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August 31, 2017

British Columbia Utilities Commission
Suite 410, 900 Howe Street
Vancouver, B.C.
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Attention: Mr. Patrick Wruck, Commission Secretary and Manager, Regulatory Support

Dear Mr. Wruck:

Re: FortisBC Energy Inc. (FEI)

Project No. 3698899

2016 Rate Design Application (the Application)

Response to the British Columbia Utilities Commission (BCUC or the Commission) Technical Information Requests (IRs) on COSA and Revenue to Cost Ratios

On December 19, 2016, FEI filed the Application referenced above. In accordance with Commission Order G-109-17 setting out the Regulatory Timetable for the review of the Application, FEI respectfully submits the attached response to BCUC Technical IRs.

If further information is required, please contact the undersigned.

Sincerely,

FORTISBC ENERGY INC.

Original signed:

Diane Roy

Attachments

cc (email only): Registered Parties



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1 **FORTISBC ENERGY INC.**

2 **A. CHAPTER 6 – FEI COST OF SERVICE STUDY**

3 **1.0 Reference: FEI COST OF SERVICE STUDY**

4 **Exhibit B-3, FEI COSA, Function Tab, Lookup Row 11920**

5 **Functionalization of Environment Health & Safety Costs**

6 In the Tab Function, Lookup Row 11920 of Exhibit B-3, Environment Health & Safety
7 Costs are functionalized as ADMIN and categorized by cost type including, but not
8 limited to Gas Supply Operations, LNG storage, Distribution, Marketing and Customer
9 Accounting.

10 1.1 Please explain why the Environment Health & Safety Costs are functionalized as
11 ADMIN costs.

12

13 **Response:**

14 Environment, Health and Safety costs are not functionalized as ADMIN costs, but are split
15 between all of FEI's functions using the following proportions.

Function	Proportion
Gas Supply Operations	1.49%
LNG Storage Tilbury	6.81%
LNG Storage Mt. Hayes	1.70%
Transmission	17.64%
Distribution	44.82%
Marketing	12.67%
Customer Accounting	14.87%
Total	100.00%

16

17 FEI used the name ADMIN as an indicator that these costs are to be allocated to all functions
18 based on the proportion of Gross O&M costs before Administration and General costs. Like
19 other Admin and General type costs¹, Environment, Health and Safety costs are incurred in
20 support of all of the primary functions of FEI and thus are allocated proportionately to each of
21 them.

¹ Legal, Human Resources, Financial and Regulatory Services and Insurance costs are also allocated based on Gross O&M before Administration and General



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1 The Environment, Health and Safety department includes a number of areas such as
2 Environmental Affairs, Occupational Health and Safety, Public Safety, Emergency
3 Preparedness, Business Continuity Planning, and Corporate Security.

4
5

6

7 1.2 Please explain why Environment Health & Safety Costs of \$418,000 and
8 \$490,800 are categorized as Marketing and Customer Accounting costs,
9 respectively.

10

11 **Response:**

12 Please refer to the response to BCUC Technical IR 1.1.1. The amounts of \$418,000 and
13 \$490,800 are 12.67 percent and 14.87 percent, respectively, of the total Environment, Health &
14 Safety costs used in the COSA.

15



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1 **2.0 Reference: FEI COST OF SERVICE STUDY**

2 **Exhibit B-8, BCOAPO IR 6.6a, p. 16; Attachment 6.6a, p. 2**

3 **Customer Weighting Factors for Meters and Services**

4 2.1 Please provide the calculations supporting the Rate 1 Customer Service Cost
5 (\$1,600) and Service Lateral Cost (\$1,535).

6
7 **Response:**

8 The RS 1 Customer Service cost of \$1,600 represents the meter set installation costs applicable
9 to larger meter sets and is the average cost to install/connect these meter sets, consisting of
10 two tie-in technicians, one crane truck and one welder for one day. FEI's average charge out
11 for this service is \$200 per hour multiplied by 8 hours to equal \$1,600. The \$1,600 is only
12 applied to larger meter sets. Of the 890,573 residential meter sets included in the study, only
13 2,316 (or 0.3 percent) attract these costs.

14 The RS 1 Service Lateral cost of \$1,535 is FEI's Service Line Cost Allowance (SLCA) that has
15 been in place since 2007, until it was changed effective January 1, 2017 by Order G-147-16
16 approving FEI's 2015 System Extension Application². Under the method used to calculate this
17 amount, which has been in place since 1996, the SLCA is a derived value that represents a
18 proxy Main Extension (MX) test for a residential customer where the Profitability Index (PI)
19 equals 1.0. In other words, the SLCA represents a capital cost where the present value of the
20 cash flows (i.e. revenue from the customer being connected) is equal to the cost to install an
21 average service line.

22

² FEI notes that although the SLCA has recently been updated, FEI has used the SLCA that was in place for the years that were used to derive the COSA data.

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1 **3.0 Reference: FEI COST OF SERVICE STUDY**

2 **Exhibit B-1, Section 6.3.6.1.1, pp. 6-25, 6-26; Appendix 8, Table 2, p.**
3 **2;**

4 **Exhibit B-11, CEC IR 16.1, pp. 36-37**

5 **Customer Weighting Factors for Administration and Billing**

6 3.1 Please provide the analysis, with calculations and explanations, which support
7 FEI's Customer Weighting Factors for Administration and Billing as seen in Table
8 6-15 on page 6-25 and Table 2 of Appendix 6-8 of Exhibit B-1.

9
10 **Response:**

11 The Customer Weighting Factors for Administration and Billing were developed in 2011 and
12 were included in FEI's 2012 Common Rates, Amalgamation and Rate Design Application. The
13 process used to develop the factors did not involve any empirical analysis or calculations, but
14 was through conversations with customer service managers using their insight and experience,
15 along with input from EES Consulting. For FEI's 2016 Rate Design Application, the factors
16 developed in 2011 were again reviewed with customer service managers to determine whether
17 they were still reasonable. FEI determined that the factors from 2011 were still reasonable and
18 subsequently used them in the COSA that supports FEI's 2016 Rate Design Application.

