint customers?

Response:

Please refer to the response to CEC IR1 36.1. For privacy reasons, FEI is prevented from sharing customer information with other companies.

36.3 Would FEI consider enabling its communication infrastructure network to be utilized by municipal water metering once the water metering becomes capable of providing more granular data?

Response:

Yes, FEI would consider enabling its communication infrastructure network to be utilized by municipal water metering provided that FEI would still be able to maintain the integrity, safety, and security of the network for its own customer metering data.

36.4 Might these sorts of combined efforts lead to additional benefits for the utilities?

Response:

One of the potential benefits for FEI's customers is to leverage the AMI network infrastructure to transmit non-gas metering data (e.g., water metering data for example) for municipalities, which could generate additional revenue to offset Project costs to the benefit of all FEI ratepayers.

36.5 Please quantify the potential revenue opportunity under some specified assumptions with respect to shared use of this infrastructure platform.

Response:

To date, FEI has had discussions with a number of municipalities across BC for two main purposes:

- To understand which municipalities are developing water metering programs; and
- To introduce FEI's AMI project and the potential to use the network infrastructure available for their planned water metering programs.

The goal of these early discussions has been to attempt to quantify the number of metering endpoints each municipality is contemplating and also to communicate the timelines of FEI's AMI Project deployment schedule to better understand how FEI's timeline coincides with each municipality's schedule.

At this point in time, it is too early for FEI to quantify the potential revenue opportunity with respect to the shared use of its infrastructure.

37. Reference: Exhibit B-1, Page 57

> AMI would allow FEI to eliminate the risk associated with procuring diaphragm meters at a reasonable price. Furthermore, as the meter manufacturers continue to transition to ultrasonic meters, FEI would not be exposed to the risk of a shrinking meter supply over the long-term.
>
> As gas meter manufacturers continue to focus resources toward development of AMI technology, the risk of technological obsolescence would be fully mitigated with the AMI alternative. Furthermore, as AMI technology is designed with a fully functioning two-way network, FEI's customers and the Company could benefit from future innovations such as potential enhancements to the meter capabilities through remote firmware upgrades, connection of new types of field devices to the network and increased capabilities through data analytics.

37.1 Please confirm that, given the potential for diaphragm meter obsolescence, FEI would likely need a complete meter change out to advanced smart meters at some point in the future anyway.

Response:

The risk of technological obsolescence is one of a number of factors that contributed to FEI proposing the AMI Project.

37.2 Is it fair to say that the AMI Project is primarily a question of timing and the values of adopting particular attributes and features of what can be achieved with the new capabilities?

Response:

Please refer to the response to CEC IR1 13.1.

37.3 Please provide a quantified estimate of the potential values of these additional innovations and features possible with the new AMI infrastructure.

Response:

Please refer to the response to BCOAPO IR1 6.1.

37.4 Please confirm that the communications infrastructure will be relying on an electric system energy source at points in the network requiring power.

Response:

Confirmed. Communications infrastructure sites, such as base station locations, will be powered by grid-supplied electricity.

38. Reference: Exhibit B-1, Page 59

> If at any point during a gas supply emergency FEI deems it necessary to reduce load to balance the system, AMI would allow for surgical reduction of load to minimize the disruption of service to customers. AMI would also allow FEI to confirm that interruptible customers have complied with any requests to adjust their gas usage. Finally, the Company would be capable of measuring the impact of appeals to the public to reduce load, minimizing the service interruption to customers.

38.1 Please quantify the probability of a gas supply emergency requiring reducing customer loads to meet the needs of maintaining the operational integrity of the gas system or effectively its resiliency.

Response:

Please refer to the response to BCUC IR1 1.3.

38.2 Please quantify the expected outcome of a failure to be able to maintain the necessary operational pressures in the gas system to prevent collapse of the gas system's pressures.

Response:

FEI requests that the following response be filed on a confidential basis pursuant to Section 18 of the BCUC's Rules of Practice and Procedure regarding confidential documents as set out in Order G-15-19. The response includes information about FEI's critical assets, system infrastructure, and system design that, if disclosed, could jeopardize the safety, security, and operation of FEI's distribution system. FEI, therefore, requests that the BCUC hold this information confidential.

The response to this question is the same as FEI's response to CEC Confidential IR1 75.3 in the matter of FEI's Application for the Tilbury Liquefied Natural Gas Storage Expansion (TLSE) CPCN proceeding (reproduced below).

[redacted]

[redacted]

16

39. Reference: Exhibit B-1, Page 60

> AMI would enhance FEI's understanding of the real-time behavior of gas consumers and the direct response of the gas system. In particular, improved understanding of customer usage patterns can be developed which would be used to support system design, improve utilization of peak resources and quantify capacity benefits of DSM activities on peak demand. As such, FEI would be able to enhance its modeling of the impacts of future growth or changes in demand over time across the system. This would allow FEI to better define the scope and timing of required capacity improvement projects, ensuring the system has sufficient capacity to deliver all hours of the day under peak conditions. These improvements are expected to provide

39.1 Please quantify the benefits for better customer understanding of gas usage in terms of: (a) system design advantages; (b) utilization of peak resources; (c) capacity benefits of DSM activities; (d) timing for capacity improvement projects; and (e) any other related benefits. Please also isolate the customer experienced benefit from the utility benefit with respect to its managing of costs and revenues (i.e. its revenue requirements).

Response:

FEI notes that the question incorrectly characterizes the referenced preamble (which refers to Section 4.3.2.4.2, page 60 of the Application) as benefits from a customer's better understanding of gas usage. The Application actually states that FEI's improved understanding of customer usage patterns will lead to a number of system planning benefits. FEI is not able to quantify the financial benefits of gaining improved understanding of customer usage patterns as a result of the AMI Project before the Project is implemented and the enhanced data from AMI is collected. Any benefits that can be quantified have been detailed in Section 4.3.3 and included in the financial model (as detailed in Sections 6.2 and 6.3). Please also refer to the response to CEC IR1 89.1 which details the anticipated timeline for implementing changes to system planning as a result of Project implementation.

40. Reference: Exhibit B-1 Page 61

> AMI would also provide benefits for the development and commissioning of local renewable natural gas (RNG) production facilities on the FEI distribution network. More granular consumption data would improve FEI's ability to verify locations with adequate sustained local demand to further encourage and attract RNG producers to attach and inject into the distribution network. Finally, AMI meters are also hydrogen compatible, which is an important feature as FEI continues to investigate the use of other renewable gases for the purposes of GHG reductions.

40.1 Please quantify the additional potential RNG which might become available to FEI as a result of AMI project capabilities improving the understanding of local usage patterns.

Response:

FEI is unable to quantify the additional potential RNG which may become available as a result of the AMI Project capabilities.

When considering new RNG supply projects, FEI analyzes the capacity of the gas network to accept the RNG injected into FEI's system. This system capacity analysis is used to confirm whether the customer gas demand, and operation of the local distribution system, would constrain the RNG production and that the volume of RNG accepted into the system would always exceed the gas demand at any time of the year. Today, the estimated customer demand data is not usually available at the level of granularity (i.e., on an hourly basis) required for the system capacity analysis. Consequently, FEI typically uses conservative estimates for gas demand when setting limits for injection volumes from RNG supply projects. By having aggregated hourly data of actual customer gas use in the area, FEI could more accurately estimate the impact of an RNG supply project and potentially set higher contractual RNG injection limits than currently possible.

41. Reference: Exhibit B-1, Page 61

> AMI would provide additional safety benefits through the near real-time use of alarms to alert FEI to issues at the meter. AMI technology would allow FEI to detect potential theft through anomalies in gas usage, tamper alarms, and other alerts communicated by the meter in near real-time as further described in Section 5.4.1.3. Awareness of the potential for theft in a timely manner would allow FEI to investigate sites and premises to assess if unauthorized alterations have created unsafe conditions.

41.1 Please provide FEI's historical experience with regard to safety issues in connection with theft and/or unauthorized alterations to its system.

Response:

As discussed in the response to CEC IR1 18.6, FEI's historical experience with safety issues as a result of theft and/or unauthorized alterations has primarily been due to meter tampers and unauthorized reactivations following meter lock-offs. The safety risks associated with these types of theft are typically low as gas is generally still flowing through the meter. Although lower in number, in some instances meter sets are unlawfully reconnected with garden hoses and unapproved fittings and regulators, which are a much more significant safety hazard to the resident(s) of the premises, the public, and FEI employees and contractors. The ability of the advanced meter to send an alarm when air is detected in the meter will alert FEI when these types of unsafe meter set alterations occur in the future.

Although FEI has encountered larger thefts upstream of customer meter sets involving unauthorized alterations to the system, these occurrences are relatively infrequent (typically less than one a year). Any alterations that are encountered are promptly addressed and removed from the system.

42. Reference: Exhibit B-1, Page 61

> The remote shut-off capabilities of AMI would provide FEI with the ability to enhance safety for customers, the public and employees when responding to emergencies such as gas leaks or structure fires. Advanced meters can detect large leaks downstream of the meter and be programmed to automatically shut off the internal valve, eliminating any potential for the development of a hazardous situation. The advanced meter would provide an alarm to FEI indicating the meter's internal valve has closed because of a high flow rate. Customers could be notified about the alert and may be able to safely remain in their homes while they wait for FEI to investigate the alert.

42.1 Please provide FEI's historical experience with leaks downstream from the meter causing potential safety issues.

Response:

Please refer to the response to BCUC IR1 2.3.3.

42.2 Please confirm or otherwise explain that the advanced meters detection of large gas flow events downstream of the meter would be instantaneous alerts based on the flow measurement and not based on the hourly reading data capability.

Response:

Confirmed.

43. Reference: Exhibit B-1, Page 61

> AMI would also enable FEI to detect smaller leaks and unexpected consumption downstream of the gas meter in the customer's house gas lines and below the flow rate of the AMI automatic shut off threshold. In these situations, hourly, high resolution data consumption from the advanced meters could be used to generate timely exception reports that alert FEI to unexpected flows over a given threshold. FEI would have the ability to contact the customer to determine if the identified constant flow is valid. By taking a proactive approach to these flow anomalies, FEI expects to help customers identify leaks in their house lines or appliances that have unintended gas flow.

43.1 Please provide FEI's historical experience with smaller leaks in terms of their frequency of occurrence and their eventual consequences.

Response:

Please refer to the response to BCUC IR1 2.3.3.

44. Reference: Exhibit B-1, Page 62

> Remote monitoring sensors installed on the AMI network would provide near real-time visibility of pressure changes, temperature changes, and reduced gas odorant tank levels. In addition, much of the monitoring processes for FEI's distribution system are done manually by site visits. AMI would enable improved monitoring of these assets and network data automatically transmitted via sensors would reduce the number of site visits required to collect data and would allow FEI to be more responsive with maintenance and repair activities.

44.1 Please provide FEI's historical frequency of requirements for these sensor-related system characteristics anomalies.

Response:

FEI performs approximately 1,100 corrective maintenance repairs on distribution system stations per year, on average.

Currently, most distribution stations use mechanical recorders to track the station's operational performance. FEI employees drive to these stations and review the information captured by the mechanical recorder on a monthly basis. If, after review, the station's operational performance does not meet expected parameters (e.g., gas pressure and/or temperature) FEI takes corrective action, which could include corrective maintenance. This manual process can create a delay as long as a month before the station's operational performance is identified.

FEI has identified 175 distribution system stations that will be upgraded from manual monitoring to AMI-enabled automated monitoring. AMI will allow FEI to receive distribution station alarms in near-real time. This automation will allow FEI to respond more quickly to distribution system station operational issues, which will improve FEI's ability to provide reliable service to customers.

44.2 Please provide FEI's estimate of the lack of detection frequency that exists in the system.

Response:

Please refer to the response to CEC IR1 44.1.

44.3 Please identify and quantify to the extent possible the benefits of more timely maintenance and repair activities.

Response:

FEI is unable to directly quantify the benefits associated with more timely maintenance and repair activities. However, the following example illustrates the reduced costs and durations associated with the detection and repair of underperforming cathodic protection (CP) systems, which are critical to ensuring the safety and reliability of buried steel pipelines.

The Canadian Standards Association (CSA) Standard Z662 *Oil and Gas Pipeline Systems* references the Canadian Gas Association (CGA) Best Practices OCC-1-2013 *Control of External Corrosion on Buried or Submerged Metallic Piping Systems* with respect to the monitoring of impressed-current CP systems states that: "[…] impressed current sources should be monitored at a frequency of once every 2 months. Longer or shorter intervals may be appropriate. Evidence of proper functioning may be current output, normal power consumption, a signal indicating normal operation, or satisfactory cathodic protection potential levels of the protected piping." [10]

Currently, FEI takes manual readings on a monthly schedule, and not exceeding six weeks. Consequently, a CP system could be operating below specification for up to six weeks before being tested and any deficiencies identified. Following the installation of the AMI network and associated field sensors, real-time monitoring will reduce the time to identify and react to problems to days, instead of a month or more. Reducing this delay improves the overall health of FEI's underground assets and reduces the probability of future corrective maintenance or asset replacements. As well, the automated nature of the CP monitoring provided by AMI will reduce the manual testing activities currently conducted by FEI technicians, as identified in Section 6.2.2.4 of the Application.

[10] https://www.cga.ca/wp-content/uploads/2020/12/2013-Canadian-Gas-Association-OCC-1-2013-EN.pdf.

45. Reference: Exhibit B-1, Page 62

> AMI would allow FEI to deploy cathodic protection sensors on its gas network for remote monitoring purposes. These remote monitoring sensors would provide near real-time visibility on the performance of the cathodic protection system that helps maintain the integrity of FEI's distribution system gaslines. If this cathodic protection system experiences a failure, this near real-time monitoring capability will allow FEI to quickly investigate the failure, resolve it and then reactivate the affected cathodic protection system, which is a critical component of maintaining FEI's overall system integrity management plan.

45.1 Please provide FEI's historical experience with respect to failures of its cathodic protection systems needing maintenance and repair to maintain system integrity.

Response:

Please refer to the response to CEC IR1 44.3.

45.2 Please provide FEI's historical experience with respect to failures related to other system integrity failure causes and issues, and the checking and integrity programs FEI must currently run to maintain the integrity of the gas system.

Response:

In addition to the cathodic protection system monitoring that the AMI Project will enhance, FEI's gas distribution system integrity programs are comprised of activities such as:

- Leak survey and repair;
- Valve maintenance; and
- Mains renewal.

With respect to FEI's gas distribution system, third party damage is a primary cause of failures as shown in the below table.

Third Party Damages to FEI's System

Year	2018	2019	2020	2021*
Total	1,201	1,069	973	833

** to September 30, 2021*

FEI has implemented a number of initiatives to reduce the number of third-party damages, including hiring damage prevention investigators, which has resulted in a reduction of these failures when compared to FEI's historical experience. Please also refer to the response to BCUC IR1 1.3 for additional information on FEI's system damage prevention programs.

