



Diane Roy
Vice President, Regulatory Affairs

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

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

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

September 29, 2017

Lawson Lundell LLP
Suite 1600 Cathedral Place
925 West Georgia Street
Vancouver, B.C.
V6C 3L2

Attention: Mr. Ian Webb

Dear Mr. Webb:

Re: FortisBC Energy Inc. (FEI)

Project No. 1598915

**Application for Approval of Operating Terms between the City of Surrey and FEI
(the Application)**

Response to the City of Surrey (Surrey) Information Request (IR) No. 1

On May 18, 2017, FEI filed the Application referenced above. In accordance with the British Columbia Utilities Commission Order G-98-17 setting out the Regulatory Timetable for the review of the Application, FEI respectfully submits the attached response to Surrey IR No. 1.

If further information is required, please contact Ilva Bevacqua at 604-592-7664

Sincerely,

FORTISBC ENERGY INC.

Original signed:

Diane Roy

Attachments

cc (email only): Commission Secretary
Registered Parties

FortisBC Energy Inc. (FEI or the Company) Application for Approval of Terms for an Operating Agreement between the City of Surrey and FEI (the Application)	Submission Date: September 29, 2017
Response to City of Surrey (Surrey) Information Request (IR) No. 1	Page 1

A. General

1.1 The City of Surrey requests FEI to provide the following information as context for the Commission's consideration of the present applications. The municipalities identified below, with the exception of City of Surrey, have modern operating agreements with FEI. The Cities of Victoria, Nanaimo and Kelowna have been selected because they are large municipalities. The District of Coldstream has been selected because its operating agreement with FEI was subject of a Commission proceeding and decision (Order No. G- 113-12 decision dated August 23, 2012). The Village of Keremeos has been selected because Commission Order No. C-8-14 directed FEI, for future operating agreement filings, to provide analysis of any wording that differs from the Village of Keremeos operating agreement.

For each of the City of Victoria, City of Nanaimo, City of Kelowna, Village of Keremeos, District of Coldstream and City of Surrey, please provide the following information in tabular form:

- (i) kilometres of FEI distribution gas mains within the boundaries of the municipality,
- (ii) kilometres of FEI high pressure transmission pipelines (IP and TP) within the boundaries of the municipality,
- (iii) number of municipal projects that required FEI to realign, raise, lower, bypass, relocate or protect (collectively, "Relocate") (1) FEI distribution gas mains, and (2) FEI high pressure transmission pipelines for each of the last five years,
- (iv) number of (1) FEI distribution gas main projects, and (2) FEI high pressure transmission pipeline projects that required the municipality to Relocate municipal facilities for each of the last five years,
- (v) total amount FEI has charged to the municipality for reimbursement of FEI costs to Relocate (1) FEI distribution gas mains, and (2) FEI high pressure transmission pipelines for each of the last five years, and
- (vi) the gross operating fee FEI paid to the municipality for 2015 and 2016, and projects it will pay to the municipality for 2017 and 2018.

FortisBC Energy Inc. (FEI or the Company) Application for Approval of Terms for an Operating Agreement between the City of Surrey and FEI (the Application)	Submission Date: September 29, 2017
Response to City of Surrey (Surrey) Information Request (IR) No. 1	Page 2

1 **Response:**

- 2 The table below provides the information requested in questions i – vi. Please note that the
3 answer to question iv is 0 for all municipalities. FEI has no record of paying to relocate any
4 municipal infrastructure for the installation of any Gas Mains or High Pressure Pipelines. This
5 excludes damages and repairs to municipal infrastructure during gas line construction.

		Victoria	Nanaimo	Kelowna	Keremeos	Coldstream	Surrey
i)	Kilometers of Distribution Mains	190.8	503.3	820.9	17.7	129.6	2,143.1
ii)	Kilometers of IP & TP*	8.1	15.9	42.4	-	16.9	104.9
iii)	Number of Gas Line Relocations						
	2012						
	DP	-	-	3	-	-	41
	IP						6
	2013						
	DP	-	-	-	-	2	44
	IP	-	-	-	-	-	6
	TP	-	-	-	-	-	4
	2014						
	DP	-	1	16		-	31
	2015						
	DP	-	-	3	-	-	11
	TP	-	-	1	-	-	-
	2016						
	DP	1	-	2	-	-	10
	Total:	1	1	25	-	2	153
iv)	FEI has not paid to relocate any municipal infrastructure for the installation of any Gas Mains or High Pressure Pipelines.						
v)	Total Cost of Gas Line Relocations						
	2012						
	DP	\$ -	\$ -	\$ 13,576	\$ -	\$ -	\$ 183,479
	IP	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 959,325
	2013						
	DP	\$ -	\$ -	\$ -	\$ -	\$ 3,612	\$ 541,773
	IP	\$ -	\$ -	\$ -	\$ -	\$ -	\$1,443,011
	TP	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 533,749
	2014						
	DP	\$ -	\$ 1,783	\$ 96,971	\$ -	\$ -	\$ 757,651
	2015						
	DP	\$ -	\$ -	\$ 8,468	\$ -	\$ -	\$ 135,582
	TP	\$ -	\$ -	\$ 833	\$ -	\$ -	
	2016						
	DP	\$ 9,708	\$ -	\$ 3,326	\$ -	\$ -	\$ 33,536
	Total:	\$ 9,708	\$ 1,783	\$ 123,174	\$ -	\$ 3,612	\$4,588,106
vi)	Operating Fees						
	2015	** \$ 180,970	** \$ 154,115	\$1,152,144	\$ 11,776	\$ 108,999	
	2016	\$ 542,359	\$ 465,809	\$1,029,095	\$ 10,955	\$ 111,634	

* IP=Intermediate Pressure, TP=Transmission Pressure

** 2015 is Partial Year Only due to implementation of Operating Fee collection mid-year.

FortisBC Energy Inc. (FEI or the Company) Application for Approval of Terms for an Operating Agreement between the City of Surrey and FEI (the Application)	Submission Date: September 29, 2017
Response to City of Surrey (Surrey) Information Request (IR) No. 1	Page 3

1.2 Please confirm or explain otherwise that the costs presented in Figures 1 and 2 of City of Surrey's application (Exhibit B2-1) are accurate.

Response:

For Surrey's Figure 1, there are a few differences in the data when compared with FEI's information, however, the differences are relatively minor. The following table provides the data from FEI's information for Figure 1.

	Type of Main	2010	2011	2012	2013	2014	2015
Zone 3 - FRASER VALLEY	DP	\$ 403,742	\$ 358,361	\$ 183,479	\$ 541,773	\$ 762,485	\$ 135,582
	IP	\$ 76,293		\$ 959,325	\$ 1,443,011		
	TP				\$ 533,749	\$ 42,722	
Zone 3 - FRASER VALLEY Total:		\$ 480,035	\$ 358,361	\$ 1,142,804	\$ 2,518,533	\$ 805,207	\$ 135,582

The table below provides the data from FEI's information for Figure 2. As shown in the table, there are more discrepancies between the information in Surrey's Figure 2, as compared to FEI's information. Without the source data for Surrey's Figure 2 Pie Chart, FEI cannot comment on the differences.

IP and TP Pipelines - 2010 to 2015			
	Surrey Figure 2 Chart		
City of Surrey	\$ 3,012,377	36%	51%
Mainland (Zone 1, 3) excluding City of Surrey	\$ 4,062,269	49%	41%
Interior (Zone 4, 5)	\$ 1,038,087	12%	3%
Island	\$ 210,709	3%	5%
Total:	\$ 8,323,442	100%	

1.3 The District of Chetwynd did not reach agreement with FEI on operating terms, and by Order No. G-17-06 dated February 2, 2006 the Commission specified the terms for FEI's operating agreement with the District of Chetwynd. The District of Coldstream did not reach agreement with FEI on operating terms, and by Order No. G-113-12 dated August 23, 2012 the Commission specified the terms for FEI's operating agreement with the District of Coldstream.

Has FEI and any other municipality in the province failed to reach agreement on an operating agreement such that the Commission has been required to specify

FortisBC Energy Inc. (FEI or the Company) Application for Approval of Terms for an Operating Agreement between the City of Surrey and FEI (the Application)	Submission Date: September 29, 2017
Response to City of Surrey (Surrey) Information Request (IR) No. 1	Page 4

1 the terms during the last ten years? If so, please provide a list of the
2 Commission orders issued during the last ten years that specified the terms of
3 operating agreements for such municipalities. For greater certainty, this question
4 is not seeking Commission orders that affirmed or accepted for filing operating
5 agreements endorsed by FEI and the respective municipality, only those orders
6 where the Commission was required to specify operating terms because FEI and
7 the municipality did not agree.
8

9 **Response:**

10 Other than the two municipalities noted above, FEI has reached agreement with all other
11 municipalities on terms for operating agreements in the last 10 years.
12

FortisBC Energy Inc. (FEI or the Company) Application for Approval of Terms for an Operating Agreement between the City of Surrey and FEI (the Application)	Submission Date: September 29, 2017
Response to City of Surrey (Surrey) Information Request (IR) No. 1	Page 5

B. Operating Fee

The City of Surrey understands that FEI is currently remitting operating fees to approximately 70 municipalities in the province, and that the operating fee paid to each of these municipalities is calculated as 3% of the gross revenues (excluding taxes) received by FEI for provision and distribution of all gas consumed within the boundaries of the respective municipality. Surrey requests FEI to provide the following information to verify Surrey's understanding.

2.1 How many municipalities in the province currently receive an operating fee from FEI?

Response:

Please refer to the response to BCUC IR 1.4.1.

2.2 Of those municipalities currently receiving an operating fee from FEI, what percentage of them have their operating fee calculated on the basis Surrey requests for itself in its application (i.e., 3% of gross revenues (excluding taxes) as set out in section 4(i) of Surrey's application)?

Response:

100 percent.

2.3 Of those municipalities currently receiving an operating fee from FEI, what percentage of them have their operating fee calculated on the basis of 0.7% of delivery margin (i.e., as set out in section 3.3.2 of FEI's application)?

Response:

No municipalities (zero percent) have their fees calculated on the basis of 0.7 percent of delivery margin, on delivery margin itself, or using the methodology set out in Section 3.3.3.1 of FEI's Application. This is a new methodology that we have developed to make the Operating Fee more closely match the circumstances of Surrey, thus avoiding a windfall to Surrey at the expense of FEI's customers in Surrey. As can be seen from the information in the responses to BCUC IR 1.4.3 and CEC IR 1.9.2, Surrey is a very different municipality from the municipalities

FortisBC Energy Inc. (FEI or the Company) Application for Approval of Terms for an Operating Agreement between the City of Surrey and FEI (the Application)	Submission Date: September 29, 2017
Response to City of Surrey (Surrey) Information Request (IR) No. 1	Page 6

1 in the Interior and on Vancouver Island which have their Operating Fees currently based on 3
2 percent of gross revenues.

3
4
5
6 2.4 Of those municipalities currently receiving an operating fee from FEI, what
7 percentage of them have their operating fee calculated on the basis of delivery
8 margin as opposed to gross revenues?
9

10 **Response:**

11 Please refer to the response to Surrey IR 1.2.3.
12
13

14
15 2.5 Of those municipalities currently receiving an operating fee from FEI, what
16 percentage of them have their operating fee calculated using the methodology
17 set out in section 3.3.3.1 of FEI's application?
18

19 **Response:**

20 Please refer to the response to Surrey IR 1.2.3.
21
22

23
24 2.6 Has the Commission previously considered the methodology FEI proposes to
25 apply for Surrey's operating fee as set out in section 3.3.3.1 of FEI's application?
26 If so, please provide references to the relevant Commission order(s) and
27 decision(s).
28

29 **Response:**

30 No.
31
32

33
34 2.7 What is the most recent operating agreement FEI has entered into that provides
35 for FEI to remit an operating fee to the municipality calculated on the basis of 3%
36 of gross revenues (excluding taxes). Please provide the name of the

FortisBC Energy Inc. (FEI or the Company) Application for Approval of Terms for an Operating Agreement between the City of Surrey and FEI (the Application)	Submission Date: September 29, 2017
Response to City of Surrey (Surrey) Information Request (IR) No. 1	Page 7

municipality, the date of the operating agreement and identify the Commission order, if any, accepting the agreement.