19 The internal knowledge used by FEI staff to develop the Administration and Billing weighting
20 factors took into consideration the frequency of meter reading, the use of remote meter reading
21 via cellular or other communications infrastructure, the method of collecting and retaining load
22 data, the amount of time spent by customer service responding to inquiries, marketing programs
23 and costs for different customer groups, the existence of dedicated account managers for
24 commercial and industrial customers and the number of resources dedicated to each customer
25 class for billing, measurement and marketing as described in Section 6.3.6.1.1 of the
26 Application. The majority of the effort and consequently factor weighting difference comes from
27 the resources dedicated to billing transportation customers, in particular, and from the dedicated
28 account managers for the commercial and industrial customers.

29 Commercial and industrial account managers perform a wide variety of services that are not
30 required for a typical residential customer. FEI has approximately 40 employees that are
31 dedicated to the approximately 92,000 commercial and industrial customers taking service
32 under commercial and industrial rate schedules. These customers cover a number of industry
33 segments, including healthcare, schools and universities, retail/grocery, office
34 space/warehousing, public sector (local and provincial), hospitality sector, apartment
35 buildings/stratas, and others where there is a common meter. The services provided to these
36 customers include help with consumption and data analysis, rate comparisons, evaluation of
37 rate options, climate action goals, evaluation of transportation vs. mass market rates, market
38 information to help with budgeting and cost forecasting, re-arranging accounts and premises

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1 based on needs, shared ownership/liability during property transfers, arranging contract and
2 transportation agreements, RNG information and related billing inquiries, bankruptcies and
3 mailing address changes.
4

5
6

7 On pages 6-25 to 6-26 of Exhibit B-1, FEI states that:

8 Based on information from FEI's marketing, customer service and billing
9 departments, weighting factors for each rate class were developed which take
10 into consideration:

- 11 • the frequency of meter reading;
- 12 • the use of remote meter reading via cellular or other communications
13 infrastructure and the method of collecting and retaining load data;
- 14 • the amount of time spent by customer service responding to inquiries;
- 15 • marketing programs and costs for different customer groups;
- 16 • the existence of dedicated account managers for commercial and industrial
17 customers; and
- 18 • the number of resources dedicated to each customer class for customer
19 billing, measurement and marketing.

20 3.2 For each of the items in the list above, please provide the supporting data that
21 FEI considered when developing the Administration and Billing customer
22 weighting factors (for example the frequency of meter reading by rate class, and
23 marketing programs and costs for different customer groups by rate class).
24

25 **Response:**

26 Please refer to the response to BCUC Technical IR 1.3.1.
27
28
29
30

31 In response to CEC IR 1.16.1 regarding the use of empirical evidence or judgement to
32 support the Weighting Factors for Administration and Billing, FEI states:

33 FEI relied on discussions with internal staff about the approximate level of effort
34 required to service different types of customers for the Customer Administration



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1 and Billing Factors, taking into consideration the factors listed on page 6-15 of
2 the Application as quoted in the preamble.

3 While this approximate level of effort was not based on the actual tracking of
4 hours by customer class, it was based on internal knowledge from staff
5 responsible for customer administration and billing. [Emphasis added]

6 3.3 Please confirm, or otherwise explain, that the reference to page 6-15 in FEI's
7 response to CEC IR 16.1 is incorrect and that the correct reference is Exhibit B-
8 1, pp. 6-25 to 6-26.

9
10 **Response:**

11 Confirmed.

12
13

14
15 3.4 Please explain if the internal knowledge used by FEI staff responsible for
16 customer administration and billing to develop the Customer Administration and
17 Billing Factors included empirical information, such as the number of customers,
18 revenue, number of bills and percentage of bad debts.

19
20 **Response:**

21 Please refer to the response to BCUC Technical IR 1.3.1.

22
23

24
25 3.4.1 If not, please explain why not.

26
27

Response:

28 Please refer to the response to BCUC Technical IR 1.3.1.

29

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1 **4.0 Reference: FEI COST OF SERVICE STUDY**

2 **Exhibit B-11, CEC IR 16.2, pp. 37–39**

3 **Historical customer weighting factors for administration and billing**

4 In response to CEC IR 1.16.2, FEI states:

5 The following table shows the FEI weightings used for the 2012 COSA provided
6 in the Common Rates, Amalgamation and Rate Design Application. Prior to
7 amalgamation the weightings would have been related to specific service areas,
8 with different customer classes in some cases, and are not comparable to the
9 FEI factors included in this Application. In addition to the 2012 Customer
10 Weighting Factor also below are the weighting factors from the 2001 Rate
11 Design, 1996 Rate Design and the 1993 Phase B Rate Design Application.

12 4.1 Please describe the rationale for the inputs used in the administration and billing
13 weighting factors for the: (i) 2012 COSA; (ii) 2001 Rate Design; (iii) 1996 Rate
14 Design; and (iv) 1993 Phase B Rate Design Application (i.e. number of
15 customers, revenue, number of bills and percentage of bad debts).

16
17 **Response:**

18 In the 2012 Amalgamation Application and the 2016 Rate Design Application FEI used two
19 factors to weight many of its customer-related costs: the Weighting Factor for Administration
20 and Billing and the Weighting Factor for Meters and Services. These factors are described in
21 Sections 6.3.6.1.1 and 6.3.6.1.2 of the Application. The Weighting Factor for Administration and
22 Billing was used to weight the customer-related costs that are functionalized as Customer
23 Accounting, and was developed based on the experience and knowledge of FEI's customer
24 service managers, with input from EES Consulting. Please refer to the response to BCUC
25 Technical IR 1.3.1 for further discussion of the Weighting Factor for Administration and Billing.
26 The Weighting Factor for Meters and Services was used to weight the customer-related meters
27 and services costs, and was developed using the costs of meters and services for each specific
28 type of customer.

29 In the 1993 Phase B, 1996 and 2001 Rate Design Applications, a single factor was used, called
30 the Customer Weighting Factor. The Customer Weighting Factor was developed using the
31 costs of meters and services for each specific type of customer, i.e. the same method used to
32 develop the Weighting Factor for Meters and Services in the 2012 Amalgamation Application
33 and 2016 Rate Design Application. In the 1993 Phase B, 1996 and 2001 Rate Design
34 Applications, after discussions with managers regarding the work effort for meter reading and
35 billing for the various rate schedules, the costs that were functionalized as Customer Accounting
36 were also allocated using the Customer Weighting Factor. In other words, the costs
37 functionalized as Customer Accounting for the 1993 Phase B, 1996 and 2001 Rate Design



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1 Applications were weighted using the factor for Meters and Services, not a separately
2 developed factor for Administration and Billing.