46. Reference: Exhibit B-1, Page 62

> AMI would provide FEI with the ability to offer enhanced billing options. Advanced meters would enable FEI to provide billing enhancements to customers, such as consolidated billing for multiple customer locations and flexible billing dates. FEI has a number of customers with multiple natural gas accounts that are consolidated to a single bill where the accounts are read on different dates and therefore billing of all accounts is delayed until the last meter read is obtained. AMI would enable FEI to obtain meter readings at different locations simultaneously and bill these accounts immediately.[52]

46.1 Please provide a list of the potential enhanced billing options. For each one, please provide the FEI estimate of the value of the benefit for FEI's management of the utility.

46.1.1 Please separately provide the potential customer experienced benefits and social benefits which may be derived from the same initiatives.

Response:

Please refer to the response to CEC IR1 18.5.

47. Reference: Exhibit B-1, Page 63 & 64

Table 4-3: AMI Alternative: NPV of Capital and Operating Costs ($ millions)

Financial Summary	AMI
Capital Costs:	
Meter Capital	$481.2
Project Management	$35.2
Software Capital	$9.1
Network Capital	$17.1
Non-Meter Capital	$3.6
AFUDC	$12.7
Total Capital	**$558.9**
O&M Costs:	
Meter Reading Costs	$78.3
Operations, Contact Centre and Meter Shop O&M	$12.8
New O&M	$97.9
Total O&M (incl. Capitalized Overhead)	**$189.0**
Baseline Capital[1]	$372.8
Baseline O&M[2]	$323.5
AMI Incremental Capital[3]	**$186.1**
AMI Incremental O&M Savings[4]	**($134.5)**

Notes:
[1] Appendix G-1, Page 1, Line 13
[2] Appendix G-2, Page 1, Line 21 less 16 percent for capitalized overheads[53]
[3] AMI Capital, $558.9, Less Baseline Capital $372.8
[4] AMI O&M, $189.0, Less Baseline O&M $323.5

47.1 Please confirm or otherwise explain that while the capital cost includes the cost of the new advanced meters, that the remaining undepreciated values for the existing diaphragm meters are not included in the financial analysis.

Response:

FEI confirms the costs presented in Table 4-3 include the cost of the new advanced meters (i.e. AMI). FEI notes that Table 4-3 represents total forecast expenditures for the AMI scenario. The cost recovery of the remaining undepreciated value of the existing diaphragm meters is neither a capital nor O&M expenditure, thus is not included in the table.

However, as further explained below, the remaining undepreciated values of the existing diaphragm meters are included in the financial analysis through FEI's proposed deferral accounts and amortization.

As discussed in Section 6.3.2.4 of the Application, FEI is seeking approval for two deferral accounts to capture and recover the costs of the existing meters that would be replaced by the new AMI meters and also the remaining book value of meters that were previously retired. FEI

confirms that the underlying financial analysis for the AMI Project and the levelized delivery rate impact over the 26-year analysis period shown in Table 6-11 of the Application includes the amortization (recovery) of these deferral accounts.

47.2 Please provide a breakout of the overhead costs that are capitalized and indicate which components of the capital have the capitalized overheads attached to their costs.

Response:

Capitalized overheads are not classified as capital spending. They are the portion of O&M cost that is capitalized based on the approved capitalized overhead rate. FEI confirms the capital costs as presented in Table 4-3 do not include the portion of O&M that is capitalized. Please refer to Confidential Appendix G-3, Schedule 7, Line 18 for the amount of capitalized overheads that is included in FEI's plant-in-service based on the forecast O&M costs.

48. Reference: Exhibit B-1, Page 64

> This would include all material and installation costs for the meters, bypass valves and regulators. Since existing meters would be replaced as part of the AMI alternative, existing programs to replace regulators and install bypass valves would be accelerated and completed at the same time as meter replacement, realizing cost savings mainly as a result of efficiencies gained from the bulk purchase of bypass valves and regulators.

48.1 Please provide FEI's estimate of savings regarding the replacement of regulators and installation of bypass valves.

Response:

Please refer to the response to BCUC IR1 21.3 for details on the regulator savings.

The bypass valve bulk purchase savings is estimated to be 7 percent or approximately $5 million.

49. Reference: Exhibit B-1, Page 65

> Software capital costs are comprised of estimates of all required capital expenditures to design, install, test, and commission the software environments needed as part of the AMI alternative, as well as estimated development costs associated with integrating new AMI environments with existing FEI systems.
>
> Software capital costs under the AMI alternative are estimated to be $9.1 million on an NPV basis.

49.1 Do FEI software costs include any requirements for modifications and/or integration with the existing FEI billing system, meter management system or any other connected and related systems FEI relies upon related to the relevant customer data? Please explain.

49.1.1 Are all of these costs included or are they outside of the scope of FEI's analysis?

Response:

FEI software costs include any work required for modifications and/or integration with existing FEI systems and these costs have been included in FEI's analysis. These include:

- Integration between FEI's customer service systems and the deployment vendor work order management system (for meter exchange information and final reads of replaced meters);
- Integration between FEI's billing system and Sensus Software as a Service (SaaS) systems for ongoing meter billing reads; and
- Integration between other FEI systems and Sensus's SaaS for alarm management, customer portal information, interval data retrieval and other applications.

49.2 Please confirm that to obtain the benefits of the AMI Project there will be a number of requirements for changes and/or upgrades to other FEI systems, and provide a brief description of these changes.

Response:

Confirmed. Please refer to the response to CEC IR1 49.1 for a description of the changes.

50. Reference: Exhibit B-1, Page 65

> **Network and Non-Meter Capital**
>
> Network and non-meter capital costs are comprised of estimates of all network licence and setup costs, including network (as defined in Section 5.4.1.1) design and installation.
>
> These costs cover miscellaneous non-meter hardware items, including gateways, transmitters, switches, and cathodic protection devices. These costs would also include handheld/drive-by meter reading devices to outfit vehicles throughout the FEI service territory that would be required to read individual meters that are not within network coverage.
>
> Network and non-meter capital costs under the AMI alternative are estimated to be $20.7 million on an NPV basis.

50.1 Does FEI have any other network communications systems it uses that may in some way need integrations into this new network?

Response:

Yes, to facilitate data transfer for the applications discussed in the response to CEC IR1 49.1, FEI will require secure network connectivity between the Sensus data centre and FEI's facilities.

50.2 Are the costs of any changes to or upgrades to these other networks included in the scope of this project or are they outside of the scope of this project?

Response:

All costs for capital, operating and sustainment work required for changes or upgrades to FEI's networks are included in the scope and costs for the Project.

50.3 Please confirm that FEI's other network communications systems may need some changes or upgrades in order to obtain benefits from the communications going over the new network.

Response:

Confirmed. Please also refer to the response to CEC IR1 50.1.

50.3.1 Please briefly describe these types of changes.

Response:

To facilitate the work described in CEC IR1 49.1, the addition of network routers, switches, and firewalls will be required, as well as the procurement of leased data circuits between FEI and Sensus data centres.

51. Reference: Exhibit B-1, Page 65

> Additional details supporting the AMI O&M costs are discussed below including the total NPV of the estimated costs for the 26-year analysis period.

51.1 Please confirm that analysis of the AMI Project over 26 years causes a cut off to the cost and benefit streams, and that in cost/benefit analysis and the process of providing NPV cost and revenue impacts leaves open the question of what benefits are sustained, lost or built upon following the analysis period.

Response:

Not confirmed. The forecast cost and additional details provided in the underlying inputs provide enough information to determine what additional costs or benefits would be sustained following the 26-year analysis period.

FEI notes that the 26-year analysis period is the same between each of the scenarios and is based on the 20-year useful life of the AMI meters and AMR modules starting after all the meters and modules have been fully deployed. The analysis period captures the full one-cycle of useful life of all meters and modules once all are fully deployed.

51.2 Please confirm that once FEI has adopted the full automation of the AMI Project that these automation benefits are highly likely to be continued in any future technology adoption and in all likelihood will be built upon.

Response:

Confirmed.

51.3 Please confirm that FEI is making a 'going concern' assumption and that FEI will continue in business by adapting its gas supply to meet the GHG requirements of the province and provide overall productivity benefits to the province by maintaining the efficacy, efficiency and cost-effectiveness of gas heating.

Response:

Confirmed. FEI continues to adapt its gas supply to meet provincial climate targets and provide the associated benefits.

51.4 Please confirm that FEI does not expect the AMI Project to become obsolete caused by any movement to stop using the gas system and a future of substantially reduced GHG emissions related to FEI's gas services and their customer's heating requirements.

Response:

FEI does not anticipate that the AMI Project will become obsolete in the foreseeable future due to changes in the use of gas related to climate policy.

52. Reference: Exhibit B-1, Page 66

> The gas shut-off valve in the advanced meter would enable FEI to realize cost savings related to this category of activity O&M. Remote shut off and turn on of gas flow would allow FEI to respond remotely to many issues occurring in the field, reducing the need to dispatch employees to attend customer premises.

52.1 Please comment on whether or not FEI could have controls that enable opportunities for mitigation using a reduced flow of gas as opposed to a complete shut-off valve turn off of gas supply to its customers.

52.1.1 Has FEI examined the potential for this and or done any estimation of potential benefits that may flow from such controls.

Response:

The meters to be used with the proposed AMI Project have valves supporting on or off only. The valve technology will not facilitate constraining supply over a specific period of time by reducing the gas supply available to a customer, nor are customer appliances designed to accommodate varying inlet pressures as a means to control heat output. As such, FEI has not estimated potential benefits arising from valves that can constrain flow through the meter.

53. Reference: Exhibit B-1, Page 68

Table 4-5: Summary of Alternative Financials

	AMR	AMI
Capital Costs (NPV, $millions)		
Meter Capital	$458.9	$481.2
Project Management	$26.2	$35.2
Software Capital	$2.2	$9.1
Network Capital	$0.3	$17.1
Non-Meter Capital	$5.4	$3.6
AFUDC	$3.6	$12.7
Total Capital	**$496.6**	**$558.9**
O&M Costs (NPV, $millions)		
Meter Reading Costs	$102.0	$78.3
Operations, Contact Centre and Meter Shop O&M	$55.4	$12.8
New O&M	$7.3	$97.9
Total O&M (incl. Capitalized Overhead)	**$164.7**	**$189.0**
Incremental Capital (NPV, $millions)	**$123.8**	**$186.1**
Incremental O&M (NPV, $millions)	**($158.8)**	**($134.5)**
Incremental To Baseline Revenue Requirement (NPV, $millions)	**$(34.5)**	**$15.0**
Incremental Delivery Rate Impact (%)	**-0.286%**	**0.125%**

For all of the reasons summarized above, and given the small difference in delivery rate impact between the two alternatives, FEI proposes the AMI alternative as being the best long-term solution for customers.

53.1 Is it FEI's position that there are sufficient benefits in the AMI Project that either cannot be accomplished with AMR or are only partially addressed by AMR, and that the revenue requirements difference of approximately $50 million NPV and a rate impact of .411% warrant the additional customer benefits achievable only through the AMI Project?

Response:

Confirmed. As noted in Section 4.3.4 of the Application, FEI's financial and non-financial analysis of the AMI alternative demonstrates that for a estimated comparative delivery rate difference of less than half a percent (0.411 percent) over AMR, there will be significant incremental benefits.

53.2 Could the decision be described as a "sufficiency decision" as opposed to an "optimal decision" in favour of the AMI Project? Please explain why or why not.

Response:

No. While AMR was considered insufficient, this does not imply that AMI was merely "sufficient". AMI is the "optimal decision" because it provides a solution that addresses all four drivers of the Project need as outlined in Table 4-4 and as discussed in the response to CEC IR1 53.1.

C. PROJECT DESCRIPTION

54. Reference: Exhibit B-1, Page 69

> The proposed AMI alternative will replace most existing customer meters with advanced meters, retrofit those meters that are not replaced with AMI communication modules, and install associated infrastructure to support delivery of hourly gas consumption and other metering information from the advanced meters/modules at customer premises, back to FEI. The Project
>
> information from the advanced meters/modules at customer premises, back to FEI. The Project will also include the installation of communication modules on infrastructure and pipeline assets enabling the remote collection of information on FEI's gas system integrity. Additionally, FEI
>
> enabling the remote collection of information on FEI's gas system integrity. Additionally, FEI customers will have the ability to access their hourly consumption information through FEI's secure and private online customer portal, and to be notified of gas flow anomalies for use by FEI and the customer to help identify potential gas leaks, faulty appliances or appliances/equipment mistakenly left on.

54.1 Please confirm, or otherwise explain, that AMI two-way communications modules can be installed along with associated infrastructure on existing diaphragm meters, which are not changed out to ultrasonic meters, which can support the delivery of hourly gas consumption and other metering information back to FEI and which can be accessed at any time FEI needs to access it.

Response:

Confirmed. This solution will be used on a subset of meters in the proposed AMI project, when an advanced meter is not available for the type of service the customer has installed, such as larger commercial and industrial services.

54.2 Please confirm, or otherwise explain, that the installation of communication modules on FEI infrastructure and pipeline assets on its own will contribute significantly to enhancing gas system integrity.

Response:

Please refer to Sections 4.3.2.4.7 and 4.3.2.4.8 of the Application for further description of the specific assets the cited text is describing. These installations will augment FEI's ability to monitor the status of the system and take more timely action to rectify situations that might affect system integrity immediately or in the future.

54.3 Please confirm, or otherwise explain, that communications module on FEI's gas system assets along with the customer level information at the same hourly granularity would provide additional enhancement for the gas system integrity.

Response:

In Section 4.3.2.4.8 of the Application, FEI describes how the installation of cathodic protection sensors will enhance FEI's ability to monitor the cathodic protection system that helps maintain the integrity of FEI's gas distribution system. FEI does not believe hourly customer consumption information will provide additional enhancement for the gas system integrity.

54.4 Please estimate the percentage contribution to gas system integrity each of these investments (gas system asset communications modules & customer meter communication module both with hourly data) will contribute to the full gas system integrity.

Response:

Please refer to the response to CEC IR1 54.3. FEI does not believe hourly customer consumption information will provide additional enhancement for gas system integrity. FEI is also not able to estimate the percentage contribution to gas system integrity related to communications modules on gas system assets.

54.5 Please quantify the benefit value improvement of the full gas system integrity versus the current baseline level of the gas system integrity with FEI's current methods of maintaining gas system integrity.

Response:

All the expected benefits associated with the Project are listed and detailed in Section 4.3 of the Application. All of the benefits that can be numerically quantified have been detailed in Section 4.3.3 and included in the financial model (as detailed in Sections 6.2 and 6.3). Please also refer to the response to CEC IR1 69.1.

54.6 Please quantify FEI's estimate of the benefit to customers of identifying gas flow anomalies leading to potential leak detection and repair, faulty appliance replacement and appliances and equipment mistakenly or unnecessarily left on. (i.e. how many of these situations does FEI encounter now and what is FEI's best estimate of what it will encounter with better information – have utilities which have already implemented such systems determined the additional level of detection for these events)?