Response:

The most recent operating agreement approved by the Commission is between FEI and the Corporation of the Village of Montrose. The Operating Agreement provides for a 3 percent Operating Fee on gross revenues, was entered into by FEI and the municipality on January 30, 2017, and was approved by Commission Order C-4-17 dated April 6, 2017.

2.8 Please complete the second column of the table below for those municipalities currently receiving an operating fee from FEI.

Total amount FEI charged to the municipality in 2016 for reimbursement of FEI costs to realign, raise, lower, by-pass, relocate or protect FEI distribution gas mains and high pressure transmission pipelines	Number of municipalities (receiving an operating fee)
\$0	
\$1 to \$10,000	
\$10,000 to \$25,000	
\$25,000 to \$50,000	
\$50,000 to \$100,000	
More than \$100,000	

Response:

As requested, below are the municipalities who have operating agreements which contain the provision for FEI to collect an Operating Fee on their behalf, grouped by the amount FEI invoiced to municipalities to relocate gas piping at the request of that municipality.

FortisBC Energy Inc. (FEI or the Company) Application for Approval of Terms for an Operating Agreement between the City of Surrey and FEI (the Application)	Submission Date: September 29, 2017
Response to City of Surrey (Surrey) Information Request (IR) No. 1	Page 8

Total Amount FEI Invoiced to municipalities in 2016 to relocate gas piping	Number of municipalities (receiving an operating fee)
\$0	63
\$1 to \$10,000	7
\$10,000 to \$25,000	3
\$25,000 to \$50,000	1
\$50,000 to \$100,000	0
More than \$100,000	1

2.9 Re: FEI's application, page 20, lines 5 to 9.

What was the original basis for FEI's decision to apply the 3% of gross revenues operating fee as a 3.09% charge on customer bills (that is, apply the 3% to the customer's delivery charges + commodity charges + Operating Fee as indicated on page 20, lines 7 to 8 of FEI's application)? Did the Commission direct FEI to apply the 3% of gross revenues operating fee in that manner? If so, please identify the applicable Commission order.

Response:

FEI has no knowledge of the original basis for calculating the Operating Fee in this manner other than it has always been done this way in the billing systems of the predecessor companies. While FEI is not aware of any Commission direction that specifies the manner of applying the Operating Fee, to the best of FEI's knowledge the manner has remained unchanged since inception.

2.9.1 By applying the 3% charge to the customer's delivery charges + commodity charges + Operating Fee, does FEI collect more revenue pursuant to the charge than it remits to municipalities? If so, what happens to the incremental revenue retained by FEI? If not, please explain.

FortisBC Energy Inc. (FEI or the Company) Application for Approval of Terms for an Operating Agreement between the City of Surrey and FEI (the Application)	Submission Date: September 29, 2017
Response to City of Surrey (Surrey) Information Request (IR) No. 1	Page 9

Response:

No. All Operating Fees collected from customers within a municipality are fully remitted to the municipality.

2.10 Re: FEI's application, page 6, lines 19 to 23; page 14, lines 7 to 9; and page 19, line 39 to page 20, line 3. FEI says that it has an objective of developing an operating fee model based on the amount and nature of the work FEI performs within Surrey and the permitting fees and other administrative costs that Surrey would levy for similar work undertaken by non-utility third parties. FEI also says that operating fees should be "proportional to the nature of the work being done". FEI also says that "Calculating the Operating Fee based on 3.09% of total revenues for 2016 results in a fee of \$3.8 million paid to the City [of Surrey], which is in excess of any reasonable amount that should be paid for the services provided. In addition, the variable factors in the formula for gross revenue (commodity costs) have no association or connection with the costs incurred by the Municipality for the Company's facilities and operations to serve customers in the Municipality." Surrey requests FEI to provide the following information to verify whether the noted associations or connections were considered in the determination of operating fees FEI is remitting to other municipalities.

2.10.1 Did FEI analyse and/or calculate the relationship between operating fee remitted and "amount that should be paid for the services provided", "nature of the work being done" or "costs incurred by the Municipality for the Company's facilities and operations to serve customers in the Municipality" for any of the municipalities in the province that currently receive an operating fee from FEI? If so, please provide the analysis. If not, please fully explain why FEI is now proposing a new approach.

Response:

No. As discussed in FEI's Application, Section 3.3.3.2, all municipalities which have operating agreements containing the legacy 3 percent Operating Fee had been a party to previous operating agreements with a similar provision that FEI inherited when acquiring the predecessor companies and distribution systems. FEI negotiated the renewals in that context. We are unaware of the analysis and trade offs that went into the original legacy agreements. Further, in Section 3.3.3.3 of FEI's Application, FEI describes the Commission's directive to consider an Operating Fee based on Delivery Margin, and this Application is the first opportunity for FEI to comply with that directive to adopt a different methodology.

FortisBC Energy Inc. (FEI or the Company) Application for Approval of Terms for an Operating Agreement between the City of Surrey and FEI (the Application)	Submission Date: September 29, 2017
Response to City of Surrey (Surrey) Information Request (IR) No. 1	Page 10

1
2
3
4
5 2.10.2 In accepting, approving or determining the terms of FEI operating
6 agreements, has the Commission previously considered such
7 relationships between the operating fee and services provided, work
8 being done or costs incurred? If so, please provide references to the
9 relevant Commission order(s).

10
11 **Response:**

12 FEI cannot speak for the Commission as to what they have previously considered. FEI only has
13 insight into the Commission's decisions and directives, and as outlined in Section 3.3.3.3 of
14 FEI's Application, the Commission articulated its concerns with the 3 percent Operating Fee on
15 gross margin and directed FEI to seek a new methodology for Operating Fees in future.

16
17
18
19
20 2.11 Has FEI estimated the savings it enjoys from placing its facilities on, along,
21 across, over or under public places owned and controlled by Surrey as compared
22 to the cost FEI would incur to purchase or expropriate statutory rights-of-ways
23 ("SROW") on private property? If so, please provide and explain the estimate.

24
25 **Response:**

26 FEI confirms that there is generally a cost to acquiring SROW. However, the premise of the
27 question appears to be that, but for this pending operating agreement, FEI would otherwise be
28 required to acquire SROW. That is not an accurate assessment of the parties' respective legal
29 positions. FEI is granted the authority and power, in accordance with and subject to the *Gas*
30 *Utility Act*, the *Utilities Commission Act* and other applicable Laws. Section 32 provides a
31 mechanism for the Commission to address disputes in the event the municipality takes an
32 unreasonable position, such as the one inherent in the question.

33 To the extent that there are any savings or efficiencies gained from using public places for FEI
34 infrastructure, those savings benefit all of FEI's customers. The presence of utilities in
35 municipalities are beneficial for the economy of the municipality and for its residents, which is
36 the basis for the original grant of CPCN to FEI's predecessor.

FortisBC Energy Inc. (FEI or the Company) Application for Approval of Terms for an Operating Agreement between the City of Surrey and FEI (the Application)	Submission Date: September 29, 2017
Response to City of Surrey (Surrey) Information Request (IR) No. 1	Page 11

The routing of a pipeline is a product of many factors (as described in more detail in the response to Landale IR 1.3), the costs of which are only one factor, and which can be weighted differently depending on the specific circumstances.

2.11.1 Would FEI agree that if it had to purchase or expropriate SROW on private property for FEI's 2,685 kilometers of pipes within Surrey's boundaries, this would cost FEI roughly \$2 billion (calculated on the basis of 2,685 kilometers of pipes * 3 meters (average width of SROW) * \$1 million/acre (average assessed value of land in Surrey))? If not, please provide and explain an estimate of what it would cost FEI to purchase or expropriate SROW on private property for FEI's pipes within Surrey's boundaries.

Response:

FEI cannot speculate on the cost of purchasing or expropriating SROWs within the boundary limits of the City of Surrey since it has never had to engage in this hypothetical exercise. As noted in the response to Surrey IR 1.2.11, the Commission oversees the use of municipal spaces by public utilities like FEI. FEI has every expectation that the Commission would not allow a municipality to force public utility customers to pay for the acquisition of SROWs in the manner hypothesized, particularly if the action was intended as a bargaining tactic to secure more favourable operating terms. This is particularly the case given that the utility's ongoing operation has been determined to be in the public interest, FEI's long operating history, and the ongoing reasonableness of the utility operating in public places.

That said, there are some obvious flaws with the calculation being proposed.

- First, it appears to be based on current assessed land values, whereas this SROW began to be acquired in the mid-1950s.
- Second, it is using assessed values. The value of land is assessed for the sole purpose of property taxation and is not a value which is transferable or applicable to other uses or purposes. Assessed value is not reflective of the market value of an affected portion of land or the compensation to be paid to a property owner in the event of expropriation. In the same manner that the assessed value of land does not form the basis of determining compensation if a municipality would expropriate land under the *Expropriation Act* (Part 6 of the *Expropriation Act* considers market value, damages, use, etc. on a case by case basis), assessed value should not be used to speculate on payments by FEI. Applicable compensation would require a parcel by parcel determination at the relevant time,

<p style="text-align: center;">FortisBC Energy Inc. (FEI or the Company) Application for Approval of Terms for an Operating Agreement between the City of Surrey and FEI (the Application)</p>	<p style="text-align: center;">Submission Date: September 29, 2017</p>
<p style="text-align: center;">Response to City of Surrey (Surrey) Information Request (IR) No. 1</p>	<p style="text-align: center;">Page 12</p>

including consideration of the size and location of the required tract of land relative to the land as a whole.

- Third, it assumes FEI is the fee simple owner of the affected lands and has sole use of those lands. Despite the SROW, there may be multi-use of the affected lands. FEI's sub-surface use may be shared with other utilities and be incidental to and permit ongoing surface use by the property owner.

2.11.2 Would FEI agree that by placing its facilities under Surrey's streets, FEI also enjoys savings from having its facilities accessible for operation and maintenance work, and from avoiding having to build and maintain its own roads to access its facilities, as compared to a scenario where FEI's facilities were located on or under private property? If not, please explain why not.

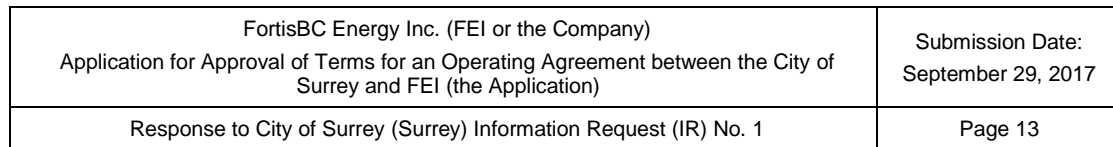
Response:

FEI would agree that operating in streets and public places may reduce costs in many cases, but FEI does not accept the implicit suggestion that FEI itself is the ultimate beneficiary of operating more efficiently. The ultimate beneficiaries of FEI's efficient operations in Surrey are our customers, who pay lower rates (other things being equal). FEI, in general terms, earns its return on invested capital, which may or may not be higher in circumstances where facilities are located in private property.

FEI, in proposing an Operating Fee based on 0.7 percent of delivery margin, is recognizing that an excessive Operating Fee will negate benefits otherwise associated with having an operating agreement.

Please also refer to the response to Surrey IR 1.2.11.

2.12 Re: FEI's application, section 3.3.3.2. FEI argues that the circumstances of Surrey "differ in important respects from those of other municipalities" justifying a different basis for an operating fee. The City of Surrey requests the following information from FEI to better understand the alleged difference.



Response:

2.12.2 Please confirm or explain otherwise that after the Vancouver Island Natural Gas Pipeline Act was amended in 2014 to enable Vancouver Island municipalities to levy an operating fee, the Commission recently approved 26 operating agreements between FEI and municipalities on Vancouver Island and the Sunshine Coast which each provide for 3% of gross revenue operating fees.

Response:

Confirmed. As stated in FEI's Application, Section 3.3.3.3, the provision for a 3 percent Operating Fee on gross revenue was contained in the existing agreements with Vancouver Island municipalities that pre-date the 26 recently approved operating agreements. In fact, in February of 2015, three Vancouver Island municipalities (Town of View Royal, District of Saanich, and District of Highlands), with existing operating agreements that had not yet expired, advised FEI that, as a result of the VINGPA amendment, they intended to levy the 3 percent Operating Fee and that FEI should seek the necessary regulatory approvals to implement its collection. By Order C-3-15 dated April 16, 2015, the Commission approved for FEI to collect the 3 percent Operating Fee which commenced on June 1, 2015.