3

4

5

6 4.1.1 Please compare the rationale provided in response to the previous
7 question to the rationale used in the development of the FEI 2016 Rate
8 Design Application and highlight and discuss any significant differences.

9

10 **Response:**

11 Please refer to the response to BCUC Technical IR 1.4.1.

12

13

14

15 4.2 Please show the calculation of the administration and billing weighting factors
16 used for the: (i) 2012 COSA; (ii) 2001 Rate Design; (iii) 1996 Rate Design; and
17 (iv) 1993 Phase B Rate Design Application.

18

19 **Response:**

20 Please refer to the responses to BCUC Technical IRs 1.3.1 and 1.4.1.

21

22

23

24 4.2.1 Please compare the calculations in the previous question to the
25 calculations used in the FEI 2016 Rate Design Application and highlight
26 and discuss any significant differences.

27

28 **Response:**

29 Please refer to the response to BCUC Technical IR 1.4.2.

30



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1 **5.0 Reference: FEI COST OF SERVICE STUDY**

2 **Exhibit B-1, Section 3.3.4, p. 3-11; Exhibit B-5, BCUC IR 14.2, p. 59**

3 **Demand meter data**

4 On page 3-11 of Exhibit B-1, FEI states: “In 1996, BC Gas filed a rate design application
5 which included a COSA study including a minimum system study (MSS).”

6 In response to BCUC IR 14.2, FEI states:

7 ... at the time of the 2001 Rate Design, while customers in the other Industrial
8 rate schedules had demand meters and daily measurement data available, a
9 large number of RS 5 customers’ volume data were still based on monthly meter
10 reads. This has now changed to all RS 5 measurement readings being available
11 on a daily basis. This is also an improvement on the customer load data which
12 allows for considering alternate methods of determining Daily Demand coupled
13 with setting the Demand Charge to apply to General Firm Service customers. ...

14 5.1 Please complete the table below which seeks to obtain and compare the demand
15 metering data for large commercial and industrial customers in 1996, 2001 and
16 2016. Please include in the response a list of the rate schedules classified as
17 Large Commercial and as Industrial.
18

	1996	2001	2016
Residential Peak Demand (GJ)			
Small Commercial Peak Demand (GJ)			
Large Commercial			
No. of Customers			
Total Peak Demand (GJ)			
No. of Customers with Demand Meters			
Total Peak Demand from Customers with Demand Meters (GJ)			
Industrial			
No. of Customers			
Total Peak Demand (GJ)			
No. of Customers with Demand Meters			
Total Peak Demand from Customers with Demand Meters (GJ)			
Total Peak Demand on FEI system (GJ)			

19
20
21 **Response:**

22 The table below provides the requested information except for Large Commercial and Industrial
23 Total Peak Demand from Customers with Demand Meters for 1996 and 2001, as that
24 information is unknown.



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1 Large Commercial includes RS 3 and RS 23. Industrial includes RS 5 and RS 25. The row
 2 called "Total Peak Demand on FEI System" includes other industrials – RS 4, RS 6, RS 7/27,
 3 RS 22, RS 22A, RS 22B – and for 1996 it also includes Bypass customers. 1996 and 2001
 4 results do not include the demand from Vancouver Island and Whistler.

	1996	2001	2016
Residential Peak Demand (GJ)	687,838	696,575	635,526
Small Commercial Peak Demand (GJ)	213,878	232,655	247,046
Large Commercial			
No. of Customers	6,107	6,412	6,709
Total Peak Demand (GJ)	229,766	200,827	200,518
No. of Customers with Demand Meters	92	325	1,681
Total Peak Demand from Customers with Demand Meters (GJ)	Unknown	Unknown	66,562
Industrial			
No. of Customers	250	690	796
Total Peak Demand (GJ)	38,679	72,368	79,740
No. of Customers with Demand Meters	153	614	796
Total Peak Demand from Customers with Demand Meters (GJ)	Unknown	Unknown	79,740
Total Peak Demand on FEI System (GJ)	1,378,133		1,206,196

5
 6 References

7 1996:

8 Residential, Small Commercial, Large Commercial and Industrial Demand from RDA
 9 Application Volume 2, Tab 2E, Section 8, Page 1, Line 1; Tab 2E, Section 9, Page 1,
 10 Line 1; and Tab 2E, Section 10, Page 1, Line 1. (Sum of respective peak demand from
 11 the Lower Mainland, Inland and Columbia Divisions).

12 Number of customers for Large Commercial and Industrial from 1996 RDA Volume 2,
 13 Tab 2A, Section 1, Page 1.0, Line 28.

14 Number of customers with Demand meters is assumed to be the number of customers
 15 with telemetry and/or AMR from the Meter Study that derives the customer weighting
 16 factor. The meter study was filed as part of FEI's (formerly BC Gas Utility Ltd.) response
 17 to Industrials Information Request Item 11, Page 2.2, 2.3, 2.5, 3.2, 3.3, 3.5, 4.1, and 4.2.
 18 The result shown in the table above is the sum of the details from the Lower Mainland,
 19 Inland and Columbia Divisions.



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1 2001:
2 Residential, Small Commercial, Large Commercial and Industrial Demand from RDA
3 Application Section 8, Page 3, Row 115. Total Peak Demand on FEI System was not
4 shown, i.e. left blank.

5 Number of customers for Large Commercial and Industrial from 2001 RDA Section 8,
6 Page 3, Row 117 (value shown divided by 12).

7 Number of customers with Demand meters is assumed to be the number of customers
8 with telemetry and/or AMR from the Meter Study that derives the customer weighting
9 factor.

10 2016:
11 Residential, Small Commercial, Large Commercial and Industrial Demand from Exhibit
12 B-1, Page 6-24, Table 6-14.

13 Number of customers for Large Commercial from Exhibit B-1, Page 6-20, Table 6-12,
14 sum of RS 3 and RS 23 and for Industrial from Exhibit B-1, Page 6-20, Table 6-12 sum
15 of RS 5 and RS 25.

16 Number of Large Commercial customers with Demand meters is assumed to be the
17 number of customers with telemetry and/or AMR from the Meter Study that derives the
18 customer weighting factor.

19 Number of Industrial customers with Demand meters is assumed to be the number of
20 customers with telemetry and/or AMR from the Meter Study that derives the customer
21 weighting factor.

22
23 For 1996 and 2001, FEI has no record of the Peak Demand from Customers with Demand
24 Meters. For 2016, all RS 5 and 25 customers have demand meters, hence Total Peak Demand
25 and Total Peak Demand from Customers with Demand Meters is the same.