Response:

Please refer to the response to BCUC IR1 2.3.3 for information regarding the number of leaks downstream of the meter FEI responds to each year.

SoCalGas has been operating a gas metering data analytics program since 2017. In February 2018, SoCalGas published an Advanced Meter semi-annual report[11] that contains an enhanced data analytics section with a summary of how many field visits resulted in the detection of a downstream leak, a hot water leak, or appliance in use for an extended period of time.

All the expected benefits associated with the Project are listed and detailed in Section 4.3 of the Application. All of the benefits that can be numerically quantified have been detailed in Section 4.3.3 and included in the financial model (as detailed in Sections 6.2 and 6.3). Please also refer to the response to CEC IR1 69.1.

[11] https://www.socalgas.com/regulatory/documents/a-08-09-023/SoCalGas_Advanced_Meter_Semi_Annual_Report_FEB2018.pdf.

55. Reference: Exhibit B-1, Page 70

> 3. Enable remote turn off/on (valve closure/open) of gas service for residential and small commercial meters;
> 4. Turn off gas supply to large groups of customers quickly in the event of an emergency, for residential and small commercial meters;

55.1 Please confirm or otherwise explain that it is the bypass valve sets along with the module placed on the gas meter that are instrumental in enabling the turn off/on function and the particular benefits associated with being able to control the gas supply to customers at the customer site.

Response:

AMI's ability to remotely turn off or on a residential or small commercial gas service is solely reliant on the AMI network and the advanced meter's internal valve; it is not reliant on the bypass valve. The bypass valve allows a field technician, when at a customer's premises, to perform maintenance on the meter set without having to interrupt gas supply to the customer.

56. Reference: Exhibit B-1, Page 72

> ***5.3.2.2 Scope of the Pilot***
>
> During the Pilot, AMI meters and communication modules were installed on existing residential services at single and multi-family dwellings and commercial properties in the Fraser Valley. Non-meter communication modules installed included odorant level monitors, pressure and temperature sensors at distribution regulator stations and cathodic protection sensors on pipelines. The network consisted of five Base Stations and 295 advanced meters and communications modules, which transmitted data to a test system connected to a portal viewable by the Pilot team for further analysis.

56.1 When FEI conducted the pilot was it restricted to only replacing existing diaphragm meters with ultrasonic meters with the AMI communications modules or did FEI also pilot AMI level communication modules on existing diaphragm meters to ensure that this process could work for meters that would not be changed out? Please explain.

Response:

Please refer to the response to BCUC IR1 13.2.

57. Reference: Exhibit B-1, Page 73

> • Change and Leave Off (gas service will be left off when meters are replaced if a customer is not home to facilitate relight) will be necessary to ensure adherence to schedule. Therefore a robust relight process will be required;
>
> • Detection of gas theft by comparing the amount of gas delivered to the distribution system against measured gas consumption in neighbourhoods was not feasible.

57.1 Please clarify whether the gas supply does or does not need to be turned off when installing the AMI communications module on the existing gas meters.

Response:

For the small number of meters where a new meter is not being installed and an AMI communications module is being installed onto the existing gas meter, the gas supply does not need to be turned off.

57.2 Please confirm or otherwise explain if the gas does not need to be turned off when installing with a new ultrasonic meter and when bypass valves are being installed.

Response:

When installing an advanced meter or a bypass valve, the gas supply to the customer does have to be turned off.

57.3 Please confirm whether or not the non-feasibility for gas theft detection was:

a) a conclusion that this could not be achieved in a wider implementation of the AMI modules, or

b) a conclusion that it could not be confirmed in such a small pilot.

Response:

FEI confirms that the non-feasibility for gas theft detection was a conclusion that this approach could not be cost-effectively or practically achieved in a wider implementation of AMI modules.

The use of upstream metering for electric theft detection is facilitated by the predominantly overhead nature of FBC's electric distribution network. This allows the use of cost-effective and upstream metering to reconcile the energy supplied (using portable meters) with downstream consumption (using AMI meters at the customer's premises). In contrast, FEI's gas system is

1 almost exclusively underground, and does not lend itself to the kind of frequent and iterative
2 deployments of upstream metering used by FBC to identify losses suspected to be related to theft.

3

58. Reference: Exhibit B-1, Page 75

> 1. Installation Services:
>
> - Installation of new advanced meters;
> - Installation of by-pass valves at most meter sets;
> - Installation of new regulators at some meter sets; and
> - Installation of new AMI communicating modules on large commercial and industrial meters.

58.1 Please explain what the new regulators accomplish for FEI and why they are only required at some meter sets.

Response:

Please refer to the response to BCUC IR1 21.1.

59. Reference: Exhibit B-1, Page 77

> 2. **Sensus SonixIQ™ advanced meters**: customer meters that comprise the majority of the Project End Points;
>
> 3. **Sensus FlexNet SmartPoint® modules**: communication modules to be mounted on existing gas meters where no installation of an advanced meter is contemplated; and

59.1 Please confirm, or otherwise explain, that both of these end points are capable of 2-way communication and indicate whether or not they are both able to be made to activate turn on/turn off valve actions.

Response:

All end points contain an integrated two-way radio frequency transceiver that is used for two-way wireless communication. The Sensus FlexNet SmartPoint modules do not have the capability to turn on/turn off valves and will be mounted on meters that do not include a shut off valve.

59.2 Please indicate whether either or both of these modules have any ability to communicate with customer appliances and/or equipment if necessary and approved by the customer.

Response:

The Sensus Sonix IQ meter can be equipped with a volume-based pulse output that can be used by customer-owned energy management systems to monitor energy usage. This functionality requires wiring directly to the meter, and is not analogous to the home area network functionality that is offered by electric advanced meters.

FlexNet SmartPoint modules do not offer a similar option. Volume-based pulse outputs are typically provided by the host meter to which the SmartPoint module is connected.

60. Reference: Exhibit B-1, Page 79

> 5.4.1.4.1 SENSUS ANALYTICS
> Sensus Analytics (SA) is Sensus' meter data management software application that stores, validates, and processes high volumes of data sent from End Points. Its data management tools aggregate information from multiple systems to produce bill-ready data for use by FEI enterprise systems.

60.1 Please confirm whether or not the SA is also capable of supplying customer information to FEI's customer portal or whether FEI will have to be creating this integration themselves.

Response:

The SA application is capable of, and ultimately will be, supplying the customer information to FEI's customer portal. However, an integration is still required between FEI systems and the SA for this to occur.

61. Reference: Exhibit B-1, Page 85 & Page 70

Table 5-2: Project Schedule

Activity	Date
CPCN Filing	May 2021
Prepare	Q2 2021 – Q3 2022
Define	Q2 2022 – Q2 2023
Design, Build, Integrate and Ready For Deployment	Q2 2022 – Q3 2024
Deploy AMI Technology/Billing System Integration	Q3 2022 – Q3 2023
Deployment Region 1: Lower Mainland South	Q4 2022 – Q2 2025
Deployment Region 2: Lower Mainland North	Q2 2024 – Q4 2026
Deployment Region 3: North Interior	Q2 2023 – Q3 2025
Deployment Region 4: South Interior	Q1 2023 – Q2 2026
Deployment Region 5: Vancouver Island	Q3 2023 – Q3 2026
Deployment Region 6: Kootenays	Q3 2024 – Q4 2026
Deploy Enterprise Data Repository, Customer Portal, Leak Detection	Q1 2024 – Q1 2025
Final Acceptance	Q3 2026
Close Out	Q3 2026 – Q4 2026

Installation of:

1. Approximately 1,100,000 residential, commercial, and industrial advanced meters and meter retrofits of communication modules capable of remote gas consumption measurement;
2. Approximately 1,100 communication modules on the gas network to increase operational awareness of the gas system state;
3. The AMI network and infrastructure to communicate with customer meters and other communication modules on the FEI gas network;
4. Approximately 780,000 bypass valve sets, as required, on residential and small commercial meter sets;
5. Residential and small commercial meter set regulators to replace those that will exceed their expected service life prior to the first meter exchange planned for post-AMI Solution deployment;

61.1 Please provide this table with the quantities for each of the infrastructure components being implemented for each schedule deployment.

Response:

FEI will determine these quantities during the Define phase of Project implementation (as described in Section 5.5.1.2 of the Application).

62. Reference: Exhibit B-1, Page 86 & 87

> ***5.6.2.2 AMI Program Director***
>
> The *Director, Energy Measurement & Technology* holds overall accountability for acceptable delivery of the AMI Solution on time, in scope and on budget. The AMI Program Director will ensure that sufficient and appropriate resources are assigned, and provide business context, expertise, support and guidance to the Project delivery team to ensure obstacles are removed and business objectives of the Project are achieved. In this role, the AMI Program Director will also keep abreast of Project activities to ensure adequate and consistent communication between the AMI Project Executive Sponsor, the Project team and representatives from all major aspects of FEI operations.
>
> ***5.6.3.1 AMI Project Director, Technology***
>
> The *AMI Project Director, Technology* is accountable for delivery of all technology aspects of the Project on time and within budget. This role is active in planning technology scope and schedule; provides guidance and direction to FEI project managers; liaises with Sensus' resources to ensure that FEI requirements and Sensus contractual obligations are met; approves technology related scope changes; signs off on major deliverables; provides approval to proceed to each succeeding phase of the Project, including final acceptance; and resolves and/or escalates issues.

62.1 Please confirm that neither the AMI Program Director nor the AMI Project Director, Technology will have responsibility for ensuring that all of the benefits for the project are realized and are optimized to ensure a cost-effective delivery of the benefits of automation of the FEI meter reading.

Response:

The AMI Project team, led by the AMI Program Director, and including the AMI Project Director, Technology, the AMI Project Director, Deployment, and the AMI Project Director, Planning & Governance are responsible for realizing the Project benefits and the cost-effective management of the Project.

63. Reference: Exhibit B-1, Page 88

> ***5.6.3.2 AMI Project Director, Planning & Governance***
>
> The *AMI Project Director, Planning & Governance* is accountable for establishing the methodology for managing the Project and oversees the development of policies, procedures and governance practices required for Project control. This role guides detailed planning of the Project master integrated plan for all scope; signs off on major deliverables; provides approvals to proceed to each succeeding Project phase; resolves and/or escalates issues; and provides guidance and direction to the FEI Planning & Governance team responsible for project reporting, financial management, contracts administration, regulatory and legal interactions, community relations and change management.

63.1 Please confirm that the AMI Project Director, Planning & Governance does not have responsibility for ensuring that all of the benefits for the project are realized and are optimized to ensure a cost-effective delivery of the benefits of automation of the FEI meter reading.

Response:

Please refer to the response to CEC IR1 62.1.

64. Reference: Exhibit B-1, Page 89

> 5.7.1 Risk Analysis and Management
>
> FEI engaged Yohannes Project Consulting Inc. (YPCI), a company specializing in risk management, to guide FEI's risk analysis. In accordance with FEI's risk management framework, risk drivers were quantitatively and qualitatively identified. The detailed Risk Analysis and Risk Register (the YPCI Risk Report) is included as Confidential Appendix E-1.

64.1 Please provide (confidentially if necessary) all comments provided by YPCI with respect to the FEI risk management framework that we aimed at improving FEI's risk management process.

Response:

The kinds of comments posited in the question did not arise. The risk management framework that was used pre-exists the Project-specific risk analysis that was performed. The framework has been applied on other FEI projects as well. YPCI was involved in developing that framework and has, since then, applied it on several occasions including in relation to the Project.

65. Reference: Exhibit B-1, Page 91

> **5.8.1 Radiofrequency Electromagnetic Fields**
>
> FEI's proposed AMI Solution is comprised of two-way communicating End Points connected as part of a Radio Frequency (RF) network. There has been discussion with respect to potential effects on human health resulting from exposure to RF electromagnetic fields in the frequency range of 3 kilohertz to 300 Gigahertz. Such concerns were addressed by the BCUC in approving FBC's AMI project. As the Panel summarized on p. ii of its July 2013 decision,[57] in granting a CPCN for FBC's AMI Project, its findings included the following:

65.1 Please provide the percentage for the RF exposure from the AMI communications modules compared to the Health Canada standards for allowable RF exposure.

Response:

The excerpt from in the preamble to this IR (Exhibit B-1, p. 91) refers to FortisBC Inc.'s (FBC) mesh network for electric meters. This response addresses FEI's proposed AMI solution for gas meters as discussed in Exponent's report "*Radiofrequency Fields in the Environment and from Advanced Metering Infrastructure*," dated May 3, 2021, which states:

> In typical operation, the Sonix IQ gas meter transmits RF [radiofrequency] energy for a total of approximately 0.34 seconds per day. This very low transmission time also means that the exposures in general are also low, especially the indoor RF exposure from the SonixIQ gas meter [at a distance of 1 meter from the SonixIQ], which is about 24 million times below the SC6 exposure limit, and substantially less than RF exposures from common natural and man-made sources (p. ix).

65.2 Please also confirm that this RF exposure is substantially different from cell phone radio frequency exposures and provide the percentage for the RF exposure from the AMI communications modules compared to cell phone exposure.

Response:

Confirmed. The RF exposure from FEI's AMI solution for gas meters is substantially different, and lower, than exposure from cell phones. The Exponent RF Technology Report filed as Appendix F-1 to the Application states, "… cell phone exposure is 1.8 million times higher than typical indoor exposure from a Sonix IQ gas meter" (p. 27).

65.3 Please confirm that FEI is not aware of any credible health data indicating that the situation has changed from the time of the Commission panel's decision July 2013 up to the current date.

Response:

FEI is not aware of any credible health data or research published since July 2013 that would change the conclusion reached by the BCUC Panel in the decision on FBC's AMI Project.

66. Reference: Exhibit B-1, Page 92 & 93

> **5.8.2 Security**
>
> The security of customer information is a high priority to FEI. Given the nature of the AMI Solution, security needs to be considered for several components. These include the meters, network, Base Stations, HES, Sensus applications and FEI enterprise systems. Since many components are installed at residential or business properties and on Company-owned infrastructure, it is critical that the electronic security of the components be comprehensive.
>
> **5.8.3 Privacy**
>
> FEI respects its customers' privacy and seeks to protect their personal information. The protection of personal information in British Columbia is governed by the provisions of the *Personal Information Protection Act* (PIPA) and the federal *Personal Information Protection and Electronic Documents Act* (PIPEDA), as applicable. FEI's privacy policy is applicable to all of the Fortis companies within British Columbia. The privacy policy applies to all personal information collected, used or disclosed by FEI, some of which will be collected using the advanced metering system.

66.1 Please confirm that the FEI security and privacy protocols with respect to AMI collected information will be at least as comprehensive and complete as FEI's treatment of security and privacy has been in the past.

Response:

Confirmed.

66.2 Please confirm that FEI's customer security and privacy will likely have improvements as a consequence of this project in that it brings further efficacy to FEI's control of these issues, all in addition to being totally compliant with applicable BC and Federal laws and regulations.

Response:

One improvement for privacy and security that would result from the AMI Project would be the encryption of data from the meter to the AMI system. Currently the meter data is collected manually in handheld devices that are not encrypted.