2.12.3 Did FEI support or oppose the recent addition of 3% of gross revenue operating fees for municipalities on Vancouver Island and the Sunshine Coast? If FEI opposed, please provide evidence of such opposition as was submitted to the Commission at the time.

FortisBC Energy Inc. (FEI or the Company) Application for Approval of Terms for an Operating Agreement between the City of Surrey and FEI (the Application)	Submission Date: September 29, 2017
Response to City of Surrey (Surrey) Information Request (IR) No. 1	Page 14

Response:

The 3 percent Operating Fee on gross revenue is not a “recent addition”, as suggested in the question; the existing Vancouver Island operating agreements previously contained that same legacy provision. FEI cannot disclose discussions that occurred during negotiations. As noted in FEI's Application, Section 3.3.3.3, during negotiations, FEI considered four key factors, and in order to achieve unanimous agreement on all terms with all the parties involved in the negotiations, FEI agreed to maintain the status quo relating to Operating Fees for Vancouver Island municipalities.

2.13 Has FEI opposed a 3% of gross revenue operating fee in any previous proceedings before the Commission? If so, please provide evidence of such opposition as was submitted to the Commission at the time. If not, please fully explain why FEI is now opposing a 3% of gross revenue operating fee for the first time.

Response:

No, other than the District of Chetwynd and the District of Coldstream where the Commission imposed operating agreement terms (disagreements were not about Operating Fees in either of those cases), FEI and the relevant municipalities had agreed to all of the operating agreement terms. The Application explains the basis for FEI's proposal. In that regard, please also refer to the responses to BCUC IRs 1.4.2, 1.5.4, and 1.11.2.

2.14 Given that City of Surrey pays to FEI the highest average annual amount (of all municipalities in the province) for reimbursement of FEI costs to realign, raise, lower, by-pass, relocate or protect FEI distribution gas mains and high pressure transmission pipelines, and pays more to FEI for such reimbursement than all Vancouver Island, Sunshine Coast and Interior municipalities combined, please explain why FEI takes the position that Surrey should receive an operating fee that is less than the 3% of gross revenue operating fee that FEI remits to other municipalities.

Response:

As stated in FEI's Application (Section 3.3.1), FEI takes the position that starting to provide Operating Fees to Surrey (after decades of no Operating Fees) may make sense, provided the

FortisBC Energy Inc. (FEI or the Company) Application for Approval of Terms for an Operating Agreement between the City of Surrey and FEI (the Application)	Submission Date: September 29, 2017
Response to City of Surrey (Surrey) Information Request (IR) No. 1	Page 15

1 fees are proportional to the nature of the work being done, and not unduly onerous to FEI's
2 customers in Surrey. FEI believes that if an Operating Fee is approved by the Commission, it
3 should be less than 3 percent of gross revenue, and calculated on principled approach which
4 provides a reasonable basis that is fair to both the City and FEI's customers in Surrey who
5 would ultimately pay such an Operating Fee.

6 FEI believes the logic in the question is flawed for three main reasons:

7 First, the reason Surrey pays to FEI the highest average annual amount for relocation-type work
8 is because Surrey is making more requests than the other municipalities. It is making those
9 requests due to its own development plans and needs, and NOT to meet the needs of FEI and
10 its customers in Surrey. If FEI has the need to perform work on its system in Surrey, unrelated
11 to requests from Surrey, FEI does so on behalf of customers, and Surrey is not invoiced for, nor
12 does it pay, for such work. As such, it is not fair that these relocation-type costs be paid entirely
13 by FEI's customers in Surrey, using an Operating Fee as a mechanism. Relocation-type costs
14 for work requested by City should properly be borne by the City on behalf of all its residents.
15 Therefore, the amount of an Operating Fee, if the Commission approves one, is irrelevant to
16 relocation costs, and should not be considered by the Commission when making its
17 determination.

18 Second, FEI's proposal on relocation in its Application, if approved by the Commission, would
19 provide the City reimbursement for 50 percent of all High Pressure Pipelines relocated within
20 Surrey, which equates to approximately \$500 thousand per year based on an average of the
21 previous 6 years. This arrangement does not exist with any other municipality as other
22 municipalities are paying 100 percent of relocation costs.

23 Third, even if one were to consider relocation work as a factor to determine the level of an
24 Operating Fee, which FEI says is inappropriate, based on the annual average over the past 6
25 years, as noted above, that would amount to \$500 thousand per year. As stated in FEI's
26 Application (Section 3.3.3.3, page 19), an Operating Fee of 3 percent on gross revenue for 2016
27 (normalized) would have amounted to \$3.8 million¹ in revenue for Surrey (as noted in the
28 responses to BCUC IRs 1.4.2 and 1.5.3 would have amounted to \$3.4 million in revenue on an
29 actual basis). Given the annual average of \$500 thousand per year over the past 6 years, an
30 Operating Fee of 3 percent on gross revenue would result in a windfall to Surrey of
31 approximately \$3 million, an amount which FEI believes is unfair and unjust for FEI's customers
32 in Surrey.

33 It is also worthy of note that over the past 6 years, there remain long outstanding invoices for
34 completed relocation work Surrey has yet to pay FEI for, that total over \$900 thousand.

¹ In FEI's Application, page 19, \$3.8 million was calculated based on normalized 2016 delivery revenue for Residential and Commercial rate schedules and actual Delivery revenues for all other rate schedules, before delivery rate riders.

FortisBC Energy Inc. (FEI or the Company) Application for Approval of Terms for an Operating Agreement between the City of Surrey and FEI (the Application)	Submission Date: September 29, 2017
Response to City of Surrey (Surrey) Information Request (IR) No. 1	Page 16

2.15 Re: FEI's application, page 20, lines 14 to 16. FEI says that its proposed methodology for calculating Surrey's operating fee addresses a Commission directive from its Order No. C-7-03 Decision dated September 3, 2003. A search of the Commission's historical orders indicates that the Commission has not considered the Order No. C-7-03 directive since 2006 when the Commission approved several Terasen Gas Inc. operating agreements that provide for 3% of gross revenues operating fees.

2.15.1 Has the Commission considered the Order No. C-7-03 directive since the orders it issued on August 29, 2006 (Order Nos. C-9-06 through C-16-06)?

Response:

To FEI's knowledge, the directive has not been directly addressed in subsequent Commission orders and decisions.

2.15.2 Following Order No. C-7-03, how many operating agreements has FEI entered into that provide for a 3% of gross revenue operating fee?

Response:

Since the issuance of C-7-03, the Commission has approved 63 operating agreements which FEI has entered into with Interior and Vancouver Island municipalities that provide for the legacy Operating Fee of 3 percent of gross revenue.

2.15.3 Please confirm that the Commission's directive at page 5 of Order No. C-7-03 Decision was made in the context of "considerable volatility" in gas commodity costs at that time (i.e., in recent years prior to 2003).

Response:

The directive of the Commission in Order C-7-03, Appendix A, page 5, states:

FortisBC Energy Inc. (FEI or the Company) Application for Approval of Terms for an Operating Agreement between the City of Surrey and FEI (the Application)	Submission Date: September 29, 2017
Response to City of Surrey (Surrey) Information Request (IR) No. 1	Page 17

1 ...the Commission considers that the inclusion of the gas commodity cost in the
2 calculation of fees for Sales Service customers has led to considerable volatility
3 in recent years. The Commission directs Terasen to seek a method in future
4 agreements to convert the fee to a charge on Utility Margin, so as to stabilize the
5 costs to utility customers.

6 Regardless of the level of volatility of the commodity, delivery margin will be more stable than
7 gas commodity costs. This is both because delivery rates are only reviewed annually as
8 compared to the potential for quarterly resetting of commodity rates, and because FEI will
9 propose rate smoothing measures for delivery rates when there are large increases or
10 decreases being considered. Please also refer to the response to Surrey IR 1.2.15.5 for a
11 discussion on historical gas commodity cost volatility and outlook.

12
13
14
15 2.15.4 Please confirm that the Commission's Order No. C-7-03 directive was to
16 seek a different method to charge the fee so as to stabilize the costs to
17 utility customers (in the context of considerable volatility in gas prices at
18 the time), and that the Commission made no directive to reduce the
19 value of the operating fee or to calculate unique operating fees for each
20 municipality.

21
22 **Response:**

23 The order speaks for itself. Please refer to the response to Surrey IR 1.2.15.3.
24
25

26
27 2.15.5 Does FEI expect that natural gas prices over the next ten years will be
28 volatile to the extent experienced during the late 1990's and early
29 2000's? Please explain.
30

31 **Response:**

32 FEI expects natural gas prices to remain volatile but not to the extent of what was experienced
33 during the late 1990s and early 2000s. Price volatility continues in the natural gas marketplace
34 despite the abundance of shale gas, which emerged after 2008. This is because supply and
35 demand balances can change quickly in response to various market factors. Natural gas prices
36 were generally at a higher level with higher volatility during the period from 2000 to 2008.

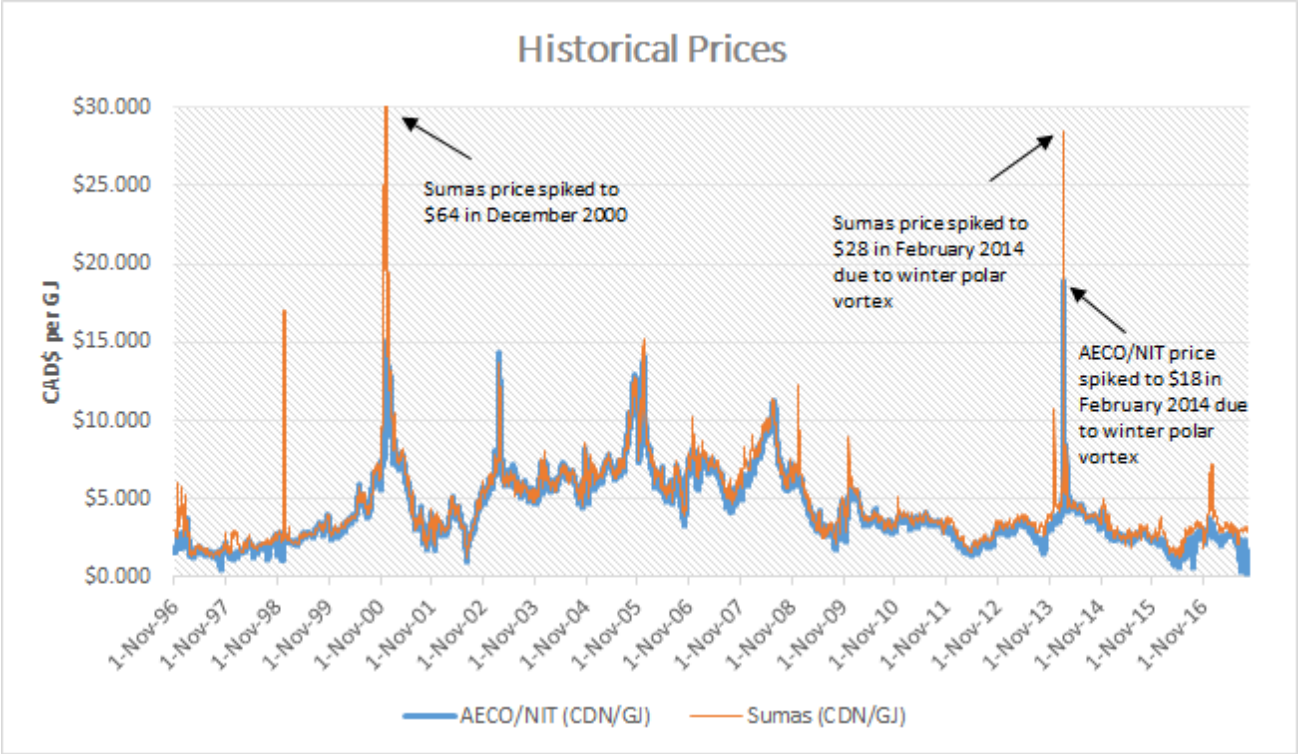
37 The figure below shows the historical daily spot prices for AECO/NIT and Sumas hubs
38 (converted to Canadian dollars per GJ). As recently as winter 2013/14, market gas prices

<p>FortisBC Energy Inc. (FEI or the Company)</p> <p>Application for Approval of Terms for an Operating Agreement between the City of Surrey and FEI (the Application)</p>	<p>Submission Date: September 29, 2017</p>
<p>Response to City of Surrey (Surrey) Information Request (IR) No. 1</p>	<p>Page 18</p>

1 spiked due to the winter polar vortex, with regional Sumas daily spot prices climbing to over \$28

2 per GJ and AECO/NIT reaching \$18 per GJ. FEI expects the potential for this level of price

3 volatility to continue in the future.