26 All Large Industrials in RS 22, 22A and 22B in 1996, 2001 and 2016 have demand meters. The
27 peak demand is the firm contract demand with each of the customers. Interruptible service
28 customers in RS 22 would have a zero peak demand.

29

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1 **B. CHAPTER 12 – FEI FINAL COST OF SERVICE RESULTS AND REBALANCING**

2 **6.0 Reference: FEI FINAL COST OF SERVICE RESULTS AND REBALANCING**

3 **Exhibit B-1, Section 6.2, p. 6-1; Exhibit B-5, BCUC IR 14.2, pp. 59-60**

4 **COSA data**

5 On page 6-1 of Exhibit B-1, FEI states that: “FEI conducted a COSA study to determine
6 how to allocate and recover FEI’s costs through customer rates.” FEI also states that:

7 Information for assessing the rate design’s effectiveness in recovering the cost of
8 service, providing a fair apportionment of costs among customers, avoiding
9 undue discrimination or providing revenue stability can all be drawn from the
10 COSA.

11 In response to BCUC IR 14.2, FEI states:

12 The Company (FEI) has made investments in tracking costing data when it
13 switched its accounting and management systems to SAP, several years after
14 the 1993 Rate Design, which tracks costs on an activity basis. The activities
15 cover an array of capital and operating activities, including those related to LNG
16 assets and operations, Transmission assets and operations, and Distribution
17 assets and operations.

18 6.1 Does FEI consider the 2016 COSA study to be: more accurate than; less
19 accurate than; or as accurate as the COSA included in the 1993 Rate Design
20 Application when considering its ability to allocate costs based on the rate class
21 that incurred the cost? Please provide calculations if necessary to support an
22 explanation of your response.

23 **Response:**

24 FEI considers that the 2016 COSA study is as accurate as the COSA in the 1993 Rate Design
25 Application.

26 FEI considers the data available for factors such as peak day demand for transportation
27 customers and RS 5 to be more accurate than those in the 1993 Rate Design Application. The
28 increase in daily demand information for RS 5 and RS 25, in particular, has been useful in
29 developing the rate design proposals for those rate schedules. However, while the increase in
30 demand meters has increased the level of information available to FEI for rate design, it has not
31 increased the information available for cost allocation in the COSA.

32 As can be seen in the table in response to BCUC Technical IR 1.5.1, although the number of
33 customers with demand meters has increased since 1996, the number is still small relative to
34 the number of customers that do not have demand meters. The number of customers with
35



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1 demand meters is less than one percent of all customers. Further, the demand meters measure
2 **actual** daily usage; however, for cost allocations in the COSA, FEI must still estimate the
3 **expected** usage on a peak day because FEI's delivery system is built to be able to serve its firm
4 customers on a peak day. Consequently, the daily reads from the demand meters do not
5 provide additional information for cost allocation. It is for these reasons that the increase in the
6 number of demand meters does not increase the level of precision of data and resulting cost
7 allocations in the COSA.

8 Peak day demand for rate schedules without demand meters such as RS 1, RS 2 and RS 3
9 should be considered similar to 1993, since the method by which these parameters are derived
10 is more or less the same as historical methods. Functionalization and classification of general
11 plant costs continues to be consistent with historical COSA methodology.

12

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1 **7.0 Reference: FEI FINAL COST OF SERVICE RESULTS AND REBALANCING**
2 **Exhibit B-1, Section 6.5.1, pp. 6-33 to 6-34; Exhibit A2-10, Section**
3 **7.2, p. 33**
4 **Revenue to cost ratio range of reasonableness**

5 On page 6-33 of Exhibit B-1, FEI states:

6 In the case of BC electric utilities, there is relative certainty in load research
7 analysis that exists from known hourly system demand and demand metering
8 data for large commercial and industrial customers with respect to the coincident
9 peak demand calculation. The equivalent level of certainty does not exist for
10 natural gas utilities...

11 On page 6-34 of Exhibit B-1, FEI states: “Consistent with past precedent and practice,
12 FEI has applied a range of reasonableness of 90% to 110% in this Application.”

13 On page 33 of Exhibit A2-10, Elenchus summarized the R:C ratio range of
14 reasonableness for different utilities, which was accepted by other regulators

Table 4: R:C Ratio Range of Reasonableness

Utility	Range of Reasonableness
AltaGas ⁶¹	95% to 105%
ATCO ⁶²	95% to 105%
Union Gas ⁶³	Close to unity ⁶⁴
Enbridge ⁶⁵	Close to unity
Centra Gas ⁶⁶	100%
SaskEnergy ⁶⁷	95% to 105%

15
16
17 7.1 Given that the range of reasonableness in other jurisdictions is no greater than
18 95 percent to 105 percent, please explain why FEI’s proposed range of
19 reasonableness of 90 percent to 110 percent is appropriate.

20
21 **Response:**

22 The appropriate range of reasonableness depends on the particular circumstances and history
23 of a public utility, and therefore practices in the various jurisdictions may not be readily
24 comparable. A 90 percent to 110 percent revenue to cost ratio range of reasonableness is
25 appropriate given the accuracy of FEI’s COSA studies, and the history of the range of
26 reasonableness applied to natural gas utilities in this Province.

27 As discussed in Section 6.5.1, page 6-33 of the Application, although there are precedents for a
28 range of reasonableness of 95 percent to 105 percent in the case of BC electric utilities, this

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1 range is not appropriate for natural gas utilities as the equivalent level of certainty does not exist
2 for natural gas utilities.

3 Prior Commission decisions specific to natural gas also support a wider range of
4 reasonableness. For BC natural gas utilities, the long standing precedent for the range of
5 reasonableness for the R:C ratio has been 90 percent to 110 percent. As mentioned in section
6 6.5.1, page 6-33, line 27, in Commission Order G-42-91, the Commission recognized the
7 subjectivity and judgment inherent in cost allocation.

8 This reliance on judgment led the Commission to conclude:

9 Given the imprecision inherent in cost of service studies in general, and in
10 particular the studies in issue, the Commission believes that as long as revenues
11 from a particular class of service and costs allocated to that class of service do
12 not differ by more than 10%, there is no compelling evidence to determine that
13 the cost of service results indicate rate restructuring is required.