FEI's customer security and privacy will continue to be a high priority regardless of the AMI Project. The AMI Project will leverage FEI's mature and tested security and privacy systems. Ongoing regular testing of security and privacy controls and systems will enable FEI to respond to changing and evolving security and privacy factors, ensuring continual improvement of FEI's cybersecurity capabilities and the efficacy of security and privacy for FEI's customers now and into the future.

1 FEI will remain compliant with provincial and federal laws and regulations regarding security and
2 privacy.

3

67. Reference: Exhibit B-1, Page 94

> **5.8.4 Customer Refusals and Opt-Out**
>
> FEI believes some customers will not want an advanced meter installed on their premises; consequently, it is possible that some customers will seek to refuse the installation of an advanced meter.

67.1 Please provide the percentage opt-outs currently experienced by FBC as of this year and any information FEI has in respect to opt-outs from the BC Hydro Smart Meter implementation as of current times.

Response:

As of the end of September 2021, FBC had an opt-out rate of 1.45 percent of customers. FEI has no information regarding the current opt-out rate for BC Hydro customers.

67.2 Please confirm that FEI does not have any information that would lead it to expect that the opt-out issues will be any different than they have been in the past and nothing to lead FEI to expect a different percentage of opt-out customers to deal with.

Response:

Please refer to the response to BCUC IR1 38.2.

68. Reference: Exhibit B-1, Page 95

> **5.8.5 Anticipated Amendments to FEI's General Terms and Conditions and Rate Schedules**
>
> FEI anticipates that, should the AMI Solution be approved, certain amendments to FEI's General Terms and Conditions (GT&Cs) and applicable commercial and industrial rate schedules will be required. These tariff changes will be required to reflect the new and updated operating terms, conditions, fees and meter specifications as a result of the Project. FEI believes that it would be most efficient to propose specific tariff changes related to the Project after the BCUC makes a determination on the Project and, if approved, closer to the actual implementation date. This application will also include the processes and fees for customers

68.1 Please confirm that FEI would require these GT&C changes upon deployment but not before then.

Response:

Confirmed. Once the BCUC renders a decision on the Application, if it is approved, then amendments to FEI's GT&Cs would need to be in place in time for the first regional deployment date because customers are not impacted until deployment commences. FEI considers that having the GT&C changes submitted as a compliance requirement for approval approximately six months prior to the Project's first regional deployment would be a satisfactory approach for FEI to incorporate directives from the BCUC's decision, the latest Project design details, new meter specifications, and any new operating terms, conditions and fees required, including the customer fee for opting out, while allowing adequate time for the BCUC to review the compliance filing and make a decision on the final tariff amendments before deployment.

Given FEI has already confirmed its intent to implement a Radio-Off Program, FEI would not object to a condition in the decision requiring FEI to do so.

68.2 Please explain whether or not this is because customers are not impacted until deployment (i.e. the planning and preparation stages after Commission decisions and approvals will not impact customers).

Response:

Please refer to the response to CEC IR1 68.1.

68.3 Please explain whether or not the changes proposed should be implemented at that time, in particular so that they can reflect elements of the Commission's

decision and any subsequent information FEI may develop as it further considers and prepares for implementation.

Response:

Please refer to the response to CEC IR1 68.1.

68.4 Please confirm that having these GT&C submitted as a compliance requirement for approval at that time would be a satisfactory approach to the timing for GT&C approval.

Response:

Please refer to the response to CEC IR1 68.1.

D. PROJECT COST

69. Reference: Exhibit B-1, Page 97

> FEI approached the financial analysis for this Project by comparing two full cost scenarios, with the difference between the scenarios being the incremental financial impact of the Project. The first scenario is FEI's Baseline meter program that represents the costs FEI expects to incur if the AMI Project is not approved. The second relates to the proposed AMI Solution. FEI took this analytical approach because of the number of changes to both operating and capital costs that will take place with approval of the Project and the requirement to understand what the operating and capital costs would have been without the Project to determine the impact. The following discussion details the expected cost of the AMI Solution compared to the expected cost of the Baseline scenario, with the difference between the two being the expected incremental cost of the Project.

69.1 Please confirm that as a consequence of this decision with respect to the approach to financial analysis of the project, FEI has not developed any incremental analysis of the project showing the benefits related to particular components of the project implementation and their specific costs.

Response:

FEI notes the incremental analysis has been completed as described in the preamble and the resulting incremental analysis can be reviewed in Confidential Appendix G-5. The analysis includes the benefits of capital and O&M savings during the post deployment period of 2027 to 2046 as demonstrated in Tables 6-2 and Table 6-5 of the Application. Please also refer to Table 6-11 of the Application which shows the incremental levelized delivery rate impact of the Project (i.e., incremental from Baseline to AMI) is approximately 0.125 percent.

69.2 Please also confirm that as a consequence of this decision and the decisions with respect to alternative analysis, FEI has landed on the option of comparison to a baseline operation of the current system with no changes for the 26 years' timeframe.

Response:

Not confirmed. The Baseline analysis is based on forecast costs for 26 years and represents the costs FEI expects to incur related to the current meter program in the absence of pursuing automation. The Baseline scenario includes future costs FEI expects, and includes a notable change related to bringing meter reading in house in 2027 as described in Sections 3.3.3 and 6.2.2.3 of the Application.

69.3 Please provide an explanation as to why FEI did not consider an option in which AMI communication modules would be installed on existing meters without the requirement for a complete change out of meters to the ultrasonic technology, and instead have a replacement of meters with the ultrasonic technology over time such that there would be no requirement to write off the undepreciated cost of existing meters at the beginning of the AMI project or have a full capital expenditure for the replacement of all meters at the begging followed by a full replacement 20 years later.

Response:

FEI did consider two additional options related to AMI deployment:

1. A slower rollout of meters based on age of the meter; and
2. Adding AMI communication modules to existing meters rather than replacing the entire meter.

The two options, and FEI's conclusions regarding their viability, are discussed further below.

1. Slower rollout of meters based on age of the meter.

In this option, the deployment of advanced meters would take place over approximately 17 years with the following considerations:

- All new customer services would be provisioned with AMI technology;
- The oldest 30 percent of meters would be replaced with AMI technology at the start of the project;
- The balance of existing meters would be replaced with AMI meters using an attrition model—either when their Measurement Canada seal was expiring, or they needed to be replaced due to broken or malfunctioning parts.

An analysis of this scenario demonstrated that any potential savings from deferring costs or avoiding the need to write-off undepreciated meters would be more than offset by higher costs related to the loss of economies of scale. This included increased pricing on meters and higher project management and manual meter reading costs. At the same time, no savings would be available for the deployment of the network due to the fact that the oldest 30 percent of meters replaced are randomly distributed throughout the service territory (and so installation of the complete fixed network would still be required at the outset of the project).

In any deployment timeline, manual meter reading in some form is required until the end of the project. However, in the case of a slower rollout of randomly distributed AMI meters, meter reading costs on a per-meter basis increase as the number of manually read meters decreases.

In this option, the customer benefits would be delivered over a much longer period, meaning that some customers would benefit from AMI at the beginning of the project, while some would have to wait much longer - with the final customers only benefiting from the project over a decade later.

2. Adding AMI communication modules to existing meters rather than replacing the entire meter

Prior to the availability of Sonix IQ meters, FEI conducted a high-level analysis that considered the option of retrofitting existing diaphragm meters with AMI modules. The diaphragm meters and AMI modules would then be replaced with Sonix IQ meters through attrition.

While this did provide some of the benefits of AMI immediately (e.g., interval data, improved billing accuracy, more billing options, and a reduction in meter reading costs), the safety, resiliency, and system planning benefits would either be significantly deferred or not achievable. Also, significant work would have been required to manage the module fleet separately from the meter fleet. This additional work would include modifications to the billing system to be able to separately track AMI modules and link them to meters. This option would also include new processes to return and reuse, or dispose of AMI modules when their associated meter was replaced for any reason.

Due to the additional costs and reduced benefits identified in this earlier analysis, FEI did not further consider this option when SonixIQ meters became available.

Since these two potential options had reduced benefits without appreciable cost savings compared to the proposed AMI Project, both were discarded as viable alternatives.

69.4 Please confirm that FEI does not have an analysis of such an alternative to determine if such an alternative could provide many of the benefits sought and potentially avoid a significant portion of the stranded asset problems.

Response:

Please refer to the response to CEC IR1 69.3.

70. Reference: Exhibit B-1, Page 98

Table 6-1: Capital and Operating Cost Summary

Line	Project Costs As-Spent In $Millions Item	Pre Deployment 2021 - 2022 (1)	Deployment 2023 - 2026 (2)	Subtotal (1+2) 2021 - 2026 (3)	Post Deployment 2027 - 2046 (4)	Total (3+4) 2021 - 2046 (5)	Reference [4] (6)
	AMI						
1	Capital[1]	48.6	589.8	638.4	119.3	757.7	Schedule 6,Line 46 + Schedule 9,Line 31+Line 39+Line 41+Line 43
2	O&M	34.7	72.8	107.6	234.3	341.9	Schedule 2,Line 13
	BASELINE						
3	Capital	46.8	115.6	162.4	474.3	636.7	Schedule 6,Line 28
4	O&M	35.1	77.2	112.3	548.2	660.5	Schedule 6,Line 12
	INCREMENTAL [5]						
5	Capital	1.8	474.2	476.0	(355.0)	121.0	Schedule 6,Line 39 + Schedule 9,Line 28+Line 36+Line 40
6	O&M	(0.4)	(4.3)	(4.7)	(313.9)	(318.6)	Schedule 2,Line 14

When considering the entire life cycle of the Project, there is an estimated reduction in costs of $197.6 million[65].

70.1 Please confirm that this does not consider undepreciated costs of the existing gas meter fleet at the start of the full implementation of a complete gas meter change-out. Please comment on how, when and if these costs would be collected from customers through rates?

Response:

FEI confirms the costs reported in Table 6-1 do not include the costs of the undepreciated costs of the existing gas meter fleet. Table 6-1 provides the capital and O&M costs for both AMI and Baseline scenarios over the 26-year analysis period. Undepreciated values of the existing gas meters are neither capital nor O&M costs. Please refer to CEC IR1 47.1 where FEI confirms those costs have been included in the financial analysis and provides a discussion of the undepreciated values of the existing meters as well as the proposed recovery mechanism included in the financial analysis for the AMI Project.

70.2 Please also confirm that this analysis does not consider the very different tail (post 2046) conditions for the baseline, where there would be no significant (above 5%) additional meter replacement costs, whereas for the AMI meters there could be substantial costs at the tail because of the bulk implementation at the start.

Response:

Not confirmed. As discussed in the response to BCUC IR1 32.1, the financial analyses for both the AMI and the Baseline scenarios are the same, which covers one cycle of the meter life. For fair comparison, if there are costs post-2046 to replace the AMI meters under the AMI scenario, then there would also be costs to replace the non-AMI meters under the Baseline scenario as well. The financial analysis would yield the same conclusion if FEI extends the analysis over a two-cycle life period when considering the future replacement costs of both scenarios.

70.3 Please confirm that the $197.6 million reduction in costs, as an analysis, covers the timeframe of the project but does not contain any elements of the tail conditions nor any treatment for the undepreciated costs of the existing gas meter fleet.

Response:

FEI notes the $197.6 million[12] referenced in the preamble is the net cost reduction (capital and O&M) over the 26-year analysis period. As discussed in the response to BCUC IR1 32.1, the analysis includes one life cycle of the meters (AMI under the AMI scenario and non-AMI under the baseline scenario); therefore, replacement costs associated with the second life cycle (i.e. post-2040) are not included.

Undepreciated values of the existing gas meters are neither capital nor O&M costs. Please refer to the response to CEC IR1 47.1 for discussion of the undepreciated values of the existing meters as well as the proposed recovery mechanism included in the financial analysis for the AMI Project.

[12] Table 6-1 of the Application, Column 5, Line 5 + Line 6.

71. Reference: Exhibit B-1, Page 100

> As shown in the table above, the AMI Solution capital cost is estimated at $638.4 million[66] and the incremental Project capital cost is estimated at $476.0 million[67]. The Project is estimated to generate incremental net savings of $355.0 million[68] in capital spending over the Post-deployment phase.
>
> estimated to be spent in the Baseline estimate of $159.1 million[72]. This incremental cost is offset by an estimated $344.4 million[73] in meter capital savings in the Post-deployment period driven by the decreased volume of meter exchanges.

71.1 Please confirm that the $355 million net savings in capital spending over the post-deployment phase limits the analysis of post-deployment to ending in 2046 and does not consider any differences in tail condition spending.

Response:

Please refer to BCUC IR1 32.1 explaining why the second life cycle meter exchange costs in the tail were not included for both the AMI and the Baseline scenario.

71.2 Please confirm that this net capital savings also does not consider the undepreciated capital costs which are associated with the early retirement of almost all of the existing gas meter fleet.

Response:

Please refer to the responses to CEC IR1 47.1 and 70.1.

71.3 Please confirm that the $344.4 million in decreased volume of meter exchanges is not in fact a saving but is really a deferral of expenditure of meter exchanges to the period after 2046 when the meter exchanges would take place (i.e. in the tail period to the analysis FEI has provided).

Response:

Not confirmed. In the absence of the AMI Project FEI expects to spend $456 million (Table 6-2, Line 11, Column 4) in meter capital during the post-deployment period for exchanging existing meters in service and installing new customer meters. In contrast, the AMI post-deployment meter capital is expected to be $112 million for exchanging and installation of new AMI meters.

The difference of $344 million[13] in expected as-spent capital results from reduced meter exchange activity. The reduced meter exchange activity is driven by the expectation that the current in service gas meters will be fully exchanged during the deployment period (2021 to 2026) for the AMI Project. In other words, the comparison should be the meter capital to replace existing meters to AMI meters during the deployment period of 2010 to 2026 under the AMI scenario versus meter capital to replace existing meters to non-AMI meters over a period of 2027 to 2046 under the Baseline scenario. As such, the $344 million should be viewed as an offset to the increased costs of fully exchanging the in-service meters during the deployment period and not as a deferral of expenditures to a period after 2046. This is evident by the fact that the total meter capital over both the deployment and post-deployment period is an increase of $32.9 million from Baseline to AMI scenario (i.e. Table 6-2, Column 4, Line 11).

[13] $456 million less $112 million = $344 million.