4

5

FortisBC Energy Inc. (FEI or the Company) Application for Approval of Terms for an Operating Agreement between the City of Surrey and FEI (the Application)	Submission Date: September 29, 2017
Response to City of Surrey (Surrey) Information Request (IR) No. 1	Page 19

C. Definition of “Relocation Costs”

3.1 Re: FEI’s application, page 21, lines 1 to 2.

Please provide references to any regulatory precedents from other jurisdictions (e.g., decisions, orders, regulations, standards, model agreements, etc.) FEI is aware of that align to FEI’s position on responsibility for upgrade/betterment costs incurred during relocation projects, and in particular that employ the “but for” concept employed by FEI.

Response:

FEI’s position regarding the costs that Surrey should pay when they need FEI facilities altered or relocated is that (i) FEI’s unavoidable costs caused by Surrey are recoverable from Surrey, and (ii) costs beyond compliance obligations, which are considered avoidable improvements by FEI and not caused by Surrey are not recoverable from Surrey. Please refer also to the response to Surrey IR 1.3.4.1 for further elaboration on how this would be applied in practice.

This practical and fair approach to the recovery of costs applies legal principles with respect to causation. Cost causation is also a well-established approach for allocating costs in the regulatory realm in the context of setting rates, and we are seeking to allocate costs fairly so the analogy is useful. Moreover, as described below,

- ***Surrey’s opposition to FEI’s proposal is inconsistent with its own approach when someone requests an alteration of municipal facilities:*** Surrey’s own bylaws address cost allocation when someone needs changes to the municipal stormwater drainage system or sanitary sewerage system (i.e., when Surrey is in the analogous position that FEI is in under the Proposed Operating Agreement). In those circumstances, Surrey goes beyond what FEI is proposing in terms of imposing costs on the requesting party. Surrey’s bylaws require payment of the full, actual cost of the work, absent qualifiers or exceptions for improvements but with additional inclusions. Surrey is also authorized to require the requestor to upgrade the system (i.e., betterment) at the requestor’s own expense.
- ***FEI’s position is consistent with the Community Charter [SBC 2003] Chapter 26 with respect to remedial work under Division 12 of Part 3:*** It invokes the concept of “standards specified by law” to determine the work required. This concept is based in cost causation principles similar to what FEI is proposing, distinguishing between costs incurred due to the parties’ actions and betterment.

Surrey Bylaws Allow Surrey to Obtain Full Recovery and Benefit from “Betterment”

Surrey has at least two different bylaws requiring a requestor to pay the full cost of work the requestor requires, as well as potentially paying for upsizing the infrastructure to meet future demand/growth for the benefit of others (i.e., betterment). Two instances that FEI identified include:

FortisBC Energy Inc. (FEI or the Company) Application for Approval of Terms for an Operating Agreement between the City of Surrey and FEI (the Application)	Submission Date: September 29, 2017
Response to City of Surrey (Surrey) Information Request (IR) No. 1	Page 20

- the extension or alteration of stormwater drainage system pursuant to the City of Surrey's Stormwater Drainage Regulation and Charges, By-law, 2008, No. 16610 (the "Drainage Bylaw");² and
- the extension or alteration of the sanitary sewerage system pursuant to the City of Surrey's Sanitary Sewer Regulation and Charges By-law, 2008, No. 16611 (the "Sanitary Sewer Bylaw").³

Surrey's Drainage Bylaw

The Drainage Bylaw makes provision for the installation or alteration of drainage services at the request of an applicant. Section 18 of the Drainage Bylaw states [*italics in original*]:

18. The cost payable by an *applicant* shall be the *actual cost* to extend the storm *drain* or *ditch* on a legally designated road allowance, from the most convenient existing storm *drain* or *ditch* to a point opposite the farthest boundary of the last *parcel* of land to be served or to such point as the *General Manager, Engineering* determines is appropriate. In addition, the *actual costs of service connection(s)* shall be added to and form part of the costs in providing such *extension*.

Under Surrey's Drainage Bylaw, an applicant has to pay "actual cost", defined as follows:

"actual cost" is defined as means all costs incurred to complete the works, including but not limited to engineering services, supply of materials, construction, supervision, administration, right of-way negotiations, acquisitions and registration, and liaison with, and fulfilling requirements of, other utilities or agencies.

The first thing of note about this section is that, unlike the definition of "actual cost" in the Drainage Bylaw, FEI's proposed definition of costs excludes certain improvements.

The second notable observation is that the Drainage Bylaw not only identifies the amount of costs payable for the work requested by the requestor, but enables Surrey to extend the scope of work beyond that required for the land to be served but "to such point as the *General Manager, Engineering* deems appropriate". FEI would enjoy no such discretion under the Proposed Operating Agreement.

Moreover, the Drainage Bylaw further contemplates the applicant bearing the cost of upsizing the system beyond the capacity required by the applicant (i.e., betterment):

22. Where the City determines that a storm *drain* and/or *ditch* of greater capacity should be installed than is required to provide service to the *parcels*

² <http://www.surrey.ca/bylawsandcouncillibrary/BYL-reg-16610-D8DE.pdf>.

³ http://www.surrey.ca/bylawsandcouncillibrary/BYL_reg_16611.pdf.

FortisBC Energy Inc. (FEI or the Company) Application for Approval of Terms for an Operating Agreement between the City of Surrey and FEI (the Application)	Submission Date: September 29, 2017
Response to City of Surrey (Surrey) Information Request (IR) No. 1	Page 21

(including their upstream catchments) for which an application for an *extension* has been made, such excess capacity shall be provided. The *City* shall pay the cost of providing such excess capacity in accordance with the current *Council* policy, but only if:

(a) the proposed *extension* does not create an excessive burden for the *City*; and

(b) the required funds are available.

Beyond the provisions specifically relating to cost, the Drainage Bylaw contains further obligations which restrict, or impose obligations on, the applicant which may affect the commencement, performance or cost of the work:

- Section 15(b) prohibits the City from permitting an extension if it would cause the time, effort and money expended by the City to exceed the revenue the extension would generate.
- Section 19 requires the applicant to prepay the cost.

Surrey's Sanitary Sewer Bylaw

Surrey's Sanitary Sewer Bylaw contains substantially similar provisions with respect to the sanitary sewerage system as the Drainage Bylaw. It requires the applicant to pay the actual cost of the work⁴ with the potential responsibility for upsizing (i.e., betterment).

Section 22 of the Sanitary Sewer Bylaw states:

22. The cost payable by an *applicant* shall be the *actual cost* to extend the sewer on a legally designated road allowance or a right-of-way acceptable to the *General Manager, Engineering*, from the most suitable existing sewer as determined by *General Manager, Engineering*, to a point opposite the farthest boundary of the last *parcel* of land to be served or to such point as the *General Manager, Engineering* determines is appropriate. In addition, the costs of *service connection(s)* to the *applicant's* property, and the costs of right-of-way acquisitions shall be added to and form part of the costs in providing the *extension*.

With respect to up-sizing, section 26 of the Sanitary Sewer Bylaw states [*underlining added, italics in original*]:

⁴ "ACTUAL COST" means all costs incurred to complete the works, including but not limited to engineering services, supply of materials, construction, supervision, inspection, administration, processing, right-of-way negotiations, acquisitions and registration, and liaison with, and/or fulfilling requirements of other utilities or agencies.

<p style="text-align: center;">FortisBC Energy Inc. (FEI or the Company) Application for Approval of Terms for an Operating Agreement between the City of Surrey and FEI (the Application)</p>	<p style="text-align: center;">Submission Date: September 29, 2017</p>
<p style="text-align: center;">Response to City of Surrey (Surrey) Information Request (IR) No. 1</p>	<p style="text-align: center;">Page 22</p>

1 26. Where the *City* determines that a sewer main of greater capacity should be
2 installed than is required to provide service to the parcels for which an
3 application for an extension has been made, the applicant will upsize the
4 sewer main, the *City* shall pay the cost of providing the excess capacity in
5 accordance with the current Council policy, if the required funds are
6 available. This provision applies only to upsizing of a sewer main of larger
7 diameter than the base size of 200 mm diameter for residential zones and
8 250 mm diameter for industrial, commercial and institutional zones.

9 **Community Charter Invokes Standards Specified By Law**

10 The *Community Charter [SBC 2003] Chapter 26*, with respect to remedial work under Division
11 12 of Part 3 invokes the concept of “standards specified by law” to determine the work required.
12 This is similar to what FEI is proposing as the distinction between costs incurred due to Surrey’s
13 request (the “but for”/avoidable cost test) and betterment.

14 Division 12 empowers a municipality to impose remedial action requirements, which, depending
15 on the circumstances giving rise to the remedial action, including contravention of the Provincial
16 building regulations or a bylaw under section 8 (3) (I) [*spheres of authority — buildings and*
17 *other structures*] or Division 8 [*Building Regulation*], require a person to [*emphasis added*]:

- 18 (i) remove or demolish the matter or thing,
- 19 (ii) fill it in, cover it over or alter it,
- 20 (iii) bring it up to a standard specified by bylaw,
- 21 (iv) otherwise deal with it in accordance with the directions of council or a person
22 authorized by council
- 23 (v) undertake restoration work in accordance with the directions of council or a person
24 authorized by council

25
26 It is also notable that, while FEI’s proposed wording confines betterments to what is defined by
27 objective laws over which FEI has no control, this is not the case in the *Community Charter* by
28 virtue of (iv) and (v) above.

29 **Surrey’s Proposed Terms Would Confer a Windfall on Surrey**

30 Laws and standards can and do change over time and may impose additional obligations, more
31 onerous obligations or relax or reduce obligations. FEI has no control over how, when, or why
32 laws or standards change but is required to comply nonetheless, and regardless of whether
33 doing so is at additional cost and expense. Put another way, these costs are unavoidable and
34 incurred because of Surrey’s actions.

35 Requiring FEI to assume the costs of any improvements, whether or not those improvements
36 were required by law or otherwise, could lead to unfair and unreasonable outcomes - a windfall

FortisBC Energy Inc. (FEI or the Company) Application for Approval of Terms for an Operating Agreement between the City of Surrey and FEI (the Application)	Submission Date: September 29, 2017
Response to City of Surrey (Surrey) Information Request (IR) No. 1	Page 23

1 to Surrey at the expense of FEI customers. The risk is particularly acute given that Surrey has
2 the ability to make and enforce laws with which FEI would need to comply.

3
4
5
6 3.2 Please provide copies of any FEI internal documents that set out FEI's policies
7 and/or practices with respect to Relocating FEI facilities to accommodate
8 municipal projects, defining the scope of FEI's work in such circumstances,
9 and/or recovering costs associated with such FEI work.

10
11 **Response:**

12 FEI practice with regards to relocating facilities and recovering cost is to follow existing
13 operating agreements. In absence of an operating agreement FEI's practise is to recover full
14 cost.

15
16
17
18 3.3 Please provide any FEI asset management guidelines / practices / procedures
19 that specify and/or discuss when end-of-life distribution gas mains and
20 transmission pipelines are to be excavated and replaced with new pipe. How
21 long does FEI expect that distribution gas mains and transmission pipelines that
22 were installed in the 1960's and 1970's will last before they need to be excavated
23 and replaced?

24
25 **Response:**

26 FEI refers Surrey to Appendix C3 of Exhibit B-1-1 in FEI's 2014-2018 PBR Plan Application
27 (included as Attachment 3.3) which describes FEI's Long-term Sustainment Plan and the factors
28 that are considered in replacing pipeline assets based on their physical characteristics, and
29 absent any third-party driven relocations.

30 As far as the financial end of life (the period of time over which the pipelines are recovered from
31 customers), this is determined through periodic depreciation studies undertaken by experts.
32 The analysis of retirements of gas mains and transmission pipelines (physical end of life) is
33 impacted by three factors that are weighted by significance, including: third party relocation
34 requests, system alterations for operating benefits, and integrity concerns. If there were no third
35 party requests for relocation much of the system would not have to be replaced for a very long
36 time. As determined by the most recent depreciation study, the current financial end of life for
37 distribution mains is 64 years and for transmission pipelines is 65 years, which would be much
38 longer if third parties were not requesting relocations.