14 The foregoing quotation and excerpts from various other decisions accepting a 90 percent to
15 110 percent range of reasonableness for gas utilities in BC are set out at length in the response
16 to BCUC IR 1.14.1 (Exhibit B-5, pages 55-59).

17 The Commission also accepted, as a guide to rate setting, a range of reasonableness of 90
18 percent to 110 percent in the FEI (formerly BC Gas) 1993 Phase B Rate Design. The same
19 range of reasonableness was used in the BC Gas 1996 Rate Design³ and in the FEI (formerly
20 Terasen Gas Inc.) 2001 Rate Design and in FEI's 2012 Amalgamation Application.

21 EES Consulting considers FEI's proposed 90 percent to 110 percent revenue to cost ratio range
22 of reasonableness for setting proposed rates to be a reasonable range for use when
23 considering the revenue to cost ratios for FEI.⁴ EES Consulting states:⁵

24 While this is a broader range than what is currently accepted by the Commission
25 for the electric utilities in B.C., it is consistent with the range previously accepted
26 for gas utilities in the Province and the larger range is appropriate in this
27 particular case. Anytime there is greater uncertainty in the COSA results, the
28 resulting revenue to cost ratios are less accurate and reliable. This makes it
29 advisable to use +/- 10% to reflect the uncertainty in the COSA. FEI COSA
30 contains uncertainty due to several factors.

31 Gas utilities use peak days that reflect extreme weather planning conditions
32 compared to the electric utilities that use actual or forecast loads under normal
33 weather conditions. While the loads used in FEI COSA reflect the cost causation

³ Commission Order G-98-96, dated October 7, 1996.

⁴ Exhibit B-1, Appendix 6-1, EES COSA Study Report, p. 2; Exhibit B-11, CEC IR 1.6.1.

⁵ Exhibit B-1, Appendix 6-1, EES COSA Study Report, p. 5.



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1 of the system, they contain less certainty than the loads used on the electric side.
2 Because a large portion of costs are allocated on the basis of the peak day use
3 per class, having uncertainty in the peak day loads used for allocation among the
4 classes will lead to more uncertainty in the COSA results.

5 This is consistent with Elenchus' observations:⁶

6 The usual revenue to cost range of acceptable ratios that Elenchus has observed
7 is between 0.90 and 1.10 or a narrower range of 0.95 to 1.05. A narrower range
8 of 0.95 to 1.05 is usually used by regulators and utilities in instances when there
9 is good load and costing data available to be used in a COSA study and the
10 utility and regulator have had experience and history in using COSA studies in
11 order to set rates.

12 As Elenchus has also stated that consistency with past practice is the most important
13 consideration,⁷ and that: "Unless there is reason to believe that the quality of data has improved
14 substantively, Elenchus would suggest that there is not a compelling case for narrowing the
15 acceptable range of revenue to cost ratios."⁸

16 Therefore, consistent with past precedent and practice, it is reasonable and appropriate to apply
17 a range of reasonableness of 90 percent to 110 percent in FEI's rate design.

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21 7.2 Please provide an updated version of the following tables to show the impact of
22 using a R:C ratio range of reasonableness of 95 percent to 105 percent:

23 i. Table 12-2: COSA R:C and M:C Results after Rate Design Proposals (Exhibit
24 B-1, p. 12-5)

25 ii. Table 12-3: R:C and M:C Results after Rate Design Proposals and
26 Rebalancing (Exhibit B-1, p. 12-7)

27 iii. Table 12-4: FEI Rate Proposal Summary (Exhibit B-1, pp. 12-8 – 12-9)

28

29 **Response:**

30 As discussed in the response BCUC Technical IR 1.7.1, FEI believes that 90 percent to 110
31 percent is the appropriate range of reasonableness to evaluate R:C ratios for each rate
32 schedule and therefore, rate design changes as proposed in the Application should be
33 approved.

⁶ Exhibit A2-2, Elenchus COSA Report, p. 29.

⁷ Exhibit A2-10, Elenchus Rate Design Report, p. 35.

⁸ Exhibit A2-9, ICG-Elenchus IR 1.1.3.

1 As shown in Table 12-3 of the Application, there are only three rate schedules that are outside
 2 the 95 percent to 105 percent range after rate design changes and rebalancing are applied: RS
 3 5/25 at 106.3 percent, RS 6/6P at 110 percent, and RS 22A at 113 percent.

4 FEI provides the three requested updated tables below, noting that Table 12-2 is unchanged
 5 from the Application since it represents the amounts before rebalancing.

6 **i. Table 12-2: COSA R:C and M:C Results after Rate Design Proposals**

Rate Schedule	Initial COSA		Revenue Shift (\$000)	Approximate Annual Bill Change	COSA after Rate Design Proposals	
	R:C	M:C			R:C	M:C
Rate Schedule 1 <i>Residential Service</i>	95.6%	93.1%	786.4	0.1%	96.4%	94.4%
Rate Schedule 2 <i>Small Commercial Service</i>	101.3%	102.5%	(1,174.1)	-0.5%	102.2%	104.1%
Rate Schedule 3/23 <i>Large Commercial Sales and Transportation Service</i>	101.6%	103.3%	1,174.1	0.6%	103.6%	107.6%
Rate Schedule 5/25 <i>General Firm Sales and Transportation Service</i>	104.9%	112.2%	45.2	0.0%	106.3%	116.0%
Rate Schedule 6/6P <i>Natural Gas Vehicle Service</i>	131.2%	159.1%			131.7%	160.4%
Rate Schedule 22A <i>Transportation Service (Closed) Inland Service Area</i>	109.5%	109.8%			113.0%	113.4%
Rate Schedule 22B <i>Transportation Service (Closed) Columbia Service Area</i>	99.7%	99.7%			103.1%	103.1%
Rate Schedule 22 <i>Large Volume Transportation Service</i>	1425.5%	1864.4%	(754.2)	-3.4%	100.0%	100.0%

Rate Schedule <i>(rates not set using allocated costs)</i>	Initial COSA		Revenue Shift (\$000)	Approximate Annual Bill Change	COSA after Rate Design Proposals	
	R:C	M:C			R:C	M:C
Rate Schedule 4 <i>Seasonal Firm Gas Service</i>	147.4%	550.9%	13.3	1.9%	150.2%	578.3%
Rate Schedule 7/27 <i>General Interruptible Sales and Transportation Service</i>	139.6%	712.3%	(90.7)	-0.3%	139.3%	713.6%