72. Reference: Exhibit B-1, Page 101

Table 6-3: Meter Unit Summary

Line	Meter Units 000's Item	Pre Deployment 2021 - 2022 (1)	Deployment 2023 - 2026 (2)	Subtotal (1+2) 2021 - 2026 (3)	Post Deployment 2027 - 2046 (4)	Total (3+4) 2021 - 2046 (5)
1	Meter Exchanges	45.0	1,053.6	1,098.6	106.6	1,205.2
2	New Meters	23.5	42.5	66.0	144.6	210.6
3	**Total AMI Meter Units**	**68.5**	**1,096.1**	**1,164.6**	**251.2**	**1,415.9**
4	Meter Exchanges	90.0	214.0	304.0	894.2	1,198.2
5	New Meters	23.5	42.5	66.0	144.6	210.6
6	**Total Baseline Meter Units**	**113.5**	**256.5**	**370.0**	**1,038.8**	**1,408.8**
7	Meter Exchanges	(45.0)	839.6	794.6	(787.6)	7.0
8	New Meters	-	-	-	-	-
9	**Incremental Units**	**(45.0)**	**839.6**	**794.6**	**(787.6)**	**7.0**

72.1 Please provide the specific number of meter replacements required in the period 2047 to 2050 for each of the AMI Meter Units and Baseline Meter Units and show the incremental requirement between the two.

Response:

Please refer to the response to BCUC IR1 32.1.

73. Reference: Exhibit B-1, Page 102

> would be achieved in FEI's Baseline meter program. The incremental cost of deploying the bypass valves sooner than would be achieved under the Baseline scenario results in incremental savings in the Post-deployment capital spending. The savings are predominantly driven from avoided inflation on the cost of the bypass valves, fixed pricing through Deployment, and efficiencies in installation achieved through the mass AMI meter deployment.

73.1 Please confirm that the savings reference, as they relate to avoided inflation on the costs of the bypass valves, is offset by the discount rate for NPV analysis, which would be required to determine if there are savings related to expenditures occurring in different time periods.

Response:

FEI confirms that on a NPV basis the savings identified from avoided inflation associated with the bypass valves is offset by the discount rate, as FEI's discount rate is higher than the inflation rate assumption used.

FEI also notes the costs in Section 6 of the Application were on an as-spent basis, which includes inflation. The bypass valve hardware and installation costs in both the AMI and Baseline scenarios are associated with the same number of units with the AMI scenario incurring the bulk of the costs upfront and the Baseline incurring costs throughout the analysis period. On an as spent basis the difference in total costs for the bypass valve hardware and installation is driven by timing, fixed pricing during the AMI deployment, and efficiencies in mass installation. On an as spent basis, the Baseline costs are more expensive because they include increased inflation resulting from the deployment period extending out into future periods. On an incremental basis, this avoided inflation on the Baseline as spent costs is the savings referred to in the preamble to the question.

73.2 Please confirm that the fixed pricing and efficiencies would be the relevant savings if a proper NPV analysis was conducted as a back up to the text making this savings claim.

Response:

Please refer to the response to CEC IR1 73.1.

74. Reference: Exhibit B-1, Page 103

Table 6-4: AMI Project Management Cost Summary

Line	Project Management Capital ($millions)	2020	2021	2022	2023	2024	2025	2026	Total	Reference [1]
1	Labour			3.7	7.3	7.5	6.2	4.1	28.9	
2	Network & Software Consulting			0.8	2.2	2.1	1.2	0.4	6.7	
3	Misc. Expenses			1.4	2.3	1.6	1.5	0.8	7.7	
4	**Total Project Management - Capital**	-	-	**6.0**	**11.8**	**11.2**	**9.0**	**5.3**	**43.2**	Schedule 6, Lines 13 through 17
5										
6	**Project Management Deferral ($millions)**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**Total**	
7	Labour	1.4	2.0						3.3	
8	Consulting and Legal	0.4	2.1	1.6	0.3	0.2	0.2	-	4.9	
9	Misc. Expenses	0.2	0.4						0.6	
10	Pre-Feasibility	1.7	-						1.7	
11	**Total Project Management - Deferral**	**3.6**	**4.5**	**1.6**	**0.3**	**0.2**	**0.2**	-	**10.5**	Schedule 9, Line 31+39+41
12										
13	**Total Project Management Capital & Deferral**	**3.6**	**4.5**	**7.6**	**12.1**	**11.5**	**9.2**	**5.3**	**53.7**	Line 4 + Line 11

Notes:

[1] *Appendix G-3 contains the AMI financial schedules.*
Appendix G-4 contains the Baseline financial schedules.

74.1 Please confirm that this project management costing does not contain any amounts for the post-deployment period to ensure realization of the benefits of the project for FEI and its customers.

Response:

The project management costing does not contain any amounts in the post-deployment period.

75. Reference: Exhibit B-1, Page 105

Table 6-5: Incremental O&M Savings Summary

Line	Incremental O&M[1] As-Spent in $Millions Item	Pre Deployment 2021 - 2023 (1)	Deployment 2023 - 2026 (2)	Subtotal (1+2) 2021 - 2026 (3)	Post Deployment 2027 - 2046 (4)	Total (3+4) 2021 - 2046 (5)	Reference[2] (6)
1	New AMI O&M	0.8	21.5	22.2	152.5	174.7	
2	Meter Installation O&M	(0.9)	(2.4)	(3.4)	(16.9)	(20.3)	
3	Meter Reading O&M	(0.0)	(21.7)	(21.7)	(404.4)	(426.2)	
4	Operations O&M	(0.0)	(0.6)	(0.6)	(25.8)	(26.4)	
5	Customer Service O&M	0.0	0.0	0.1	(12.7)	(12.6)	
6	Meter Shop O&M	(0.2)	(1.0)	(1.3)	(6.5)	(7.8)	
7	Incremental O&M costs / (savings)	(0.4)	(4.3)	(4.7)	(313.9)	(318.6)	Schedule 2, Line 14 & Agrees to Table 6-1 Line 6

75.1 Please confirm that after the 2046 period ending this analysis, the incremental O&M savings would continue as part of the ongoing use of AMI meters or further technologically improved automated meter reading and that it would be logical to assume that this as an important tail condition in the analysis, because the baseline assumption would not have this as a tail condition.

Response:

FEI confirms that the incremental O&M savings would continue beyond 2046 as part of the ongoing use of AMI meters. FEI notes it is possible that the incremental O&M savings could increase beyond 2046 with further technological improvement in automated meter reading as well as continued increases in the cost expected for physical meter reading for the existing meters (regardless if it is done in-house or by a third party).

76. Reference: Exhibit B-1, Page 106

> ***6.2.2.2 Meter Installation O&M***
>
> Currently, FEI allocates 14 percent of the meter exchange installation cost to O&M and this has been included in both the AMI Solution and Baseline scenario. However, for the AMI Solution, the incremental meter exchange activities in the Deployment phase are not allocated to O&M, as these activities are incremental to normal operation. All of the exchanges in the Post-deployment phase are allocated 14 percent to O&M.

76.1 Please explain why FEI allocates 14% of the meter exchange installation costs to O&M.

Response:

Please refer to the response to BCUC IR1 25.1.

77. Reference: Exhibit B-1, Page 107

Table 6-6: Meter Reading O&M Summary

Line	Meter Reading O&M[1] As-Spent in $Millions Item	Pre Deployment 2021 - 2022 (1)	Deployment 2023 - 2026 (2)	Subtotal (1+2) 2021 - 2026 (3)	Post Deployment 2027 - 2046 (4)	Total (3+4) 2021 - 2046 (5)
1	Meter Reading	25.4	34.4	59.8	29.1	89.0
2	Large Commercial / Industrial Cellular	1.0	1.4	2.4	1.1	3.5
3	**AMI Meter Reading O&M**	**26.4**	**35.9**	**62.3**	**30.2**	**92.5**
4	Meter Reading	25.4	55.5	80.9	432.5	513.4
5	Large Commercial / Industrial Cellular	1.0	2.1	3.1	2.1	5.2
6	**Baseline Meter Reading O&M**	**26.4**	**57.6**	**84.0**	**434.6**	**518.6**
7	Meter Reading	-	(21.1)	(21.1)	(403.4)	(424.5)
8	Large Commercial / Industrial Cellular	(0.0)	(0.7)	(0.7)	(1.0)	(1.7)
9	**Incremental Meter Reading O&M**	**(0.0)**	**(21.7)**	**(21.7)**	**(404.4)**	**(426.2)**

Notes:

[1] *O&M costs net of capitalized overheads.*

77.1 Please explain what the footnote with respect to O&M costs being net of capitalized overheads means, in terms of why would meter reading O&M be capitalized in the first place and then need to be netted out in this presentation.

Response:

FEI's current approved capitalized overhead rate is 16 percent. The capitalized overhead rate is applied to total O&M, which includes meter reading costs. Any changes in O&M levels will result in a change in the amount of O&M that is capitalized. Therefore, in the financial analysis that supports this Application, total forecast O&M has been reduced by 16 percent for the portion that is capitalized.

78. Reference: Exhibit B-1, Page 109

> Table 6-7 below summarizes the reduction in existing Operations O&M and the incremental Operations O&M included in the financial analysis.
>
> **Table 6-7: Operations O&M Summary**

Line	Operations O&M[1] As-Spent in $Millions Item	Pre Deployment 2021 - 2022 (1)	Deployment 2023 - 2026 (2)	Subtotal (1+2) 2021 - 2026 (3)	Post Deployment 2027 - 2046 (4)	Total (3+4) 2021 - 2046 (5)	Reference (6)
1	Existing Operations Activities	(0.0)	(0.6)	(0.6)	(54.0)	(54.6)	
2	New Operations Activities	-	-	-	28.2	28.2	
3	Incremental Operations O&M costs / (savings)	(0.0)	(0.6)	(0.6)	(25.8)	(26.4)	Agrees to Table 6-6 Line 4

> Notes:
>
> [1] O&M costs net of capitalized overheads.

78.1 Please discuss whether or not FEI would expect to have ongoing costs related to opt-out customers and dealing with their concerns and also with any charges FEI would be implementing for the opt-out option.

Response:

As discussed in Sections 5.8.4 and 5.8.4 of the Application, FEI is proposing that customers choosing to opt out will be responsible for the incremental costs of choosing a radio-off AMI meter through a one-time set up fee and a monthly manual meter reading fee thereafter. Therefore, FEI anticipates the ongoing costs related to customers choosing to opt out of a radio-on meter will be offset by the opt-out fees.

78.2 Please quantify the potential costs for opt-out customer management.

Response:

Please refer to the response to CEC IR1 78.1. As discussed in Section 5.8.5 of the Application, FEI has not yet quantified the opt-out costs, but expects to file for approval of any necessary tariff changes, including opt-out fees at least six months prior to the Project's first regional deployment.

79. Reference: Exhibit B-1, Page 110

> ***6.3.1.1 Analysis Period***
>
> The financial analysis period FEI has used is 20 years after deployment of the last AMI meter installed. The 20-year period is equal to the estimated useful life of the new AMI meters. The last AMI meter to be exchanged is in 2026, resulting in 2046 as the final year of the analysis period. Twenty years Post-deployment plus 6 years 2021-2026 for Pre-deployment and deployment result in a 26-year analysis period.

79.1 Please confirm that if the AMI estimated useful life is 20 years for a new AMI meter, then the first exchanges might be expected to begin 20 years after the start of the deployment (2023) and one might expect that the first capital expenditures for AMI meter replacement could start in 2043, which would be 20 years after the first deployment was completed and would end in 2047, 20 years after the last of the AMI meters was deployed (2026).

Response:

Confirmed. Please refer to the response to BCUC IR1 32.1 detailing why meter capital starting from 2043 are not included in the analysis.

79.2 Please confirm that nothing in the financial analysis has addressed the AMI meter replacement timings or costs but instead has relegated this issue to a post-analysis period without any comment on its potential significance.

Response:

Please refer to the response to BCUC IR1 32.1 for why costs associated with a second meter life cycle are not included. FEI notes that the financial analysis excluded the replacement costs for both the AMI and the baseline scenarios after the 26-year analysis period. As such, for fair comparison, replacement costs as well as the O&M savings from non-AMI meters to AMI meters would have been included in both scenarios.

80. Reference: Exhibit B-1, Page 111 & 112

> ***6.3.1.5 Existing Book Value of Meters and Installation***
>
> Included in the financial analysis for both AMI and Baseline scenarios is the opening balance of current plant and accumulated depreciation for existing (non-AMI) meter hardware (asset class 478-10) and meter installation (asset class 474-00 and 474-02) specific to the series 200[116] and 400[117] meters as at January 1, 2021. The opening gross plant balance of existing meter hardware is $163.3 million, less accumulated depreciation of $90.3 million, for a net book value of $73.0 million. The opening gross plant balance of existing meter installation costs is $265.7 million, less accumulated depreciation $87.1 million for a net book value of $178.6 million.
>
> FEI notes the opening balances only include the values of the 200 and 400 series meters, and exclude the plant values associated with commercial and industrial meters, bypass valves, and capitalized overheads as these are not impacted by the Project.
>
> These opening balances have been included in the analysis to capture the ongoing cost of service in the Baseline scenario and to calculate the value for the meters no longer in use in the AMI scenario.

80.1 Please point out in the FEI financial analysis where the undepreciated costs of the existing meters and their installation costs and net book values ($73 million and 178.6 million = total $251.6) is proposed to be recovered from ratepayers as a consequence of the bulk meter replacement.

Response:

The following table summarizes where the beginning balance of undepreciated capital costs of $73 million and $178.6 million for a total NBV of $251.6 million is in the financial analysis.

Line	ITEM	2021	Reference
1	Beginning Plant: 47810 - Non AMI Meter adds ($000)	163,320	Appendix G-3, Schedule 7, Line 3
2	Beginning Accumulated Depreciation: 47810 - Non AMI Meter adds ($000)	(90,327)	Appendix G-3, Schedule 8, Line 3
3	Beginning Non AMI Meter NBV	**72,993**	Line 1 + Line 2
4			
5	Beginning Plant: 47400/02 - Non AMI Meter installation ($000)	265,656	Appendix G-3, Schedule 7, Line 4
6	Beginning Accumulated Deprecation 47400/02 - Non AMI Meter installation ($000)	(87,085)	Appendix G-3, Schedule 8, Line 4
7	Beginning Non AMI Meter Installation NBV	**178,571**	Line 5 + Line 6
8	Total Beginning NBV of NON AMI Meters and Installation	**251,564**	Line 3 + Line 8

FEI also provides the following continuity schedule showing how the above NBV reduces to zero and where the value of the undepreciated cost of the existing meters is added to the proposed deferral accounts to be recovered from ratepayers.

Line	ITEM	2021	2022	2023	2024	2025	2026	Reference
1	Beginning NBV of NON AMI Meters and Installation	251,564	239,874	217,104	159,702	83,090	23,738	
2	Plant Additions	13,903	2,540					Appendix G-3, Schedule 7, Line 22 + Line 23
3	Depreciation Expense	(25,593)	(25,310)	(25,462)	(21,218)	(12,731)	(4,244)	Appendix G-3, Schedule 7, Line 22 + Line 23
4	**Historical Meter Loss Deferral Addition**	**-**	**-**	**(12,340)**	**(24,681)**	**(24,681)**	**(12,340)**	**Appendix G-3, Schedule 9, Line 4**
5	**In Service Meter Write Off Deferral**	**-**	**-**	**(19,600)**	**(30,713)**	**(21,940)**	**(7,154)**	**Appendix G-3, Schedule 9, Line 13**
6	Ending NBV of NON AMI Meters and Installation	239,874	217,104	159,702	83,090	23,738	(0)	Sum of Line 1 through Line 5

80.2 It is logical that these values would continue to be included in the Baseline scenario. Please explain how FEI has used this to calculate the value for meters no longer in use in the AMI scenario (i.e. what has FEI done with this value in its financial analysis for the baseline).