FortisBC Energy Inc. (FEI or the Company) Application for Approval of Terms for an Operating Agreement between the City of Surrey and FEI (the Application)	Submission Date: September 29, 2017
Response to City of Surrey (Surrey) Information Request (IR) No. 1	Page 24

3.4 Re: FEI's application, page 21, lines 21 to 23. FEI says that its proposed definition of Relocation Costs "recognises the possibility of necessary improvements, without extending the recoverability of costs beyond those costs associated with improvements required by law or sound engineering practices." The City of Surrey requests the following information from FEI to better understand the operation of the underlined wording above.

3.4.1 Please explain in as much detail as possible what, if any, costs would be excluded pursuant to FEI's proposed definition of Relocation Costs per the underlined wording above.

Response:

Terminology Subject to FEI's Application

Cost allocation is determined with reference to the definition of "Relocation Costs" in the Proposed Operating Terms which are the subject matter of FEI's application, and which state (in part):

"Relocation Costs" means the costs of a party to:

(i) realign, raise, lower, by-pass, relocate or protect the party's facilities to accommodate the work of the other party; ...

...but excludes the value or incremental costs of any upgrading and/or betterment of the party's facilities or the facilities of third parties beyond that which is required to comply with applicable Laws or sound engineering practices;"

Under this definition, causation (a "but for" test) prevails. That is, the requesting party will pay for those costs that the owner would not have incurred but for the request to relocate. This principle is fair and consistent with common tort and contractual principles.

The types of scenarios that arise can be broadly categorized in the following table. It is important to note that in terms of responsibility for payment of relocation costs would be subject to the appropriate apportionment (100 percent Gas Mains, 50/50 percent High Pressure Pipelines). FEI would have no objection to including the following scenarios in the Operating Terms for additional clarity.

FortisBC Energy Inc. (FEI or the Company) Application for Approval of Terms for an Operating Agreement between the City of Surrey and FEI (the Application)	Submission Date: September 29, 2017
Response to City of Surrey (Surrey) Information Request (IR) No. 1	Page 25

Scenario	Outcome	Rationale	Responsibility for Payment
1. The facilities that the other party has requested be relocated are already identified for replacement under owner's asset management plans	Relocation Costs do not include these costs	The decision to replace is merely accelerated by the request	Owner pays
2. Party requests a relocation of an asset that: <ul style="list-style-type: none"> • is not slated to be replaced under owner's asset management plans; and • identical replacement CAN be made under prevailing laws and sound engineering practices 	Relocation Costs include the lesser of (a) the actual costs for the identical replacement; or (b) the actual costs of another more cost-effective code-compliant alternative	The costs are caused solely by the requesting party, and the owner would not have incurred them but for the request	Requesting party pays Relocation Costs, per appropriate apportionment
3. Party requests a relocation of an asset that: <ul style="list-style-type: none"> • is not slated to be replaced under owner's asset management plans; and • Identical replacement CANNOT be made under prevailing laws and sound engineering practices (asset or technology obsolete, etc. and alternatives are required to meet Laws and sound engineering practices) 	Relocation Costs include the actual costs for what needs to be installed in conformity with prevailing Laws and sound engineering practice, since identical replacement is not possible	The costs are caused solely by the requesting party, and the owner would not have incurred them but for the request	Requesting party pays Relocation Costs, per appropriate apportionment
4. Party requests a relocation of an asset that: <ul style="list-style-type: none"> • is not slated to be replaced under owner's asset management plans; and • a more cost-effective (less expensive) and longer-term alternative, such as polyethylene (PE) pipe can be used under prevailing laws and sound engineering practices (no capacity increase) 	Relocation Costs include the actual costs of the most cost-effective code-compliant alternative	The costs are caused solely by the requesting party, and the owner would not have incurred them but for the request	Requesting party pays Relocation Costs, per appropriate apportionment
5. Party requests a relocation of an asset that: <ul style="list-style-type: none"> • is not slated to be replaced under owner's asset management plans; • a more cost-effective (less expensive) and longer-term alternative, such as polyethylene (PE) pipe can be used under prevailing laws and sound engineering practices (no capacity increase); and • the owner takes the opportunity to increase the capacity or otherwise further improve the facilities 	Relocation Costs include the actual costs of the most cost-effective code-compliant alternative but do not include the incremental costs, if any for the increase in capacity or further improvement(s)	The replacement costs are caused solely by the requesting party, and the owner would not have incurred them but for the request; additional costs would be excluded	Requesting party pays Relocation Costs, per appropriate apportionment; Owner pays for improvements

FortisBC Energy Inc. (FEI or the Company) Application for Approval of Terms for an Operating Agreement between the City of Surrey and FEI (the Application)	Submission Date: September 29, 2017
Response to City of Surrey (Surrey) Information Request (IR) No. 1	Page 26

1 The obligation to comply with Laws and sound engineering practices has been adopted in other
2 Operating Agreements⁵ and incorporated into both FEI's and Surrey's Proposed Operating
3 Agreement terms. Section 4.1(a) of the Proposed Operating Agreements states, in part:

4 4.1(a) In its occupancy and use of Public Places, including conduct of Work,
5 FortisBC shall conform to sound engineering practices and comply with all
6 applicable Laws...

7 For FEI to be obligated to perform relocation work and to do so in accordance with applicable
8 laws and through accepted operating terms (including by Surrey in its own application), but
9 without the corresponding right to recover those associated costs, penalizes FEI for compliance
10 with mandatory obligations and quite simply creates an unjust and unreasonable outcome.

11
12
13
14 3.4.2 Please explain why Surrey should reimburse FEI for FEI's costs of
15 "necessary improvements" given that FEI system improvements are to
16 the benefit of FEI customers.

17
18 **Response:**

19 The principle at play is cost causation, not attribution of benefits. Please refer to response to
20 Surrey IR 1.3.4.1 for an explanation of how this principle plays out in practice.

21 Please refer to response to Surrey IR 1.3.5 for a discussion of why recoverability of costs should
22 not turn on a more nebulous concept of benefit attribution.

23
24
25
26 3.4.3 If Surrey needs FEI to move a distribution gas main to accommodate a
27 municipal water main upgrade project, the gas main is 50 years old and
28 fully depreciated, and FEI takes the opportunity of the excavation to
29 replace the gas main with new pipe, is it FEI's position that Surrey
30 should pay 100% of FEI's costs of the new pipe? If so, please fully
31 explain why and please explain whether it would be relevant to FEI if
32 the gas main was due or overdue for replacement pursuant to FEI's
33 asset management guidelines / practices / procedures. If not, please
34 explain how FEI would propose to allocate its costs.

⁵ Section 6.4 of the Keremeos Operating Agreement states "All work carried out by FortisBC shall be carried out in accordance with sound engineering practices."

FortisBC Energy Inc. (FEI or the Company) Application for Approval of Terms for an Operating Agreement between the City of Surrey and FEI (the Application)	Submission Date: September 29, 2017
Response to City of Surrey (Surrey) Information Request (IR) No. 1	Page 27

Response:

Please refer to the response to Surrey IR 1.3.3, which discusses why the depreciation period may have little relationship with the service life of a particular main. The response to Surrey IR 1.3.4.1 explains that an asset that was scheduled for replacement in FEI's asset management plans would be the responsibility of FEI, since in that case the relocation costs are accelerated and not solely caused by Surrey's request (but rather FEI's decision to replace the asset anyway).

3.4.4 If Surrey needs FEI to move a distribution gas main to accommodate a municipal water main upgrade project, and upon excavation FEI discovers that its gas main was not installed with a sufficient depth of cover to meet Code requirements, is it FEI's position that Surrey should pay 100% of FEI's cost to bring the gas main into compliance with Code requirements? If so, please fully explain why. If not, please explain how FEI would propose to allocate its costs.

Response:

FEI installs its assets in accordance with the code requirements at the time of installation. If the code has changed, or if depth of cover has been reduced over time by the action of others, the costs to bring it into compliance with current code requirements should be recoverable from Surrey. FEI is only having to incur the costs because of the fact that the relocation request was made. Please refer to the response to Surrey IR 1.3.4.1.

3.4.5 If Surrey needs FEI to move 500 meters of steel distribution gas main 30 centimeters to accommodate a municipal water main upgrade project, and upon excavation FEI discovers that its gas main is leaking due to premature failure and that 1000 meters of gas main needs to be replaced, is it FEI's position that Surrey should pay 100% of FEI's cost to replace the entire 1000 meters of gas main? If so, please fully explain why. If not, please explain how FEI would propose to allocate its costs.

FortisBC Energy Inc. (FEI or the Company) Application for Approval of Terms for an Operating Agreement between the City of Surrey and FEI (the Application)	Submission Date: September 29, 2017
Response to City of Surrey (Surrey) Information Request (IR) No. 1	Page 28

Response:

No, that is not FEI's position. The need to replace the main in this scenario is not caused by Surrey, but rather by the failure of the asset itself. However, this scenario would be dependent on whether other code-compliant repair options were available that did not necessitate full replacement of the 1000 meters of gas main noted in the scenario. Please refer to the response to Surrey IR 1.3.4.1.

3.4.6 If FEI decides to replace the leaking steel gas main referenced in the question above with PVC pipe and in FEI's opinion this will also require all of the connected customer service lines to be upgraded from steel to PVC, is it FEI's position that Surrey should pay 100% of the costs to replace the entire 1000 meters of gas main and 100% of the costs to replace the customer service lines? If so, please fully explain why. If not, please explain how FEI would propose to allocate the costs.

Response:

FEI does not use PVC pipe, rather FEI uses polyethylene (PE) pipe. A leaking pipe is FEI's responsibility because the need to replace the pipe is not caused by Surrey. FEI would still have to replace the pipe and reconnect customer service lines, regardless of Surrey's request. Please refer to the response to Surrey IR 1.3.4.1.

3.4.7 If FEI decides to replace the leaking steel gas main referenced in the question above with an upgraded larger capacity gas main in anticipation of load growth, is it FEI's position that Surrey should pay 100% of FEI's costs for the larger pipe? If so, please fully explain why. If not, please explain how FEI would propose to allocate its incremental costs for the upgraded pipe.

Response:

Surrey would not pay if the replacement was caused by pipeline failure rather than Surrey's request. Please refer to the responses to Surrey IRs 1.3.4.1 and 1.3.4.5.

FortisBC Energy Inc. (FEI or the Company) Application for Approval of Terms for an Operating Agreement between the City of Surrey and FEI (the Application)	Submission Date: September 29, 2017
Response to City of Surrey (Surrey) Information Request (IR) No. 1	Page 29

3.4.8 If FEI's decision to replace the leaking gas main with an upgraded larger capacity gas main also requires FEI to upgrade other facilities (such as compressors), is it FEI's position that Surrey should pay 100% of FEI's costs for the associated upgrades and work? If so, please fully explain why. If not, please explain how FEI would propose to allocate its incremental costs for the ancillary facility upgrades.

Response:

Please refer to the response to Surrey IR 1.3.4.1.

3.5 Please confirm or explain otherwise that when FEI takes the opportunity presented by a facility relocation project to upgrade FEI facilities (e.g., by installing higher capacity pipes and/or pipes made of technologically advanced materials with longer service lives), FEI and its customers are the beneficiaries of the system improvement. Is it not appropriate that those benefitting from system improvement pay the costs of the upgrading/betterment of the system? Please explain.

Response:

FEI's proposal is based on principles of cost causation, not attribution of benefits. Under FEI's proposal, the requesting party is responsible for the costs that would not be incurred but for the request. The owner is responsible for anything beyond that. Please refer to the response to Surrey IR 1.3.4.1.

Seeking to attribute benefits instead of costs is a far more nebulous or "grey" concept than the well-established legal principles of cost causation. Take, for instance, the scenarios in this question ("by installing higher capacity pipes and/or pipes made of technologically advanced materials with longer service lives"). There is a benefit to FEI and its customers. But the same rationale could justify the payment of all FEI's incurred costs, including any optional upgrades, by Surrey:

- The very purpose and intended outcome of the relocation work is to accommodate and enable a Municipal Project to proceed. By its definition, such a project is an undertaking "for a municipal purpose and community benefit". Any benefit to FEI customers is only incidental to the purpose for which the work was required to be undertaken in the first place.