1 **ii: Table 12-3 (Revised): R:C and M:C Results after Rate Design Proposals and Rebalancing Using**
 2 **a Range of Reasonableness of 95 percent to 105 percent**

Rate Schedule	COSA after Rate Design Proposals		Rebalance Amount (\$000)	Approximate Annual Bill Change	COSA after Rate Design Proposals and Rebalancing	
	R:C	M:C			R:C	M:C
Rate Schedule 1 <i>Residential Service</i>	96.4%	94.4%	1,742.6	0.2%	96.6%	94.7%
Rate Schedule 2 <i>Small Commercial Service</i>	102.2%	104.1%			102.2%	104.1%
Rate Schedule 3/23 <i>Large Commercial Sales and Transportation Service</i>	103.6%	107.6%			103.6%	107.6%
Rate Schedule 5/25 <i>General Firm Sales and Transportation Service</i>	106.3%	116.0%	(1,138.5)	-1.2%	105.0%	112.6%
Rate Schedule 6/6P <i>Natural Gas Vehicle Service</i>	131.7%	160.4%	(75.9)	-20.3%	105.0%	109.5%
Rate Schedule 22A <i>Transportation Service (Closed) Inland Service Area</i>	113.0%	113.4%			113.0%	113.4%
Rate Schedule 22B <i>Transportation Service (Closed) Columbia Service Area</i>	103.1%	103.1%			103.1%	103.1%
Rate Schedule 22 <i>Large Volume Transportation Service</i>	100.0%	100.0%			100.0%	100.0%

Rate Schedule <i>(rates not set using allocated costs)</i>	COSA after Rate Design Proposals		Rebalance Amount (\$000)	Approximate Annual Bill Change	COSA after Rate Design Proposals and Rebalancing	
	R:C	M:C			R:C	M:C
Rate Schedule 4 <i>Seasonal Firm Gas Service</i>	150.2%	578.3%	(9.1)	-1.3%	148.3%	560.4%
Rate Schedule 7/27 <i>General Interruptible Sales and Transportation Service</i>	139.3%	713.6%	(519.1)	-1.6%	137.1%	679.5%

3
 4 Applying a 95 percent to 105 percent range of reasonableness to R:C ratios and shifting the
 5 revenue responsibility to RS 1 customers with a R:C ratio of less than 100 percent will put
 6 upward pressure on RS 1 delivery rates and further reduce the delivery charges for RS 6/6P,
 7 RS 5/25, RS 7/27 and RS 4 as discussed below.

8 When rebalancing RS 6 and RS 5/25 to an R:C of 105 percent, there is an additional effect on
 9 RS 7/27 and RS 4 as these two rates are derived from RS 5/25 rates as described in sections
 10 9.6.5 and 9.7.1, respectively. If FEI were to shift all of the rebalancing to RS 1 as proposed in

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1 the Application, the total revenue shift to RS 1 from rebalancing would be \$1.743 million, which
 2 is \$1.682 million higher than proposed, and results in an annual bill impact of approximately 0.2
 3 percent to RS 1 customer from rebalancing. RS 6 customers will experience a reduction of 20.3
 4 percent in their annual bill, RS 5/25 customers a reduction of 1.2 percent, RS 7/27 a reduction
 5 of 1.6 percent and RS 4 a reduction of 1.3 percent. Rebalancing the charges under RS 22A
 6 would be inconsistent with continuing to grandfather the terms and conditions of service under
 7 this rate schedule. Since RS 22 is available for all large industrial customers, grandfathered RS
 8 22A (and RS 22B) customers may elect this rate schedule as an alternative. Consequently, FEI
 9 has not rebalanced RS 22A to 105 percent for this response.

10 **iii: Table 12-4 (Revised): FEI Rate Proposal Summary Using a Range of Reasonableness of 95**
 11 **percent to 105 percent**

Rate Schedule	Estimated COSA-Based 2018 Rates	Proposed Rate Changes	Estimated 2018 Rates After Proposed Changes
RS 1 – Residential			
Basic Charge (daily)	\$0.3890	\$0.0195	\$0.4085
Delivery Charge (\$/GJ)	\$4.821	(\$0.052)	\$4.769
RS 2 – Small Commercial			
Basic Charge (daily)	\$0.8161	\$0.1324	\$0.9485
Delivery Charge (\$/GJ)	3.850	(\$0.186)	3.664
RS 3/RS 23 – Large Commercial			
Basic Charge (daily)	\$4.3538	\$0.4357	\$4.7895
Delivery Charge (\$/GJ)	\$3.189	\$0.001	\$3.190
RS 4			
Basic Charge (Monthly)	\$439	Nil	\$439
Delivery Charge (\$/GJ) Off Peak	\$1.278	\$0.047	\$1.325
Delivery Charge (\$/GJ) Extended Period	\$2.183	(\$0.121)	\$2.062
RS 5/RS 25			
Basic Charge (Monthly)	\$587.00	Nil	\$587.00
Delivery Charge (\$/GJ)	\$0.887	(\$0.063)	\$0.824
Demand Charge (\$/Month/GJ)	\$21.596	\$2.784	24.380
RS 6/RS 26			
Basic Charge (Monthly)	\$61	Nil	\$61
Delivery Charge (\$/GJ)	\$4.873	(\$1.613)	\$3.260



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Rate Schedule	Estimated COSA-Based 2018 Rates	Proposed Rate Changes	Estimated 2018 Rates After Proposed Changes
RS 7/RS 27			
Basic Charge (Monthly)	\$880.00	Nil	\$880.00
Delivery Charge (\$/GJ)	\$1.455	(\$0.080)	\$1.375
RS 22			
Basic Charge (Monthly)	\$3,664.00	Nil	\$3.664.00
Firm Demand Charge (\$/Month/GJ)	n/a		\$25.000
Firm MTQ (\$/GJ)	n/a		\$0.150
Interruptible MTQ (\$/GJ)	\$1.060	(\$0.088)	\$0.972

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7.2.1 Please provide supporting explanations and calculations for any changes to rate design proposals if a R:C Ratio range of reasonableness of 95 percent to 105 percent was utilized.

Response:

Please refer to the response to BCUC Technical IR 1.7.2.