Response:

The net plant-in-service of the asset accounts include capital additions, retirements, and depreciation.

In the Baseline scenario, the opening balance of the net plant-in-service of the asset account related to the existing non-AMI meters will continue to depreciate until they are retired and exchanged with new non-AMI meters as new capital additions. The financial analysis for the Baseline scenario provides the expected continuity of the net plant-in-service asset accounts over a 26-year period in the absence of the AMI project.

In the AMI scenario, the opening balance of the net plant-in-service asset account for the meters is the same as the Baseline scenario. In 2023 when AMI deployment begins, the financial analysis of the AMI scenario retires the undepreciated value of the existing meters which are replaced with new AMI meters as new capital additions. The undepreciated values related to the now retired existing meters are moved to the deferral accounts as proposed in Section 6.3.2.4 and amortized/recovered. Please also refer to the response to CEC IR1 80.1 for an illustration of transferring the remaining undepreciated value related to the existing meters to the proposed deferral accounts.

81. Reference: Exhibit B-1, Page 115 (please treat this as a confidential question if the answer moves into the confidential information)

> **Recovery of Existing Meters**
>
> FEI has considered two options for the recovery period of the remaining rate base value of existing meters to be removed from service as part of the proposed AMI Project. In both cases, the existing meters would be removed from service as they are replaced over the 2023-2026 period, with the remaining net book value for the retired meters transferred to a new rate base deferral account named "Existing Meter Cost Recovery". The first option would be to amortize the account over a 5-year period, and the second to amortize the account over a 10-year period. The 5-year amortization period is consistent with the BCUC's decision for the recovery of the remaining costs of FBC's existing electric meters as determined by Order C-7-13 in FBC's AMI CPCN Application. The 10-year amortization period is based on the estimated remaining life of the existing meters as determined in the 2017 Depreciation Study approved as part of FEI's 2020-2024 MRP Application.
>
> FEI is proposing an amortization period of 5 years, and has assumed this treatment in the financial analysis for the Project. The estimated remaining rate base value of FEI's gas meters to be transferred to the deferral account and amortized over 5 years is approximately $79 million[124].

81.1 Please confirm whether or not a deferral account for Existing Meter Cost Recovery would attract interest charges and if so at what rate.

Response:

FEI notes the Existing Meter Cost Recovery deferral account is proposed as a rate base deferral account and therefore will attract FEI's rate base return along with FEI's overall rate base, which includes both interest and FEI's return on equity.

81.2 Please explain why FEI would propose an amortization period of 5 years instead of 10 years to match the estimated remaining life of the existing meters.

Response:

Please refer to the response to BCUC IR1 29.4.1.

81.3 Please confirm whether or not the $79 million is the rate base value of the existing gas meters and whether or not this includes the installation costs for the gas meters upon exchange.

Response:

FEI confirms the $79 million is the undepreciated cost of in-service non-AMI meters that will be retired as a result of the AMI Project. The $79 million includes the undepreciated meter hardware and installation costs. Please refer to the response to CEC IR1 81.4 for the calculation of the $79 million which shows it includes the remaining book value of both meters and installation costs.

81.4 Please provide the calculations for the $79 million to demonstrate from where the number is derived.

Response:

The $79 million in additions related to the existing in-service meters is based on a continuity of the accumulated depreciation for meter hardware and installation accounts not including the opening balance of historical losses related to previously retired meters. The following table summarizes the calculation of the $79 million of in-service meter book value that has been added to the meter cost recovery deferral account.

Line	NON AMI Meters Units	2021	2022	2023	2024	2025	2026
1	**Beg Non AMI Meters**	1,030,080	1,042,328	1,053,594	877,995	526,797	175,599
2	Added Non AMI Meters	12,248	11,266				
3	Retired Non AMI Meters			(175,599)	(351,198)	(351,198)	(175,599)
4	**End Non AMI Meter**	**1,042,328**	**1,053,594**	**877,995**	**526,797**	**175,599**	-

	Item	2021
7	Beg Accumulated Depreciation Meter Hardware	(117,209)
8	Beg value of historical losses	26,882
9	**Beginning Balance Accumulated Depreciation 47810 Non AMI Meter Adds**	**(90,327)**
10		
11	Beg Accumulated Depreciation Meter Installation	(134,245)
12	Beg value of historical losses	47,160
13	**Beginning Balance Accumulated Depreciation 47400/02 Non AMI Meter Installation**	**(87,085)**

	Accumulated Depreciation Continuity	2021	2022	2023	2024	2025	2026
16	Beg Accumulated Dep Meter Hardware, 2021 = Line 7, Other Years = Line20	(117,209)	(119,972)	(129,957)	(116,690)	(75,049)	(26,410)
17	Depreciation Expense	(9,897)	(9,986)	(10,070)	(8,392)	(5,035)	(1,678)
18	Retirements	7,135	-	27,695	55,391	55,391	27,695
19	**In-service Meter Write Off Deferral Addition [1]**	-	-	**(4,357)**	**(5,358)**	**(1,717)**	**393**
20	End Accumulated Dep Meter Hardware, Line 16+17+18+19	(119,972)	(129,957)	(116,690)	(75,049)	(26,410)	(0)
21							
22	Beg Accumulated Dep Meter Installation, 2021 = Line 11, Other Years = Line 26	(134,245)	(138,335)	(153,659)	(140,876)	(92,221)	(33,306)
23	Depreciation Expense	(15,696)	(15,324)	(15,392)	(12,826)	(7,696)	(2,565)
24	Retirements	11,605	-	43,418	86,835	86,835	43,418
25	**In-service Meter Write Off Deferral Addition [2]**	-	-	**(15,243)**	**(25,354)**	**(20,224)**	**(7,547)**
26	End Accumulated Dep Meter Installation	(138,335)	(153,659)	(140,876)	(92,221)	(33,306)	(0)
27							

	Write Off Deferral Additions	2021	2022	2023	2024	2025	2026	Total
29	Total In-service Write Off Deferral Additions, Line 19 + Line 25	-	-	19,600	30,713	21,940	7,154	**79,407**

Notes:

[1] *(((Line 16 + Line 17)/Line 1)*Line 3)-Line 18*

[2] *(((Line 22 + Line 23)/Line 1)*Line 3)-Line 24*

The total in service meter book value of $79 million is for both the undepreciated value of the meter hardware and installation that is to be written off from plant to the in-service meter write off deferral. The write off amount for both asset accounts has been calculated independently. The annual write off amount calculation is summarized below:

(Beginning balance of accumulated depreciation + the annual deprecation amount) divided by the beginning balance of meters. This value is multiplied by the number of retirements for the period and the difference between this value and the value of the retirements for the period equals the write off amount.

81.5 Please confirm that the amortization of the existing meters shows in the cost-of-service analysis as an amortization value spread out over the full analysis period of 26 years.

Response:

Not confirmed. As discussed in Section 6.3.2.4 of the Application, the proposed amortization period of the Existing Meter Cost Recovery deferral account, which captures the $79 million, is 5 years commencing the year after the deferral addition in 2023. This results in amortization in years 2024 to 2031. The deferral account additions and amortization can be reviewed in Confidential Appendix G-3, Schedule 9, Lines 12-18.

82. Reference: Exhibit B-1, Page 116

Table 6-10: Existing Meter Asset Continuity ($ millions)

Line	Non-AMI Meter Losses	2021	2022	2023	2024	2025	2026	Total	Reference[1]
1	Beg Hardware and Installation[2]	429.0	424.1	426.7	355.6	213.3	71.1		Schedule 7, Line 4 + Line 5
2	Additions	13.9	2.5	-	-	-	-		Schedule 7, Line 23 + Line 24
3	Retirements	(18.7)	-	(71.1)	(142.2)	(142.2)	(71.1)		Schedule 7, Line 41 + Line 42
4	End Hardware and Installation	424.1	426.7	355.6	213.3	71.1	-		Schedule 7, Line 59 + Line 60
5									
6	Accumulated Depreciation, Beginning[3]	(177.4)	(184.3)	(209.6)	(195.9)	(130.2)	(47.4)		Schedule 8, Line 4 + Line 5
7	Depreciation	(25.6)	(25.3)	(25.5)	(21.2)	(12.7)	(4.2)		Schedule 8, Line 23 + Line 24
8	Retirement	18.7	-	71.1	142.2	142.2	71.1		Line 3
9	**Existing Meter Write Off[4]**	-	-	**(19.6)**	**(30.7)**	**(21.9)**	**(7.2)**	**(79.4)**	Schedule 9, Line 13
10	**Previously Retired Meter Write Off[5]**	-	-	**(12.3)**	**(24.7)**	**(24.7)**	**(12.3)**	**(74.0)**	Schedule 9, Line 4
11	Accumulated Depreciation, Ending	(184.3)	(209.6)	(195.9)	(130.2)	(47.4)	-		Schedule 8, Line 61 + Line 62
12									
13	NBV, Beginning[6]	251.6	239.9	217.1	159.7	83.1	23.7		Line 1 + Line 6
14	NBV, Ending	239.9	217.1	159.7	83.1	23.7	-		Line 4 + Line 11

Notes:

[1] *Appendix G-3, AMI Financial Schedules.*

[2] *Beginning plant values of 163.3 + 265.7 as reported in Section 6.3.1.5.*

[3] *Beginning plant values of 90.3 + 87.1 as reported in Section 6.3.1.5.*

[4] *Line 9 sums to $79.4.*

[5] *Line 10 sums to $74.0.*

[6] *Beginning plant values of 72.99 + 178.6 as reported in Section 6.3.1.5.*

82.1 Please explain the relationship of this table to any charges to customers and in particular to the proposed new deferral accounts for Existing Meter Cost Recovery and Previously Retired Meter Cost Recovery.

Response:

The referenced table provides the continuity of the non-AMI meter assets accounts and shows that the beginning balance, additions, retirements, deprecation, and amounts written off (transferred) to the deferral reduce the non-AMI asset balances to zero by the end of the AMI deployment period.

The $79.4 million under the total column on Line 9 is the total amount related to existing meters transferred to the proposed Existing Meter Cost Recovery deferral account as discussed in Section 6.3.2.4 of the Application. The $74 million under the total column on Line 10 is the total amount related to previously retired meters which will be transferred to the proposed Previously Retired Meter Cost Recovery deferral account, also as discussed in Section 6.3.2.4.

FEI notes that Schedule 10 in Confidential Appendix G-3 provides the continuity for the two deferrals and provides the amortization amount that will be reflected in rates for the deferral additions mentioned above.

83. Reference: Exhibit B-1, Page 117

Table 6-11: Levelized Delivery Rate Impact

Levelized Rates	AMI	Baseline	Incremental
NPV Annual Revenue Requirement millions	1,247	1,232	15
Levelized % Increase 2021 Rates	10.348%	10.223%	**0.125%**

The estimated incremental delivery rate impact expected over the 26-year analysis period for the AMI Project is 0.125 percent when compared to 2021 rates. In 2027, the year after full AMI deployment, the cumulative delivery rate impact would be at its highest level of 4.79 percent, resulting in a cumulative annual average bill increase of $21 dollars for a residential customer consuming 90 GJs per year. Each year thereafter, the cumulative delivery rate impact would decrease resulting in an overall average of 0.125 percent per year over the 26-year analysis period. The year 2033, the year after the proposed "Existing Meters Cost Recovery" deferral account has been fully amortized, will be the first year the incremental delivery rate impact will be a decrease.

83.1 Please confirm whether FEI is proposing delivery rates as charges to customers as an average across the project analysis timeframe through to 2046, or is FEI expecting the delivery rate impacts to be highest in 2027 and declining thereafter until the end of the 26 years analysis period.

Response:

The delivery rate impacts in the financial analysis increase to a peak in 2027 of an estimated 4.79 percent then decline thereafter until the end of the 26-year analysis period. FEI is not proposing delivery rates in this Application. Please refer to the response to BCUC IR1 31.2 and 31.3.

83.2 Please provide FEI's proposed changes to delivery rate over the full 26 year analysis period in a graphic form with numerical data attached.

Response:

Please refer to the response to BCUC IR1 31.3. FEI clarifies these are not the proposed delivery rate changes from 2021 to 2046. They are what the expected annual delivery rate impacts would be when compared to the Baseline (i.e. incremental to the Baseline) based on the forecast capital and O&M costs over the 26-year analysis period. The actual delivery rate changes from 2021 to 2046 will depend on the revenue requirements of those individual years.

E. PROVINCIAL GOVERNMENT ENERGY OBJECTIVES

84. Reference: Exhibit B-1, page 140 and page 60

> These energy objectives provided in the CEA placed focus on demand-side management measures and advanced metering. The Project implements AMI technology and provides a foundation to support and enable natural gas conservation and efficiency primarily through the provision of improved natural gas consumption information for customers. Improved consumption data will support natural gas conservation by providing consumers with actionable insight on their consumption further enabling the implementation of demand side measures to reduce consumption. Finally, reducing customer consumption of natural gas will contribute to lowering GHG emissions in BC and is consistent with climate action plans which are described in greater detail below.
>
> AMI would enhance FEI's understanding of the real-time behavior of gas consumers and the direct response of the gas system. In particular, improved understanding of customer usage patterns can be developed which would be used to support system design, improve utilization of peak resources and quantify capacity benefits of DSM activities on peak demand. As such, FEI would be able to enhance its modeling of the impacts of future growth or changes in demand over time across the system. This would allow FEI to better define the scope and timing of required capacity improvement projects, ensuring the system has sufficient capacity to deliver all hours of the day under peak conditions. These improvements are expected to provide financial and service benefits for both the customer and the Company through more targeted, and therefore more cost-effective, options to maintain sufficient capacity under peak conditions. Supported by AMI data, models of impacts on peak demand can be more fully and confidently utilized, resulting in reduced costs and improved resiliency for customers.

84.1 If FEI is also able to make use of the information to develop new DSM programs, please explain when FEI expects to have enough data to make changes to its DSM programs, and when these would be presented to the Commission.

Response:

Although there are claimed benefits associated with leveraging AMI technology to enhance natural gas conservation and energy efficiency programs, further research and field pilots will be required to assess and quantify feasibility prior to developing new DSM programs enabled by AMI data. FEI expects to conduct exploratory research in early 2022 and then assess whether a pilot would be the appropriate next step once AMI is in place. The results of that pilot would be used to assess whether it is feasible to develop a larger scale DSM program which would then go through FEI's program development and approval process.