FortisBC Energy Inc. (FEI or the Company) Application for Approval of Terms for an Operating Agreement between the City of Surrey and FEI (the Application)	Submission Date: September 29, 2017
Response to City of Surrey (Surrey) Information Request (IR) No. 1	Page 30

- 1 • Moreover, in order to internalize and distribute the costs among the persons who benefit
2 from that activity, installing higher capacity pipes and/or pipes made of technologically
3 advanced materials with longer service lives not only benefits FEI and its customers, but
4 directly benefits Surrey, its residents and the travelling public. Each of those examples
5 would likely reduce maintenance obligations, permit future municipal developments to
6 tie-in to the newly increased capacity pipe and extend the schedule for replacement,
7 activities which entail traffic disruptions, road closures, and other disturbances.

8

FortisBC Energy Inc. (FEI or the Company) Application for Approval of Terms for an Operating Agreement between the City of Surrey and FEI (the Application)	Submission Date: September 29, 2017
Response to City of Surrey (Surrey) Information Request (IR) No. 1	Page 31

1 **D. Apportionment of Relocation Costs**

2 No questions.

3

4 **E. Release of Statutory Rights of Way**

5 No questions.

6

1. LONG TERM SUSTAINMENT PLAN

1.1 LTSP OVERVIEW

The FEU (Gas) Asset Management group provides planning and management oversight of the installation, operation, and maintenance of the Company's distribution and transmission gas system assets which includes approximately 23,000 km of distribution mains, 3,900 km of transmission pipelines, over 500 stations and over 30,000 valves installed with a combined book value of approximately \$3 billion and a replacement value of approximately \$6.8 billion. These natural gas assets are located throughout the province of British Columbia where natural gas continues to be delivered safely and reliably to more than 945,000 customers in over 140 communities.

Asset management at the FEU and its predecessor companies has been practiced in one form or another since the first piece of pipe was installed. However, in the early days when infrastructure was near the beginning of its service life, the processes in place and the general understanding of failure modes or causes were rudimentary. There was little history to draw from as well as limited experience with asset failures. This together with the fact that control and management of the assets was local and data collection was manual made it very difficult to develop an in-depth understanding of how to ensure asset reliability over the long term. As a result, when maintenance practices were implemented, it often meant adopting expertise developed in other industries as that was where the best information could be found.

In 2001, an initiative was undertaken by the Distribution department at the FEU (which later joined the Transmission group to become Operations) to better understand the failure modes of the natural gas delivery assets and the effectiveness of the maintenance procedures in place at that time. The results of this initiative included the centralization of operations and maintenance administration, and of maintenance planning and scheduling. Complementing this was the introduction of in-line inspection programs and risk-based natural hazards inspections, as well as a shift to a continuous improvement approach to maintenance administration.

The move to a more centralized approach was made possible by the implementation of the Plant Maintenance module of SAP (SAP-PM), which went live in 2002. These changes improved the degree of collaboration, data sharing and analysis being performed, and also led to the identification of opportunities for efficiency improvements with respect to maintenance programs. As well, the collection of data specific to individual pieces of equipment such as operating conditions that impact performance, failure types and causes, and other general attributes of the natural gas assets became feasible.

As time progressed, history began to be collected for specific assets which in turn enabled analyses to develop an improved and more detailed understanding of the natural gas assets and their failure modes. It has also laid the foundation from which appropriate means of managing the impacts of equipment failure may be identified. During this period, a number of incidents occurred within the energy industry that led to the term "Aging Infrastructure"

1 becoming a focus within the utility industry. Concern was raised throughout North America
2 specific to the age of much of the infrastructure that enables current life style and supports
3 commerce throughout the region. Efforts were made to develop an understanding of the
4 impacts of aging infrastructure and through this, it was determined that a more forward looking
5 view of asset condition and reliability was required. In order to enhance the FEU's ability to
6 manage the lifecycle of its assets, the FEU proposed a long-term capital planning approach, or
7 the "Long Term Sustainment Plan" (LTSP).

8 As a result of previous work toward developing a LTSP, it became apparent that the scale of the
9 challenge was such that it required the full-time dedication of assigned personnel to create the
10 first iteration of the LTSP. In 2012, a project team was convened. The team comprised of
11 individuals with more than 130 years of cumulative Operations and Engineering experience in
12 more than 40 positions within the company. The LTSP was made possible by the experience,
13 varied backgrounds and full-time dedication of the team.

14 The LTSP's objectives are to:

- 15 • Gain an increased understanding of asset condition and future reliability of natural gas
16 delivery assets;
- 17 • Develop a sustainable methodology to identify and prioritize capital work as much as 20
18 years into the future; and
- 19 • Implement and use the methodology to create a detailed sustainment capital forecast for
20 2014 and 2015, and a prioritized list of future projects and programs.

21 During the course of the project the team developed a fundamentally different approach towards
22 the concept of "aging infrastructure". In gaining an understanding of asset condition and the
23 impact of age, the team realized that in fact age is not the causal factor which affects the
24 probability of failure. Rather, the probability of failure is determined by the presence of threats
25 such as corrosion or natural forces which act on the pipe. Corrosion is dependent on factors
26 including coating and mitigating measures such as cathodic protection. Steel pipe that is
27 properly coated and has effective cathodic protection has little threat of corrosion and can last
28 virtually forever. Polyethylene pipe (PE) was expected to last 35 to 40 years when it was first
29 installed in the early 1980s. However, samples of PE of this age removed from service in 2011
30 were tested by an independent laboratory and showed no degradation in their performance.
31 Thus an asset's risk is dependent on the presence of threat factors which the project team has
32 identified through literature, experience and expert knowledge. This approach ensures
33 resources are allocated to where they are most effective at mitigating threats to pipe condition,
34 maximizing the cost-effectiveness of each dollar spent and optimizing the service life of assets.
35

36 In the previous RRA, the elements of a LTSP were defined at a conceptual level. With the
37 actual implementation of the LTSP, the elements of the plan have been redefined in terms that
38 more closely reflect how the plan was set up. These elements are:

- Data
- Methodology
- Tools
- Results

The following sections provide a discussion of each of these elements and how they combine to form an effective and defensible means of identifying future sustainment capital work.

It should be noted that the term LTSP has been useful in identifying the need to address a more long range view of asset management and as a means of coordinating the initial work. However, long term planning and effective asset sustainment are key points in the FEI asset management program. Accordingly, as the long term planning is operationalized it will cease to be a standalone initiative and simply be a part of the overall asset management program.

1.2 ELEMENTS OF THE LTSP

1.2.1 Data

The basis of any analysis or decision making process is the availability and quality of information. Thus an important element of the LTSP is the data input. The data sources selected are discussed below. The LTSP has obtained the best information available at the time of development, incorporating data from a multitude of sources that is objective, current and supportable.

The main source of data for the LTSP is the enterprise Geographic Information System (GIS). It provides objective data, such as operating pressure, install date, and physical properties, on all of the FEU's underground pipeline lineal assets. Write access for this data is strictly controlled, and updates are made as per long-established procedures that require installation documentation or other records. The GIS data is updated constantly and is the most current representation of FEU's gas distribution and transmission systems. The assessment software used for the LTSP is set up such that it can extract information in real-time from the GIS, ensuring that only the most current information available is used for the assessment.

Other sources of data used include the FEU's historical records, BC Government mapping data, and field reports documenting the actual observed condition of assets. Field reports of asset condition are given strong consideration within the risk assessment criteria. Recent initiatives underway to organize, validate, authenticate, and digitize historical records (e.g. Gas Asset Records Project) have also provided a valuable source of information. These aforementioned types of information either originated from qualified internal staff or came from reputable external sources, and are supported by documentation.

A key value provided by the LTSP has been the consolidation of information from numerous operating groups and external organizations, and the ability to analyze the relationships between what were previously disparate data sets. Information that was previously only available within individual departments and external organizations is now available via the tools provided by the LTSP to aid decision-making. The information will be used for identifying areas of concern and making informed decisions.

1.2.2 Methodology

The second critical element of the LTSP is the risk assessment methodology. Risk is defined as follows:

$$\text{Risk of Failure} = \text{Probability of Failure} \times \text{Consequence of Failure}$$

Failure is defined as:

- an unplanned release of gas to atmosphere, or
- an unplanned loss of ability to deliver gas to customers without interruption.

The objective of the LTSP is to ensure continued safe and reliable delivery of gas to the FEU's customers in the most cost effective manner. To achieve this, the team created a sustainable and consistent methodology that evaluates, for each asset, the relative probability and consequences of a failure which together reflects the level of relative risk present in the FEU's assets. The relative probability, consequence and risk are expressed by means of a numerical score. The risk "score" is calculated as the product of the corresponding probability "score" and consequence "score". This risk score assists in determining 20-year planning priorities by which assets are evaluated in detail by skilled Asset Management staff and further actions, if necessary, are defined and scheduled.

The probability, consequence and risks are all expressed in relative terms, not in absolute terms. The FEU have had few significant asset failures so the limited statistics available are insufficient to determine absolute probabilities of failure applicable to the FEU's distribution system with any accuracy. Statistics based upon the experience of other jurisdictions are also of limited relevance because there are variables that are unique to every operating company, such as pipe materials, operating conditions and history. Probability, consequence and risks expressed in relative terms, based upon the project team's experience and expertise and engineering judgment from outside the team, are considered valid alternatives. The project team's methodology does not seek to predict where and when the next failure will occur, but rather aims to objectively compile all available information regarding an asset and its environment and place it in context relative to other similar assets. The ability to evaluate all assets on an equal and relative basis lends itself to making prudent and cost effective decisions to allocate resources where they are most needed.

Both the probability and consequence of failure are evaluated by splitting each into a hierarchy of weighted sub-categories which are simpler to evaluate independently using concrete data. This hierarchy can be described as an arrangement similar to a rooted tree, with the higher levels describing generic categories of possible threats to an asset and each subordinate level becoming more numerous and describing specific failure modes that each relate to its generic parent category. Refer to Figures C3-1 and C3-2, below for an illustration of the hierarchies. The probability of failure is measured by the presence of *Threats*¹ that have the potential to compromise the safety, reliability and integrity of the asset. *Threats* were defined by the project team through literature, experience and expert knowledge, and represent the main mechanisms by which an asset would fail. A brief description is provided in the next section. *Threats* are further divided into sub-elements called *Threat Factors*. *Threat Factors* represent data factors relevant to the probability of failure in the fashion defined by the applicable *Threat* and are scored based on data attributes extracted from various data sources. For example, Pipe Material would be a *Threat Factor* relevant to the Corrosion *Threat*. The relative meaning and importance of each *Threat Factor* to the *Threat* in question is subject to the project team's expert opinion and analysis of available history. A weighted *Threat* score is calculated from the factor scores. Similarly each *Threat* is also evaluated relative to other *Threats* in its impact on the overall probability of failure and a *Probability of Failure* score is calculated accordingly. The consequence of failure is also evaluated using a hierarchical process via *Consequences* and sub-factors *Consequence Factors*, to derive a weighted *Consequence of Failure* score. The final risk score is the product of the *Probability of Failure* and *Consequence of Failure* Scores.

¹ The definition of *Threat* here is intended to be consistent with the definition of *Hazard* within CSA Z662-11, where it is defined as "a condition with the potential for causing an undesired consequence". The difference in nomenclature arose due to other reference literature used by the project team, but for all intents and purposes the terms *Threat* and *Hazard* can be considered interchangeable here.