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1 **FORT NELSON SERVICE AREA**

2 **C. CHAPTER 13 – FORT NELSON COST OF SERVICE ALLOCATION METHODOLOGY**

3 **8.0 Reference: FORT NELSON COST OF SERVICE METHODOLOGY**

4 **Exhibit B-1-2, Table 1, p. 1; Exhibit B-11, CEC IR 66.1, Attachment**
 5 **66.1, p. 1**

6 **Customer weighting factors for meters and services**

7 On page 1 of Exhibit B-1-2 FEI presents the customer weighting factors for Fort Nelson
 8 Service Area for both Meters and Services, and Customer Administration & Billing in
 9 Table 1, reproduced below.

Table 1: Fort Nelson Service Area Customer Weighting Factors for Meters & Services

Rate schedule	2016 Weighting Factors
Rate 1 - Domestic (Residential) Service	1.0
Rate 2.1 – General (Small Commercial) Service	1.6
Rate 2.2 – General (Large Commercial) Service	5.7
Rate Schedule 25 – General Firm Transportation	191.5

10

11

12 In response to CEC IR 66.1, FEI provided attachment 66.1 which included the following
 13 table for Fort Nelson:

AMALGAMATED WEIGHTING FACTOR RESULTS	Rate 1 - Residential	Rate 2.1 - Small Commercial	Rate 2.2 - Large Commercial	Rate 25 - General Firm Transportation
<i>2016 Weighting Factors</i>	1.000	1.576	4.764	31.278

14

15 8.1 Please explain which factors were amalgamated to obtain the figures presented
 16 in attachment in response to CEC 66.1.

17

18 **Response:**

19 When responding to CEC-FEI IR 1.66.1 FEI incorrectly used the preliminary, and not the final,
 20 meters and services study results to produce the table in the response.

21 There are two primary differences between the preliminary and final study results. The first
 22 difference is that in the final study FEI was able to obtain the insurable (replacement) value for
 23 the RS 25 Tackama meter set and subsequently use it as the cost for that meter set and service
 24 for the study. The second difference was that the formulas for summing the Total Cost for RS
 25 2.2 (Large Commercial) meter set and service incorrectly excluded the column with the cost of
 26 the meter set. Finally, the title in the table in response to CEC-FEI IR 1.66.1 which reads
 27 AMALGAMATED WEIGHTING FACTOR RESULTS is a legacy title from the FEI study as the



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1 same template was used. The title should more accurately read FORT NELSON WEIGHTING
2 FACTOR FOR METERS AND SERVICES.

3 The above changes are included in the corrected response to CEC-FEI IR 1.66.1, Attachment
4 66.1, being filed concurrently with these responses. FEI has also included the corrected table
5 below. To be clear, the factors used in the Fort Nelson COSA for allocating Meters and Services
6 are those found on Page 1 of Exhibit B-1-2, Table 1 and are equal to those in the following
7 table.

Fort Nelson Weighting Factor for Meters and Services	Rate 1 - Residential	Rate 2.1 - Small Commercial	Rate 2.2 - Large Commercial	Rate 25 - General Firm Transportation
<i>2016 Weighting Factors</i>	1.000	1.576	5.716	191.509

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8.1.1 Please provide calculations that show the amalgamation of the weighting factor results.

Response:

Please refer to the response to BCUC Technical IR 1.8.1.

8.1.2 Please explain the differences between the Fort Nelson Weighting Factors for Meters and Services for Rate 2.2 and Rate 25 in Exhibit B-1-2, p. 1 and Exhibit B-11, CEC 1.66.1, Attachment 66.1.

Response:

Please refer to the response to BCUC Technical IR 1.8.1.



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1 **10.0 Reference: FORT NELSON COST OF SERVICE ALLOCATION METHODOLOGY**
2 **Exhibit B-1-2, p. 1; Exhibit B-8, BCOAPO IR 6.6a, Attachment 6.6a**
3 **Customer Weighting Factors for Meters and Services**

4 10.1 In the same format as FEI's response to BCOAPO IR 6.6a, Attachment 6.6a,
5 please show the calculation of the Customer Weighting Factors for Meters and
6 Services.

7
8 **Response:**

9 FEI has provided the calculation in the corrected response to CEC-FEI IR 1.66.1, Attachment
10 66.1, being filed concurrently with these responses.

11

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1 **11.0 Reference: FORT NELSON COST OF SERVICE ALLOCATION METHODOLOGY**

2 **Exhibit B-1-2, Table 2, p. 2**

3 **Fort Nelson Customer Weighting Factors for Administration and**
4 **Billing**

5 11.1 Please provide the analysis, with calculations and explanations, which support
6 the Fort Nelson Service Area Customer Weighting Factors for Administration and
7 Billing as seen in Table 2 on page 2 of Exhibit B-1-2.

8
9 **Response:**

10 The Fort Nelson Service Area Customer Weighting Factors for Administration and Billing were
11 derived in the same way as for FEI. Please refer to the response to BCUC Technical IR 1.3.1.

12

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1 **D. CHAPTER 13 – FORT NELSON FINAL COST OF SERVICE RESULTS AND**
2 **REBALANCING**

3 **12.0 Reference: FORT NELSON FINAL COST OF SERVICE RESULTS AND**
4 **REBALANCING**

5 **Exhibit B-1, Section 6.5.1, p. 6-34; Exhibit B-1-1, Section 13.7, p. 13-**
6 **48; Section 13.7.1.4, p. 13-50 – 13-51; Exhibit A2-10, Section 7.2, p.**
7 **33**

8 **Revenue to cost ratio range of reasonableness**

9 On page 6-34 of Exhibit B-1, FEI states: “Consistent with past precedent and practice,
10 FEI has applied a range of reasonableness of 90% to 110% in this Application.”

11 On page 13-48 of Exhibit B-1-1, FEI states:

12 the COSA results as presented in section 13.4.3 show that the residential,
13 commercial and industrial customers’ revenue to cost ratios are outside the
14 range of reasonableness (90 percent to 110 percent). Therefore, FEI is
15 proposing to rebalance rates to bring Fort Nelson’s rates to the boundaries of the
16 range of reasonableness in consideration of rate shock constraints.

17 On page 33 of Exhibit A2-10, Elenchus summarized the R:C ratio range of
18 reasonableness for different utilities, which was accepted by other regulators in Table 4
19 (shown below).