84.2 Does FEI expect to implement Time of Use rates in the future as a result of the AMI Project implementation?

84.2.1 If no, please explain why not.

84.2.2 If yes, when does FEI expect to offer such rates?

Response:

FEI does not expect to implement Time of Use rates in the future for the following reasons:

- FEI is a seasonal peaking utility with peaks in the winter and on very cold days. The peaks are not on the same day, not at the same time, nor in the same place, and therefore the time of day does not align well with peak use especially in warmer months when there are very few capacity constraints regardless of the time of day; and
- Unlike the electric system where demand is instantaneous and the system needs to be actively balanced from generation to consumption, FEI has gas inventory in the form of line pack, and on and off system storage, allowing FEI to respond to immediate changes in demand on its system by using these inventory sources.

85. Reference: Exhibit B-1, page 140

> The Project will also support the energy objective stated in section 2(k) of the CEA "to encourage economic development and the creation and retention of jobs". The Project will support this objective by creating jobs and contributing to the local economy. The Project will create jobs in BC through FEI's contractors, and result in the procurement of goods and services from locally-owned and operated vendors and subcontractors. FEI also anticipates an increase in the use of local services, such as dining, accommodations and other services, during deployment, which will benefit the economy.

85.1 Does FEI expect that the Project will result in Net job increases, accounting for any loss of jobs occurring in meter reading? Please explain and quantify.

Response:

FEI will determine internal job impacts during the Define phase of Project implementation (as described in Section 5.5.1.2 of the Application). FEI has estimated automation will result in a reduction of internal activities, which will be offset by new AMI activities and expanded scope of work. Overall, the Project is estimated to result in a net job reduction from current levels, which includes currently outsourced meter reading positions.

85.2 How did FEI determine that jobs would be created and that there would be contributions to the local economy?

Response:

FEI's determination that jobs would be created and that there would be contributions to the local economy is based on the scope of the Project. Deployment is expected to take three years, and will take place throughout the province. It is FEI's expectation that the Project contractors will be hiring people locally to perform much of the work, and will make other economic contributions through travel, lodging, and the need for other services.

85.3 Please provide a chart identifying the expected number of incremental FTE's matched with the following information, and please provide the source of the data:

- Type of employment;
- Location/local economy affected;
- Estimated annual wage;
- Expected timeframe and duration of employment.

Response:

As noted in the preamble, FEI expects that jobs will be created through FEI's Project contractors. As FEI is continuing to develop its deployment strategy, the Company is unable to provide the requested details at this time.

86. Reference: Exhibit B-1, page 140 and page 141

The provincial government explicitly stated its support for advanced metering solutions, mandating BC Hydro to install advanced meters by the end of 2012 and establish a program to install and put into operation a smart grid by the end of 2015 as provided in the CEA and the Smart Meters and Smart Grid Regulation (2010). The provincial government also demonstrated its support for advanced metering for utilities other than BC Hydro. Section 17 (6) of the CEA provides:

> (6) If a public utility, other than the authority, makes an application under the Utilities Commission Act in relation to smart meters, other advanced meters or a smart grid, the commission, in considering the application, must consider the government's goal of having smart meters, other advanced meters and a smart grid in use with respect to customers other than those of the authority.

FEI submits that the implementation of AMI supports British Columbia's energy objectives as cited above and meets the government's goal of having advanced meters and a smart grid (as defined in the CEA and in the related regulation) in use for FEI customers.

8.2.1 Smart Meters and Smart Grid Regulation

The provincial government has given effect to the 2007 BC Energy Plan in several enactments, including the Smart Meters and Smart Grid Regulation (2010). The Smart Meters and Smart Grid Regulation (2010) details the prescribed requirements of "Smart Grid" and "Smart Meter". FEI has examined the regulation, and although the regulation is clearly "electricity utility" focused, there is much that applies to natural gas as well. FEI has determined that its proposed Project is aligned with many of that regulation's requirements. A summary table of the regulation requirements, adapted for a natural gas utility focus, is provided below.

Table 8-1: Summary of Smart Meter and Smart Grid Requirements

Category	Requirements of Smart Grid Regulation	FEI's Proposed AMI Solution
Meter	Measures commodity supplied to an eligible premises	✓
	Transmits and receives information in digital form	✓
	Enables remote disconnect for residential premises	✓
	Records and timestamps measurements of natural gas consumption	✓
	Records intervals at a frequency of at least 60 minutes	✓
	Can be configured remotely or onsite	✓
Installation	An advanced meter will be installed for each eligible premises	✓
	Secure hardware and software systems will be installed to: • Monitor, control and configure advanced meters and communications infrastructure • Store, validate, analyze and use the data measured by and received from advanced meters • Provide secure internet access for data about a customer's natural gas consumption, measured by the advanced meter • Integrate with the utility's other systems	✓
	Communications infrastructure includes a telecommunications network that is capable of delivering two-way, digital and secure communications	✓
	Communications infrastructure must integrate to the utility's systems	✓
Smart Grid	Enable two-way, digital, and secure communication among system devices, automation-enabled devices and the systems and equipment used by the utility for monitoring and controlling its natural gas system	✓
	Integrate the operation of the smart grid with the utility's other operations	✓

86.1 Recognizing that natural gas and electricity often have different end-uses, with differing demand drivers (natural gas often being used for heating and hot water), please confirm that the end-use benefits expected to be achieved from AMI type electricity information can also be achieved from natural gas use. For instance, with AMI type information from natural gas, customers could be inspired to turn down their thermostat, or take showers instead of baths, resulting in reduced natural gas use.

Response:

FEI could not find a study that confirms that the end-use benefits expected to be achieved from AMI type electricity information can also be achieved from natural gas use. However, FEI agrees with the general presumption in the question that where natural gas and electricity can be used for the same end use, the application of AMI should result in similar benefits.

86.2 Has FBC or BC Hydro reported/documented significant reductions in energy consumption as a result of their implementation of AMI?

86.2.1 If yes, please provide the information and any quantification of energy savings from the AMI that is available. Please provide the information confidentially if necessary.

86.2.2 If no, why does FEI expect to achieve conservation benefits as a result of AMI?

Response:

FBC has not formally assessed the impact of AMI on reductions in energy consumption. FEI is not aware of any study that BC Hydro has commissioned to evaluate the impact of AMI on reduction in energy consumption.

As outlined in Section 4.3.2.2 of the Application, FEI expects that AMI would be used to further enhance programs within the DSM portfolio, potentially resulting in customer energy savings. The availability of hourly consumption data to customers and FEI would open up new opportunities for DSM programs, including:

- Near real-time consumption reports to enhance commercial and industrial energy assessments, home energy reports for residential customers, measurement and verification activities and DSM program evaluation;
- Increased customer awareness of energy consumption on an end-use or time-of-day perspective may cause them to use less energy;

- Providing customers with the ability to identify their estimated usage for the billing cycle in advance would enable proactive opportunities to reduce use;
- Providing FEI with data to better characterize customer segments in order to make even more informed decisions when planning for future DSM programs. For instance, this data would help better inform the Residential End Use Study, Commercial End Use Study and Conservation Potential Review; and
- Gas AMI devices may be used to gather real-time data when conducting pilots and demonstrations for new natural gas saving technologies rather than FEI being required to purchase separate data loggers for this purpose.

These benefits will not be able to be quantified until AMI is in place.

86.3 Please quantify the conservation benefits FEI expects to achieve or identify where they are included in this application.

Response:

Please refer to the response to CEC IR1 86.2.

87. Reference: Exhibit B-1, page 142

> The Project is aligned with the CleanBC Plan and FortisBC's Clean Growth Pathway as follows:
>
> - the proposed advanced meters are compatible with certain renewable gases, such as hydrogen and biomethane;
> - the proposed advanced meters provide detailed data which can enhance energy efficiency programs and help customers to better manage their gas consumption; and
> - the proposed advanced meters substantially eliminate manual meter reading thereby avoiding GHG emissions associated with meter reading vehicles as described in Section 4.3.2.1.

87.1 Please confirm, or otherwise explain, that all the forms of meters are compatible with renewable gases that FEI would likely be incorporating as part of the natural gas offering either now or in the future.

Response:

Please refer to the responses to BCUC IR1 34.1 and 34.2.

87.2 Please confirm or otherwise explain that if FEI were to utilize electric vehicles, they would significantly reduce the GHG emissions associated with meter reading.

Response:

FEI interprets this question as referring to a scenario where FEI would bring manual meter reading in house in 2027, and that manual meter reading would continue without automation.

FEI confirms that an electric vehicle fleet would reduce the GHG emissions associated with manual meter reading.

To the extent that FEI were to bring manual meter reading in house, FEI would consider using electric vehicles to support in-house meter reading and would evaluate factors such as range requirements, charging infrastructure, initial costs and replacement cycles at that time. The reduction in GHG emissions based solely on reduced fleet activity associated with the introduction of AMI is addressed in Section 4.3.2.1 of the Application.

88. Reference: Exhibit B-1, page 142 and page 143

> **8.3 *LONG TERM GAS RESOURCE PLAN***
>
> FEI's most recent Long Term Gas Resource Plan (LTGRP) was filed on December 14, 2017 (2017 LTGRP) and was accepted by the BCUC on February 25, 2019 by Decision and Order G-39-19. The 2017 LTGRP cites advanced metering solutions in a number of instances as important for gaining better data on customer usage that would allow the utility to better plan its
>
> In Section 2 of the 2017 LTGRP, FEI describes the importance of innovative and integrated customer solutions for positioning natural gas services competitively within BC's energy marketplace for the benefit of all customers. Advanced metering is cited as a potential solution that FEI is exploring.
>
> In addition, FEI responded to a number of information requests (IRs) on AMI technologies related to carbon emissions, demand side management and demand forecasting. In responses to IRs, FEI referred to its investigation of AMI for load aggregation, efficiency, and detection of fugitive emissions.[132]

88.1 Please confirm that the LTGRP and the application proceeding may be considered to be on the record in this proceeding.

Response:

Not confirmed. FEI does not believe that the 2017 LTGRP and the application proceeding materials may be considered to be on record in this proceeding. Any materials from the 2017 LTGRP proceeding would need to be specifically filed in this Application's proceeding in order to be considered on record. As the LTGRP was a public proceeding, FEI and interveners can refer to information from that proceeding without placing it on the record.

89. Reference: Exhibit B-1, page 143 and page 60

> In Section 6.2.1.3 of the 2017 LTGRP, FEI describes how its exploratory peak analysis work remains theoretical because it is not supported by direct measurement of FEI's customer end-use trends. The current monthly meter reading data is insufficient to reliably understand what use trends are occurring that could impact peak demand. Advanced metering is noted as a possible solution to provide improved data for analysing end use trends and analysing peak demand trends. The data provided by AMI will help FEI to determine the impacts its Conservation & Energy Management (C&EM) measures on peak demand.[133] Advanced metering, as proposed for the Project, represents the primary technology that would enable this improved understanding of the impact of changing end-use trends on both total annual and temperature sensitive customer demand.
>
> Further discussion of the key opportunities enabled by AMI technology for use in long term resource planning is provided in Section 4.3.2.4.2.
>
> AMI would enhance FEI's understanding of the real-time behavior of gas consumers and the direct response of the gas system. In particular, improved understanding of customer usage patterns can be developed which would be used to support system design, improve utilization of peak resources and quantify capacity benefits of DSM activities on peak demand. As such, FEI would be able to enhance its modeling of the impacts of future growth or changes in demand over time across the system. This would allow FEI to better define the scope and timing of required capacity improvement projects, ensuring the system has sufficient capacity to deliver all hours of the day under peak conditions. These improvements are expected to provide financial and service benefits for both the customer and the Company through more targeted, and therefore more cost-effective, options to maintain sufficient capacity under peak conditions. Supported by AMI data, models of impacts on peak demand can be more fully and confidently utilized, resulting in reduced costs and improved resiliency for customers.

89.1 When does FEI expect to be able to produce the relevant information to enhance planning and make meaningful changes to system planning as a result of the AMI Project implementation?

89.1.1 Please provide an expected timeline for the information accumulation, the types of activities FEI will undertake to interpret it, and when changes to planning might be placed before the Commission.

Response:

FEI expects that relevant information in limited quantities will begin to be available for analysis once the meters first deployed have been in place through one winter period. This would be the second quarter of 2024, should the deployment plan commence in March 2023 as proposed in the Application. FEI also expects to apply learnings from this first winter as soon as practical, when available, in assessing local capacity requirements. However, information sufficient to understand, verify, and fully apply meaningful changes to system planning processes, supported by data, and to apply those changes to the system at a larger scale will require data collection and assessment through multiple winter periods in all FEI operating regions and take several years to complete.

Based on the deployment plan presented in Appendix D of the Application, the initiation of meter deployment and thus the subsequent availability of hourly winter consumption data will be staggered with initial deployment starting as early as March 2023 in Region 1 (Lower Mainland South) and as late as February 2025 in Region 6 (Kootenays).

FEI expects that by March 2024 only 15 percent of the meters in Region 1 will have been in place through one full winter period. By the second quarter 2026 all meters in this region will have been in place through at least one winter period. The meters deployed in Region 6 would have data for the first winter period (winter 2025-26) available in the second quarter of 2026, but all meters in this region would not have reported data through a full winter until the following spring in the second quarter of 2027.

As data begins to become available for analysis in 2024, FEI will further investigate the peak hour demand versus temperature relationship that the data provides. FEI's regional design temperatures are determined using an extreme value analysis of local index weather stations and represent an extreme cold temperature likely to occur only once in twenty years. Through regression analysis FEI will be able determine a new peak hour demand estimate at FEI's design temperature for the region for each customer with an upgraded meter. FEI's traditional peak demand estimates are derived using monthly billed metered consumption verses an average temperature observed in the region. The extensive AMI data collection capability will allow FEI to collect additional points representing peak hour demand versus temperature each month compared to the one currently able from FEI consumption measurement data. This extensive set of data will result in a more concise determination of peak hour demand and the relationship to temperature for all customers and provide a much better understanding of the statistical variability of the data. FEI will then be able to calculate new estimates of peak use per customer (UPC_{peak}) for customers in various rates schedules that can be compared with UPC_{peak} determined from monthly data and make a preliminary determination on how the enhanced peak hour data from AMI implementation may change FEI's forecasts of local and system wide peak hour and peak day demand.

FEI expects that filings to the BCUC based on a peak demand analysis using AMI-only data could be available by early 2029. In some regions where deployment was completed first, this could occur earlier. Regardless, AMI data will be considered to some extent in peak demand assessments, depending on its suitability and availability, once it first starts to become available in 2024.

F. CONSULTATION & ENGAGEMENT – APPENDIX H

90. Reference: Exhibit B-1, page 120 and page 131

> To ensure the effectiveness of its Consultation, Engagement and Communications Plan, FEI considered lessons learned from the implementation of advanced electric meters by FBC between 2013 and 2016. In addition, FEI conducted a Customer Perception Survey of advanced meters, and implemented best practices from other North American utility deployments of advanced meters. Best practices from the COVID-19 pandemic were also considered to ensure FEI engaged and consulted in a safe, effective and timely manner.
>
> ### 7.2.7 FEI Has Engaged With Industry Associations to Collect Subject Matter Expertise Regarding Best Practices and Safety Features
>
> In addition to the affected parties identified above, FEI has also engaged with BC Hydro and Power Authority (BC Hydro) regarding the Project. BC Hydro has knowledge and expertise regarding its own smart metering upgrade program. FEI met with BC Hydro in early 2020 to discuss its lessons learned and understand its experiences with the smart meter program.
>
> In addition, the Institute for Catastrophic Loss Reduction (ICLR) approached FEI in November 2020 to discuss the Project and learn more about the safety capabilities of the proposed meter. FEI met with members from the ICLR in fall of 2020 to discuss the Project. The ICLR provided a recommendation that FEI investigate the potential to include automatic seismic shut-off devices as a feature of the proposed advanced meter.