Figure C3-1: Illustration of Probability of Failure Analytical Hierarchy

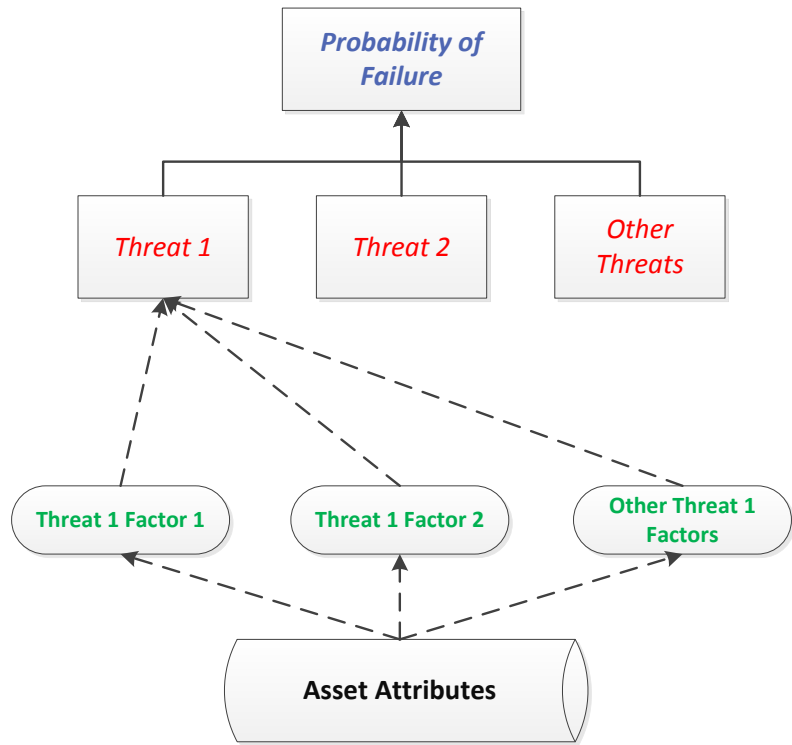
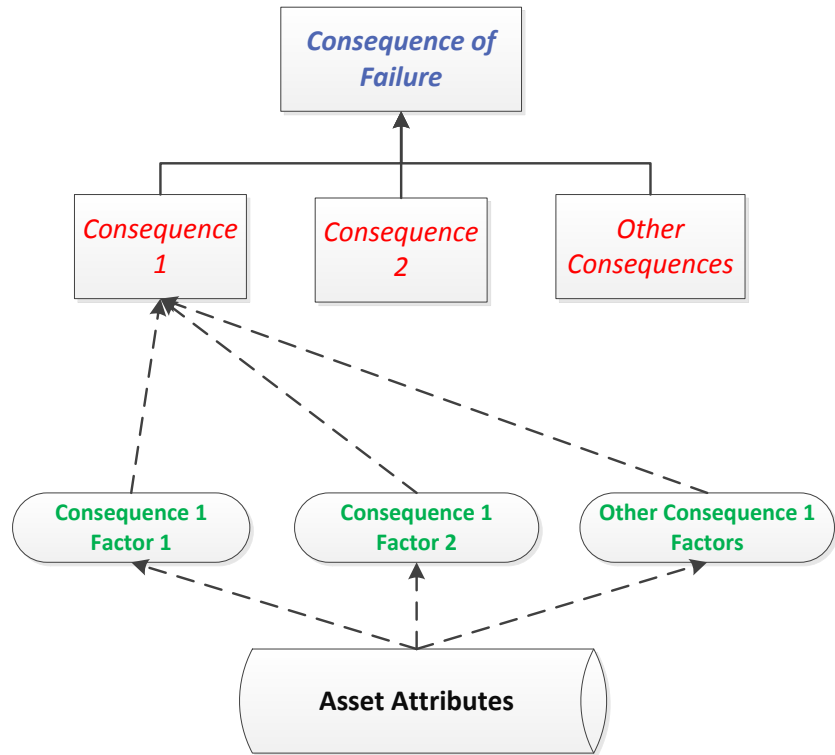


Figure C3-2: Illustration of Consequence of Failure Analytical Hierarchy



1 It is important to note that identifying assets as having a high relative “risk score” does not mean
2 there is an imminent risk of failure. A high “risk score” is only a relative ranking of areas of
3 interest. This knowledge will permit the company to become even more proactive by addressing
4 areas of interest before they develop into failures. Skilled staff will use this information in
5 conjunction with inputs from ongoing Integrity Management activities to investigate areas of
6 interest further and make decisions regarding potential mitigating actions.

7 The algorithms and criteria used are unique to the FEU, though the general approach is
8 consistent with transmission pipeline risk management practices and the elements of CSA
9 Z662, Oil and Gas Pipeline Systems, Annex N, Guidelines for Pipeline System Integrity
10 Management Programs. Annex N details requirements relating to knowledge, identifying
11 threats, and evaluating and ranking risk. The *Threat* and *Consequence* criteria are developed
12 based on multiple reference sources, including relevant publications, practices in other
13 jurisdictions, and the experience of the team and other internal experts. For example, the main
14 *Threats* are derived from the incident cause categories typically used in the industry, notably the
15 US Department of Transportation Pipeline and Hazardous Materials Safety Administration.

16 The FEU’s model is unique because every distribution system has its unique challenges, and
17 therefore a customized model is more effective at addressing risks pertinent to the FEU’s
18 system. For example, many distribution systems of other utilities contain cast iron pipe whereas
19 the FEU’s system does not. The FEU’s model is built to address small incidents down to routine
20 leaks, because such a model conservatively addresses all possible incidents that are hazardous
21 to the public and is driven by pipe integrity. Typical models that address only pipeline incidents
22 that cause injury or fatality place a majority of weight on third party activity and improper
23 operations and only minor consideration of other issues. This distribution of weighting is not
24 compatible with the intent of the LTSP, which is to drive Asset Management decisions on assets
25 based on condition rather than external activity. Therefore, a customized model addressing all
26 leak events is more suitable for the LTSP’s purposes. Risks directly associated with operating
27 errors and external interference are addressed by the FEU’s ongoing Integrity Management
28 Program.

29 The *Threats* and *Consequences* documented below are the result of the first iteration of the
30 LTSP process. As improved information and knowledge becomes available, these *Threats* and
31 *Consequences* and associated algorithms will be updated. The framework established by the
32 LTSP is by no means static; the FEU will continually improve and update the model.

33 **PROBABILITY OF FAILURE – THREATS**

34 The relative probability of failure is calculated via a weighted average algorithm that sums the
35 incremental likelihood that the given asset will fail in the fashion defined by each *Threat*. These
36 individual *Threat* scores are in turn scored by analyzing applicable asset data via *Threat*
37 *Factors*. The types of *Threats* evaluated are:

Threat	Description
Corrosion	This threat relates to the gradual deterioration of pipe material by chemical reaction with its environment. This threat is evaluated based on mitigating measures such as coating and cathodic protection, and direct observations reported by field personnel.
Equipment Malfunction	Certain models or types of equipment are known, through experience, to be prone to leaks or fail to function as intended. In other cases, the equipment may be obsolete or no longer fit for purpose.
Material/Joint Failure	This threat relates to joints such as welds or fittings between pipe segments. Specific weld processes have been identified to be more vulnerable to seismic events. Certain types of tees and fittings, such as mechanical fittings, are also known to be vulnerable.
Excavation/Third Party Damage	Increased third party activity in the vicinity of pipe translates into increased probability of the pipe being hit or punctured. The FEU repairs all damage that it is aware of, but on occasion a third party may damage a pipe and not report it to the FEU. Damaged pipe has an increased probability of failure.
Natural Forces	This threat relates to the possibility of pipe being damaged or ruptured by ground or water movement.
Leak History	Industry experience indicates that where there have been previous leaks; additional leaks are more likely to develop. This indicates that local conditions are conducive to further corrosion or other factors, depending on the leak cause. It is a relative indicator of pipe condition.
Loss of Supply	This threat is relevant to areas which are known to have debris within the gas pipe. The debris may cause blockage of pipe or equipment failure.

- 1
- 2 It is important to note that age is not considered a *Threat*. For the assets under consideration,
- 3 age in itself does not cause failure. Failure is caused by the presence of *Threats* as identified
- 4 above. Imagine a piece of steel pipe enclosed in a box with an inert atmosphere. Without the
- 5 effects of oxidation, external physical force or internal pressure, nothing would happen to the
- 6 pipe; the passage of time would have no effect on a pipe's condition. In the absence of other
- 7 *Threats*, there is no justification for attributing an increase in the probability of failure on the
- 8 basis of age alone.
- 9 Many of the *Threats* identified are independent of time, but it can be argued that Corrosion acts
- 10 over time. However, age neither indicates the rate of corrosion or when corrosion was initiated
- 11 or even if corrosion is present. At best, age is only used to infer the current condition of an
- 12 asset under an assumed steady rate of corrosion. It is possible for an old pipe to have minimal
- 13 corrosion and it would be incorrect to assign an increased Corrosion threat score due to age. It
- 14 is far more relevant to evaluate factors that directly affect corrosion rate, such as pipe coating
- 15 and cathodic protection, and where possible, the actual observed condition of the asset from
- 16 field reports.
- 17 The installation date of an asset is still a consideration, not as an indicator of age but rather as a
- 18 means of determining characteristics that impact the probability of failure. It is not the age of the
- 19 asset that influences the end of its service life but a manufacturing or installation technology that

results in the asset's failure. For example, during the 1960s, the FEU purchased and installed a significant amount of steel pipe that was factory coated with a polyethylene tape. Experience has shown that this tape is prone to disbondment, or loss of adhesion with the pipe, resulting in a void forming between the pipe and tape layers and potentially trapping in water that increases corrosion. Furthermore, the disbonded tape material can also result in shielding of the cathodic protection system; the polyethylene tape actually prevents electrical current from the cathodic protection from reaching the bare pipe underneath the void and renders the cathodic protection ineffective. These factors will result in conditions that enable corrosion to occur. As with many similar failure modes, the issue is the type of pipe coating rather than the pipe's age. Coal tar enamel coated pipe from the same era that has not disbonded continues to serve well and is expected to continue to do so for some time into the future. Age is not the causal factor; the manufacturing method of the era is.

CONSEQUENCE OF FAILURE - CONSEQUENCES

The relative consequence of failure is calculated via a weighted average algorithm that reflects the different means by which an asset failure can impact ratepayers and other members of the public. The different categories of *Consequence* evaluated are:

Consequence	Description
Financial	This measure measures the rate impact to customers by evaluating the residual book value of each pipe. The premature retirement of an asset before it is fully depreciated is undesirable. If a pipe fails, the net effect is equivalent to the premature retirement of the failed pipe. The net result of a premature asset retirement is that there will be a net increase, proportional to the residual value, in the Cost of Service for the customer. The methodology only identifies areas of interest for further assessment by Asset Management staff. By assigning a higher consequence to pipes with relatively high residual value, it incents the FEU to proactively address serious threats in newer pipes before conditions deteriorate and allows Asset Management to be cognizant of the relative rate impact when considering pipe replacement.
Public Safety	This measure evaluates the potential for any incident to impact the well-being of the public. This is dependent on indicators such as population density in the vicinity of the pipe and pipe operating pressure.
Difficulty of Repair	This measure evaluates the difficulty of restoring a given pipe segment back to service in the event of a loss of integrity. Factors considered include pipe diameter, pressure and location.
Security of Supply	This measure evaluates the potential for service outages to downstream customers if a pipe segment were taken out of service. The loss of a critical pipe segment may impact system wide pressures.
Regulatory Intervention	This measure considers the potential for increased regulatory scrutiny, the introduction of onerous regulatory requirements and penalties if a failure were to occur on a given pipe segment.

The above threats and consequences are not comprehensive. There are additional threats and consequences which were evaluated but deferred for future implementation due to incomplete data or time constraints. Please refer to Section 3.0 below for more information on Next Steps.

The central principle during the development and application of the above *Threats* and *Consequences* is always to ensure the safe and reliable delivery of gas to customers at reasonable cost. The customers' interests are always the foremost consideration. For example, the *Financial* consequence evaluates the negative impact to the ratepayer of a premature retirement of an asset, thereby enabling Asset Management to weigh these customer impacts in its decision making.

Each *Threat* is scored via applicable *Threat Factors* and defined scoring criteria, then normalized to 10. A weighting is then applied to each *Threat* to reflect its relative importance. Finally each weighted score is summed to provide a "*Probability of Failure*" score. The "*Consequence of Failure*" score is calculated in the same manner. The final risk score is the product of the *Probability of Failure* and *Consequence of Failure* Scores as per the following algorithm:

$$Risk\ of\ Failure = \sum \left(\frac{Threat\ Score}{x\ Normalization\ Factor} \right) \times \sum \left(\frac{Consequence\ Score}{x\ Normalization\ Factor} \right)$$

1.2.3 Tools

The project team implemented software tools capable of consolidating all the data sources and applying the risk assessment methodology to the FEU's entire gas system to identify areas of interest. These tools make it possible to conduct a consistent comparison of thousands of assets and can facilitate effective Asset Management decision making for asset service life optimization.

The primary tool used to conduct the risk analysis is the Geospatial Analysis application (GSA) from General Electric. The GSA application is an add-on to the FEU's existing GIS software. It is capable of extracting data from multiple sources, applying scores as defined by users, and overlaying the results onto geospatial data for a visual representation of the results. The project team worked closely with the vendor to configure the custom risk algorithm with the score calculation. The GSA application was able to apply the risk algorithm at a very detailed level; down to individual pipe segments. The results from the GSA application identify relative risk scores for each piece of main within a specified area.