Table 4: R:C Ratio Range of Reasonableness

Utility	Range of Reasonableness
AltaGas ⁶¹	95% to 105%
ATCO ⁶²	95% to 105%
Union Gas ⁶³	Close to unity ⁶⁴
Enbridge ⁶⁵	Close to unity
Centra Gas ⁶⁶	100%
SaskEnergy ⁶⁷	95% to 105%

- 20
- 21
- 22 12.1 Please provide an updated version of the following tables to show the impact of
- 23 using a R:C ratio range of reasonableness of 95 percent to 105 percent:
- 24 i. Table 13-26: Revenue to Cost and Margin to Cost Ratios before rebalancing
- 25 (Exhibit B-1-1-1, Evidentiary Update, p. 13-50)
- 26 ii. Table 13-27: Revenue to Cost and Margin to Cost Ratios after rebalancing
- 27 (Exhibit B-1-1-1, Evidentiary Update, p. 13-51)

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1 iii. Table 13-29: Fort Nelson Rate Proposal Summary (Exhibit B-1-1-1,
2 Evidentiary Update, p. 13-56)

3
4 **Response:**

5 As discussed in the response to BCUC Technical IR 1.7.1, FEI believes that 90 percent to 110
6 percent is the appropriate range of reasonableness to evaluate R:C ratios for each rate
7 schedule and therefore, rate design changes as proposed in the Application for Fort Nelson
8 should be approved.

9 As shown in Table 13-27 of the Application, Fort Nelson proposed rates for Rate 1, Rate 2.1
10 and Rate 2.2 have been adjusted to account for the shift in revenue responsibility to bring Rate
11 1 close to a 90 percent R:C ratio, Rate 2.1 to a 110 percent R:C ratio and Rate 2.2 to a 123.9
12 percent R:C ratio.

13 Applying a 95 percent to 105 percent range of reasonableness to evaluate rate schedules would
14 mean a greater revenue shift to Rate 1. Rebalancing Rate 2.1, Rate 2.2 and RS 25 to 105
15 percent would shift \$24 thousand, \$33 thousand and \$8 thousand, respectively, from these rate
16 schedules to Rate 1, resulting in an R:C ratio for Rate 1 of 95 percent. Rebalancing and the
17 shifting revenue responsibility equates to an annual bill increase for Rate 1 of 5.3 percent, a
18 decrease for Rate 2.1 of 1.3 percent, a decrease for Rate 2.2 of 7.6 percent and a decrease for
19 RS 25 of 3.3 percent. The annual bill changes described above are averages; some Rate 1
20 customers will experience annual bill increases of slightly higher than 9 percent, approaching
21 the level of what may be considered rate shock for these customers, particularly when coupled
22 with Fort Nelson’s approved revenue requirement increase for 2018⁹.

23 FEI provides below the three requested updated tables, noting that Table 13-26 is unchanged
24 from the Application since it represents the amounts before rebalancing.

25 **i. Table 13-26: Revenue to Cost and Margin to Cost Ratios before rebalancing**

Rate Schedule	Initial COSA		Revenue Shift (\$000)	Approximate Annual Bill Change	COSA after Rate Design Proposals	
	R:C	M:C			R:C	M:C
Rate 1 <i>Domestic (Residential) Service</i>	90.5%	88.0%	0.8	0.1%	90.9%	88.4%
Rate 2.1 <i>General (Small Commercial) Service</i>	108.3%	110.7%	(126.0)	0.1%	107.2%	109.4%
Rate 2.2 <i>General (Large Commercial) Service</i>	113.2%	118.2%	127.0	0.1%	114.5%	118.4%
Rate Schedule 25 <i>General Firm Transportation Service</i>	112.1%	112.1%	(1.8)	-1.2%	111.0%	111.0%

26

⁹ Order G-162-16

1 ii: **Table 13-27 (Revised): Revenue to Cost and Margin to Cost Ratios after rebalancing using a**
 2 **range of reasonableness of 95 percent to 105 percent**

Rate Schedule	COSA after Rate Design Proposals		Rebalance Amount (\$000)	Approximate Annual Bill Change	COSA after Rate Design Proposals and Rebalancing	
	R:C	M:C			R:C	M:C
Rate 1 <i>Domestic (Residential) Service</i>	90.9%	88.4%	65.4	5.3%	95.0%	93.7%
Rate 2.1 <i>General (Small Commercial) Service</i>	107.2%	109.4%	(24.0)	-1.3%	105.0%	106.6%
Rate 2.2 <i>General (Large Commercial) Service</i>	114.5%	118.4%	(33.3)	-7.6%	105.0%	106.3%
Rate Schedule 25 <i>General Firm Transportation Service</i>	111.0%	111.0%	(8.1)	-3.3%	105.0%	105.0%

3
 4 iii: **Table 13-29 (Revised): Fort Nelson Rate Proposal Summary using a range of reasonableness of**
 5 **95 percent to 105 percent**

Rate Component	Rate 1	Rate 2.1	Rate 2.2	Rate 3.1	RS 25
Existing COSA Rates					
Minimum daily Charge incl. 1 st 2 GJ/month	\$0.5483	\$1.4337	\$1.4337		
Administration Charge (/month)					\$202
Next 28 GJ/month	\$4.885				
Excess over 30 GJ/month	\$4.782				
Next 298 GJ/ month		\$5.336	\$5.336		
Excess over 300 GJ/month		\$5.210	\$5.210		
Delivery Charge First 20 GJ/month				\$4.522	\$4.522
Delivery Charge Next 260 GJ/month				\$4.201	\$4.201
Excess over 280 GJ/month				\$3.450	\$3.450
Minimum Delivery Charge/month				\$1,826	\$1,826
Total Annual Bill:	\$742	\$2,433	\$28,546	n/a	\$148,664
Proposed Rates					
Basic Charge/Day	\$0.3686	\$1.2786	\$3.3626		
Basic Charge (/Month)				\$600.00	\$600.00
Administration Charge (/Month)					\$39.00
Demand Charge (/GJ/Month)				\$26.421	\$26.421
Delivery Charge (\$/GJ)	\$3.512	\$3.782	\$3.401	\$1.000	\$1.000
Commodity Cost Recovery Charge (\$/GJ)	\$1.275	\$1.275	\$1.275	\$1.275	
Storage and Transport Charge (\$/GJ)	\$0.019	\$0.020	\$0.017	\$0.019	
Total Annual Bill:	\$783	\$2,406	\$26,251	n/a	\$140,144



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12.1.1 Please provide supporting explanations and calculations for any changes to rate design proposals if an R:C ratio range of reasonableness of 95 percent to 105 percent was utilized.

Response:

Please refer to the response to BCUC Technical IR 1.12.1.