90.1 Please provide a summary list of the lessons learned from the FortisBC AMI experience.

Response:

Please refer to the response to BCUC IR1 36.4.

90.2 Please provide a summary list of the lessons learned from the BC Hydro experience.

Response:

Please refer to the response to BCUC IR1 36.5.

90.3 How did FEI make use of these lessons learned from both FortisBC and BC Hydro?

Response:

FEI has incorporated lessons learned, as discussed in the responses to BCUC IR1 36.4 and BCUC IR1 36.5, into its plans. Further, FEI will continue to leverage its existing knowledge and expertise from industry to inform its consultation, engagement, and communication plans throughout the Project.

91. Reference: Exhibit B-1, page 123

> 7.2.4 FEI Developed Project Specific Tactics to Research, Consult and Communicate with Stakeholders to Date
>
> **Customer Research**
>
> FEI contracted a third-party firm to complete a Customer Perception Survey for residential and commercial gas customers. The Survey ran from September 3 to 24, 2019, and included 722 respondents. The full results are included in Appendix H-5.

91.1 Please provide the total cost of the Customer Perception Survey.

Response:

The Customer Perception Survey undertaken by Sentis Research in 2019 cost approximately $26 thousand.

92. Reference: Exhibit B-1, Appendix H-5, page 2 and 4

Does your advanced meter automatically transmit electricity consumption information to the utility company or is your meter read manually?

		Residential	Commercial
	Yes, it transmits automatically	46%	46%
	Not sure, but assume it transmits automatically	51%	50%
	I chose to have my meter read manually each month	3%	4%

While all customers would have an advanced natural gas meter installed at their home/businesses, customers could choose to have the wireless transmission feature of their meter turned off. This means the meter would not be able to wirelessly send gas use information to FortisBC, and that: A FortisBC representative would come to your property to manually read your meter and your bill may include an additional amount to cover administration and manual meter reading costs

Which option are you likely to choose?

		Residential	Commercial
	Wireless transmission turned on	69%	64%
	Wireless transmission turned off	7%	9%
	Don't know/ Not sure	24%	27%

92.1 Do the 3% and 4% correspond with FBCs and BC Hydro's data regarding the proportion of manual meter reading that is undertaken? Please explain.

Response:

FEI does not have records for BC Hydro's manual meter reading data, but has included corresponding data on FBC's manual meter reading in Table 3-6 in Section 3.1.2 of the Application.

92.2 It would appear that a larger proportion of customers would choose to have their FEI AMI wireless transmission turned off than believe they currently have their meter read manually. Please explain.

Response:

FEI does not have additional data to understand why a higher proportion of customers suggested they may choose to have wireless transmission turned off for their gas meter as compared to the

1 proportion that have opted for wireless transmission to be turned off on their electric meter.
2 However, FEI suggests that respondents' understanding of how their electric meters are currently
3 read could contribute to the difference.

4

93. Reference: Exhibit B-1, page 125 and Appendix H-7, PDF page 553 of 783

93.1 Did FEI undertake to determine the level of comfort prior to attending an information session, such that FEI could determine if there was any improvement in the comfort level as a result of the information session?

93.1.1 If yes, please provide the 'before' comfort level.

93.1.2 If not, please explain why not.

Response:

FEI did not conduct a survey prior to the information session. FEI offered the voluntary survey to attendees after the information session based on the assumption that participating attendees did not previously have an established level of knowledge regarding the Project, which is further confirmed by the survey results. Nine out of ten information session attendees who completed the survey indicated that their overall knowledge of the Project had increased after attending the

session. Similarly, 73 percent of attendees indicated that they felt somewhat or very comfortable with the proposed Project after attending the information session.

93.2 Recognizing that there were very few respondents, it appears that 14% of the information session attendees do not feel comfortable with the proposed project. Please explain whether or not this group is expected to be satisfied with the Radio Off option, or if there remain lingering concerns regarding the project altogether.

Response:

Although FEI has not conducted further research regarding survey responses, FEI expects the radio off option to alleviate concerns expressed by the two respondents, and also to do so for the majority of the other customers that may express similar concerns. Please also refer to the response to BCSEA IR1 29.1.

93.2.1 To the extent that customers are not satisfied with the radio off option, what additional steps have been undertaken, or will FEI undertake, to reassure the customers who remain concerned.

Response:

As outlined in Section 7.2.5 of the Application, FEI has undertaken a number of engagement and communication activities regarding the Project in order to keep customers informed, build broader awareness, and address any concerns that they may have. FEI will continue to engage with customers and in an open and transparent fashion throughout the Project with the goal of educating and informing them about the benefits of the Project, and to address any concerns that they may have.

94. Reference: Exhibit B-1, pages 125-126 and Appendix H-6 Communication Metrics

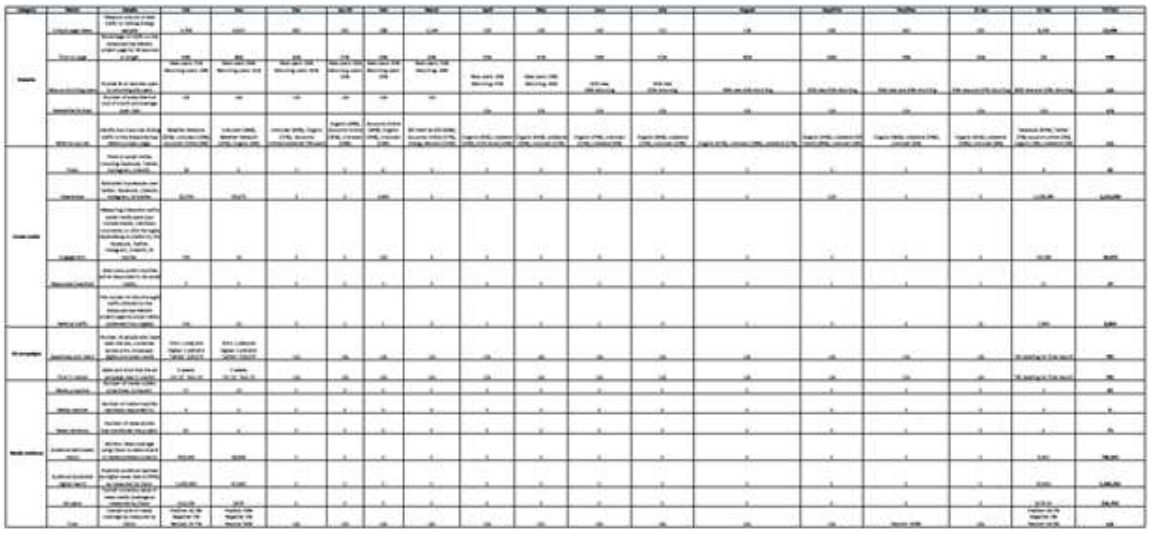
7.2.5 Consultation and Communication Activities to Date

Customer and Public Communications

FEI used a variety of communication channels to support consultation and raise awareness of the Project, with about two-thirds of respondents to FEI's Customer Perception Survey indicating they preferred to stay updated via direct communications and a website. The communications FEI used included:

- Project announcement, including a news release, website, *Energy Moment* newsletter, bill insert, a notification on FEI's online bill payment platform and social media;
- 2019 public information session promotion, including outreach to media outlets, newspaper and digital advertising, a blog post on FortisBC.com, and social media;
- 2021 virtual information session promotion, including newspaper and social media advertising, *Energy Moment* newsletter and a notification on FEI's online bill payment platform; and

- Ongoing communications and Project updates, including social media, bill inserts and website updates.



94.1 FEI used multiple means of contacting the public which are described in pages 125-129, as well as communication with employees. Certain media can overlap targets, (e.g. Energy Moment and webpage) and certain customers would not access the information even if it were received (i.e. reading of bill inserts). Please provide an estimate of the total proportion of customers that FEI believes are currently aware of the project.

Response:

FEI is unable to provide an estimate of the proportion of customers that it believes are aware of the Project due to a number of factors, including a lack of data on which customers may have been reached by multiple forms of outreach. However, FEI is able to confirm that communication on the Project was sent to customers via bill inserts in November 2019, March 2020, and September 2020, each reaching approximately 455,800 gas customers who have registered with Account Online. In addition, Appendices H-6, H-8, and H-9 to the Application include engagement data related to social media content and news coverage of the Project for the period between the Project announcements in fall 2019 to early winter 2021.

95. Reference: Exhibit B-1, page 126

> Energy Moment
>
> To ensure customers remained updated, FEI included content in its *Energy Moment* newsletter in October 2019, January and March 2020, and February 2021 (Appendix H-20). *Energy Moment* is an FEI-produced newsletter that goes to more than 40,000 subscribers. FEI will continue to provide Project updates via *Energy Moment* as the Project progresses. Similarly, external public communication channels will continue to be used as needed to inform and engage customers and the public as the Project progresses.

95.1 Has FEI included content in its Energy Moment newsletter over the last six months (i.e. Since February 2021)?

95.1.1 If no, please explain why not.

Response:

FEI has not published Project updates in its Energy Moment newsletter since February 2021. To date FEI has used the Energy Moment newsletter as a means to communicate Project milestones to customers, such as the Project announcement and the in-service meter inspection performed as part of the Project's development. Project updates to-date occurred in October 2019, March 2020 and February 2021.

FEI intends to include Project updates in Energy Moment in the future as major Project milestones occur.

95.2 Will FEI continue to include content related to the AMI project in its Energy Moment newsletter through to the completion of the Project?

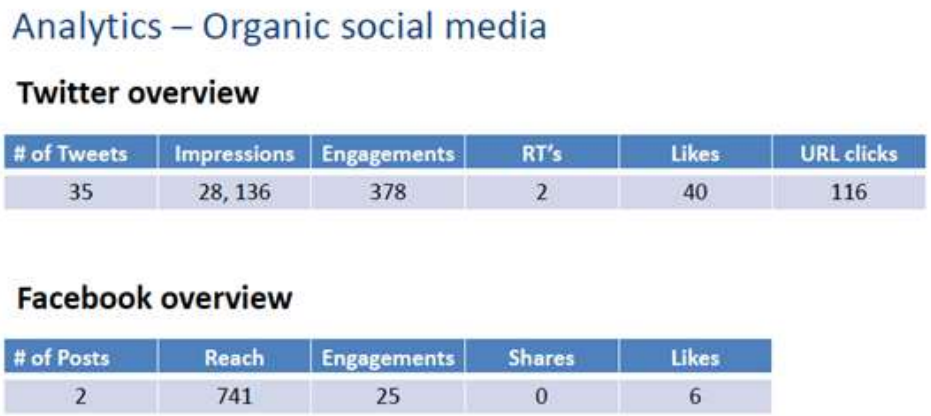
95.2.1 If yes, please explain how often such content will be included.

95.2.2 If no, please explain why not.

Response:

Please refer to the response to CEC IR1 95.1.

96. Reference: Exhibit B-1, Appendix H9-, PDF page 585/783



Analytics – Organic social media

Twitter overview

# of Tweets	Impressions	Engagements	RT's	Likes	URL clicks
35	28, 136	378	2	40	116

Facebook overview

# of Posts	Reach	Engagements	Shares	Likes
2	741	25	0	6

96.1 Please explain what is meant by "Organic" social media.

Response:

Organic social media refers to all posts made by FEI across its social media platforms without paid promotion.

97. Reference: Exhibit B-1, page 134

> FEI seeks to build relationships with Indigenous groups across the province and will continue to abide by its core principles throughout the lifecycle of the Project. At the time of filing, there are no known outstanding issues; however, FEI will continue to engage with Indigenous groups throughout the life of the project and will address issues and concerns that may arise.

97.1 Will FEI advise the Commission if any concerns arise related to Indigenous groups? Please explain why or why not.

Response:

FEI will advise the BCUC through periodic Project updates as to the status of engagement with Indigenous groups affected by the Project, including concerns that arise.

98. Reference: Exhibit B-1, pages 135 and 136

> **7.3.1 Indigenous Groups Potentially Affected**
>
> The list of potentially affected Indigenous groups is presented below (Table 7-1). Due to the nature of the Project, the potential impacts for Indigenous groups are anticipated to be minimal.
>
> FEI is committed to continued engagement with Indigenous communities that have customers on Crown reserve lands, as these groups have been identified as those potentially affected by the scope of the Project.

Table 7-1: Indigenous Groups Engaged

Indigenous Communities		
Adams Lake Indian Band	Musqueam Indian Band	Squiala First Nation
Aitchelitz Band	Neskonlith Indian Band	Stz'uminus First Nation
Chawathil First Nation	Okanagan Indian Band	Sumas First Nation
Cheam First Nation	Osoyoos Indian Band	T'Sou-ke First Nation
Coldwater Indian Band	Penticton Indian Band	Tk'emlúps te Secwépemc
Cowichan Tribes	Prophet River First Nation	Tsartlip First Nation
Esquimalt Nation	Seabird Island Indian Band	Tsawout First Nation
Fort Nelson First Nation	Semiahmoo First Nation	Tsawwassen First Nation
Halalt First Nation	Shíshálh First Nation	Tseshaht First Nation
Hupacasath First Nation	Shxwhá:y Village	Tseycum First Nation
Katzie First Nation	Skeetchestn Indian Band	Tsleil-Waututh First Nation
K'ómoks First Nation	Skowkale First Nation	Tzeachten First Nation
Kwaw Apilt First Nation	Skwah First Nation	Union Bar Indian Band
Lheidli T'enneh First Nation	Snuneymuxw First Nation	Wei Wai Kum Nation
Lhtako Dene First Nation	Songhees First Nation	Westbank First Nation
Little Shuswap Lake Indian Band	Soowahlie Indian Band	Williams Lake Indian Band
Lower Nicola Indian Band	Splatsin First Nation	Yakweakwioose Indian Band
Matsqui First Nation	Squamish Nation	?aq'qm (St. Mary's Indian Band)

98.1 In what ways are the above groups potentially affected by the scope of the Project?

Response:

As customers, the Indigenous groups noted above are potentially affected by the scheduling of appointments and technician access to each gas customer premises to turn off and then relight any gas appliances as part of the meter exchange process. During this process, customers will not be able to use their appliances for approximately one hour while the meter set is replaced.

Aside from the above impacts, FEI does not anticipate any unique impacts for Indigenous groups (noted in Table 7-1) who are also gas customers.

98.2 What types of impacts is FEI expecting to occur, and why does FEI expect this to be minimal?

Response:

Please refer to the response to CEC IR1 98.1.