A secondary tool developed was a database application using Microsoft Access. This database enabled the manual analysis of other asset classes and paralleled the risk calculations of the GSA application. This is necessary because the GSA application is currently not configured to access the transmission module of the GIS software, and much of the data regarding transmission pressure (TP) pipelines and stations exist in documents and other formats not easily imported into the GSA. One example would be historical leaks on transmission pipelines;

they are documented manually in incident reports rather than plotted in the GIS system. Slight changes were included to address differences in assets and in the data available.

Like the GSA application, the results of the database identify risk scores for each asset relative to the other assets of the same type.

1.2.4 Results

The final element of the LTSP combines the data, methodology and the capability of the software tools to produce a holistic risk assessment of all of the FEU's gas assets. The results of the relative risk assessment have been validated and the FEU will use these results, in conjunction with inputs from its ongoing Integrity Management activities, to direct its asset risk mitigation efforts efficiently and cost-effectively. Separate sets of relative risk scores were generated for different asset classes and provide a means of identifying which assets should be considered first by skilled personnel. The GSA application produced an assessment of over 300,000 distribution pipe segments. Sustainment projects can be scoped down to individual pipe segments where appropriate. The Microsoft Access Database produced rankings of stations and transmission pipeline segments. Assets with conditions that warrant further analysis or investigation as indicated by a high relative risk score are brought to the attention of Asset Management staff. Skilled personnel will select a course of action that is appropriate and effective for the specific concerns under consideration. It is important to note that the LTSP results provide additional data to assist Asset Management staff in making decisions. Decisions are not made based on results from the LTSP alone. There is still a need for expert judgment before the work is assigned, and, where appropriate, the work may entail mitigating actions rather than pipe replacements.

The risk assessment results also present great opportunities for year-to-year comparisons of the system health and for identifying project synergies both internally and externally. The project team held a series of information sessions with selected municipalities to share information regarding anticipated work, including the municipalities of Burnaby, Coquitlam, Richmond, Vancouver, New Westminster, Penticton, Castlegar, Trail, Nelson, Metro Vancouver and the Regional District of Central Kootenay. Many municipalities are also undertaking long term plans of their own and synergies exist for sharing costs. The FEU, working through local Operations Managers, will continue to improve information sharing and cooperation with municipalities to realize those synergies. An example of such synergy would be to coordinate the timing of work with municipal projects such that only one pavement repair is required. Through ongoing communications and improved information sharing, the FEU believe that reduced paving costs will continue to benefit both customers and municipal taxpayers while at the same time reducing inconveniences for residents.

VALIDATION PROCESS

The project team undertook a validation process on the methodology, tools and results of the LTSP and is confident that the results generated provide a reasonable assessment of the relative risk of the FEU's natural gas delivery assets. The risk assessment methodology had

1 been validated at multiple points of the development process by engineering and operations
2 representatives. The programmed algorithms in the GSA application and Microsoft Access
3 Database were verified by both checking programming code and manually calculating dozens of
4 randomly selected samples.

5 The weighted algorithm that underlines the current risk model was examined closely in order to
6 provide insight into possible limitations of the model including biases, inadequacy,
7 discontinuities and imbalances. Specifically, the overall algorithm was tested in terms of whether
8 it reacts appropriately to changes in any and all variables through a statistical analysis utilizing a
9 Monte Carlo simulation. A biased algorithm would lend disproportionate influence to certain
10 factors and erroneously shift the distribution of scores to overestimate or underestimate risks.
11 The Monte Carlo simulation confirmed that the current algorithm did not introduce bias.

12 The resulting risk scores and relative rankings were validated with the Operations staff in all
13 areas of the province. The GSA application's results consistently matched problematic areas
14 identified by Operations personnel. Recent leaks matched those mains identified in the top 10
15 percent of "Probability of Failure" scores.

16

2. IMPACT ON SUSTAINMENT CAPITAL EXPENDITURE

The development of the LTSP has enhanced the FEU's understanding of the risk factors relevant to pipe failures. The reality is that a significant proportion of the FEU's assets, due to the technology and practices used in the era of installation, do possess characteristics which have been demonstrated through experience to be a concern so replacement may be more reasonable than repairs and mitigation. The LTSP results also bring to the forefront indications of asset conditions that warrant mitigation, whereas in the past Asset Management may not have had the capability to pinpoint these concerns before they develop into leaks. In order to act proactively on this data, the FEU are seeking to increase its resources in order to execute an increased level of sustainment capital expenditure over the long term.

FEI has challenges in obtaining resources to execute an increased level of sustainment capital in 2014. Therefore for 2014 FEI forecasts maintaining the same level of sustainment capital expenditure as in 2013. For 2015-2018, FEI is forecasting to gradually increase sustainment capital by an average of \$1 million per year starting in 2015 to a total of \$82.3 million in 2018. Regardless of the level of expenditures, the process enhancements developed by the LTSP have been applied towards developing a list of capital replacements to be undertaken during the PBR period and will be an integral part of FEI's capital planning processes for future years.

Using the LTSP together with additional analyses/investigations by Asset Management personnel, FEI has also identified a number of projects and programs expected to exceed the CPCN threshold. These projects involve larger IP system upgrades and TP pipeline replacements. They are documented in the CPCN section of the Application found at Section C4-4.6.

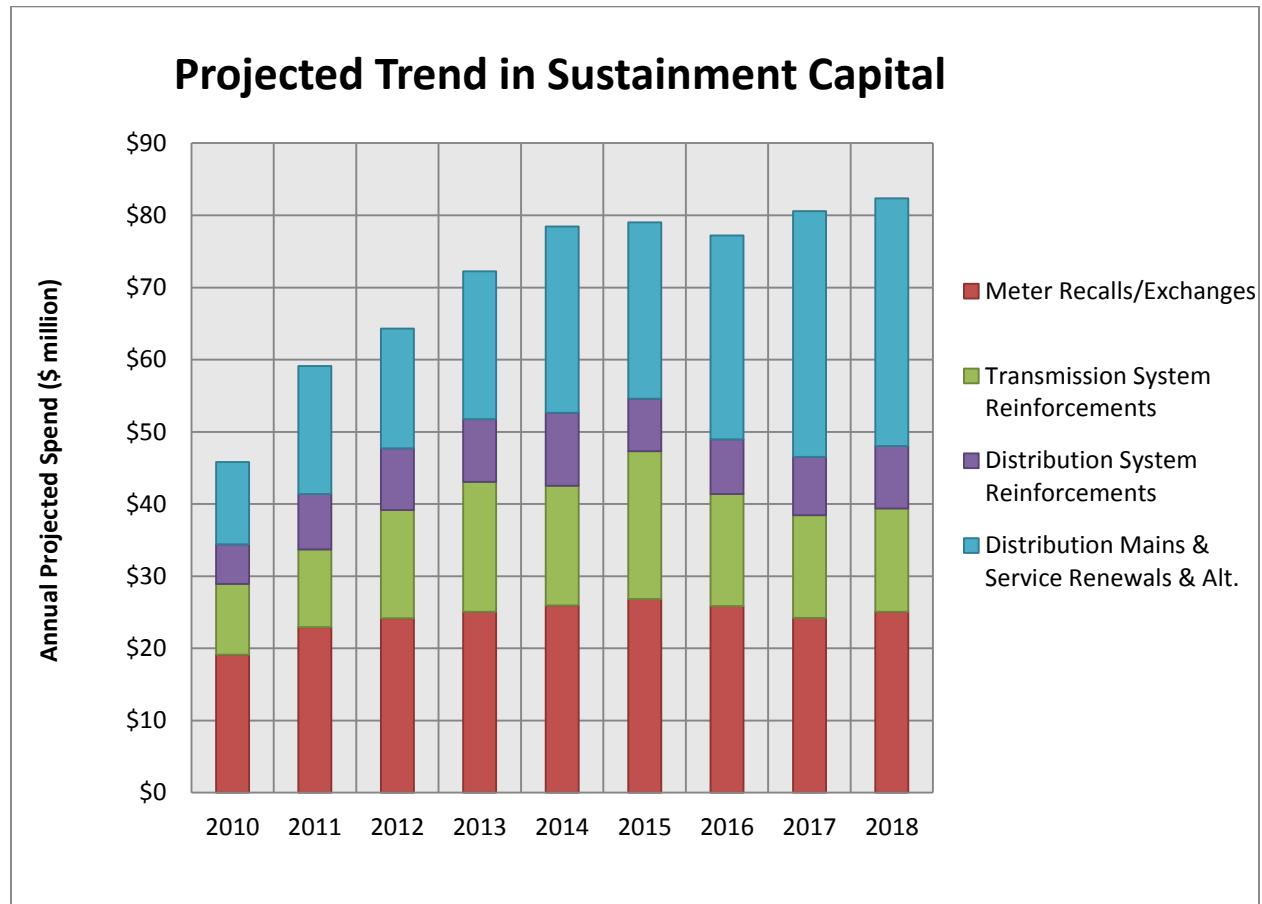
The LTSP enhances the FEU's Asset Management and capital planning processes and works in conjunction with the FEU's continuing Integrity Management Program (IMP). The FEU's IMP activities work to prevent, monitor and remediate hazards/threats that can potentially impact the operation and integrity of its assets. Selected IMP activities such as In-Line Inspections may rely on quantitative risk assessment methods which are common practice. Requests for sustainment capital work may arise directly from IMP activities, and data from IMP activities can be a valuable input into the LTSP. The LTSP can also support IMP activities by directing attention to areas of interest.

Contrary to the framework outlined in the previous RRA, the project team found it impractical to define a strict level of risk exposure beyond which action would be triggered. Risk is subjective and the timing and location of failures cannot be predicted with absolute certainty. It is not feasible, and may not be possible, to reduce risk to zero. In every system there always exists a non-zero risk of an undesirable outcome, and the marginal increase in cost of service for mitigating actions must be balanced against the marginal reduction in risk. The team's approach was not to define what an "acceptable" level should be, but rather to ensure the FEU undertake reasonable and effective measures to enhance its ability to maintain safety and reliability over the long term. The decision on whether to replace an asset based on its risk level is still subject to the judgment of experienced staff, not a mathematical formula. The output of the LTSP

provides an additional tool that helps ensure that the FEU's asset sustainment capital is spent on projects that deliver the highest relative cost-benefit. The mains with the highest relative risk scores are continually addressed. With future annual iterations of the risk assessment, improved data and comparisons will be available to judge the effectiveness of the risk mitigation measures and the level of expenditures will be adjusted accordingly to achieve a balance between risks, customer impacts, the FEU's ability to execute work, corporate strategy and external factors.

The projected Sustainment Capital Expenditures and Base Capital are shown in Figure C3-3. This projection is based on project-specific estimates of pipe replacements in areas of interest. Further work is still required to refine the estimates. Nevertheless, it provides an enhanced level of accuracy compared to previous projections and represents a reasonable and prudent level of expenditures to support the continued safe and reliable delivery of natural gas to FEI's customers.

Figure C3-3: Projected Annual Capital Spend (FEI: 2013-2018)



3. NEXT STEPS

This is the first iteration of the entire risk assessment process and FEI expects that all elements of the LTSP will continue to evolve and improve as more experience and knowledge is gained.

For example, a number of additional *Threat* and *Consequence* factors were identified during the development process, but were ultimately deferred due to incomplete or missing data, or time constraints. One such Threat Factor would be to use slope grade as a proxy for possible landslide hazards. Topological information currently in the FEU's GIS systems can be used to calculate slope grading and identify steep areas; however, further analysis is required to implement such a calculation in the GSA software and to determine the applicability of the information. Other potential threat and consequence factors may also be included in future enhancements to the methodology, but similar to the above example, further analysis would be required to determine the quality of the underlying data, availability of the data and updates to it, and also how to identify an appropriate measure for the factor across the FEU's natural gas delivery assets.

The improved forward visibility and ability to plan work attained by the LTSP will allow the FEU to work more closely with municipalities and other utilities to leverage synergies between projects. The FEU will continue to maintain positive relationships with these parties to realize these benefits.

Through adopting a continuous improvement philosophy, considering a longer-term planning horizon (a 20-year outlook), and also collaborating with municipalities and other utilities, the LTSP will continue to support the ongoing operation and maintenance of a safe, reliable natural gas delivery system.