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October 3, 2022

Residential Consumer Intervener Association  
c/o Midgard Consulting Inc.  
Suite 828 – 1130 W Pender Street  
Vancouver, B.C.  
V6E 4A4

Attention: Mr. Peter Helland, Director

Dear Mr. Helland:

**Re: FortisBC Energy Inc. (FEI)**

**Project No. 1599352**

**Application for Acceptance of Demand-Side Management (DSM) Expenditures  
for 2023 (Application)**

**Response to the Residential Consumer Intervener Association (RCIA)  
Information Request (IR) No. 1**

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On July 5, 2022, FEI filed the Application referenced above. In accordance with regulatory timetable established in British Columbia Utilities Commission Order G-219-22 for the review of the Application, FEI respectfully submits the attached response to RCIA IR No. 1.

For convenience and efficiency, FEI has occasionally provided an internet address for referenced reports instead of attaching lengthy documents to its IR responses. FEI intends for the referenced documents to form part of its IR responses and the evidentiary record in this proceeding.

If further information is required, please contact the undersigned.

Sincerely,

**FORTISBC ENERGY INC.**

***Original signed:***

Diane Roy

Attachments

cc (email only): Commission Secretary  
Registered Parties

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## 1 A. Background

### 2 1. Reference: Exhibit B-1 Application pp. 6, 14 3 DSM Expenditures

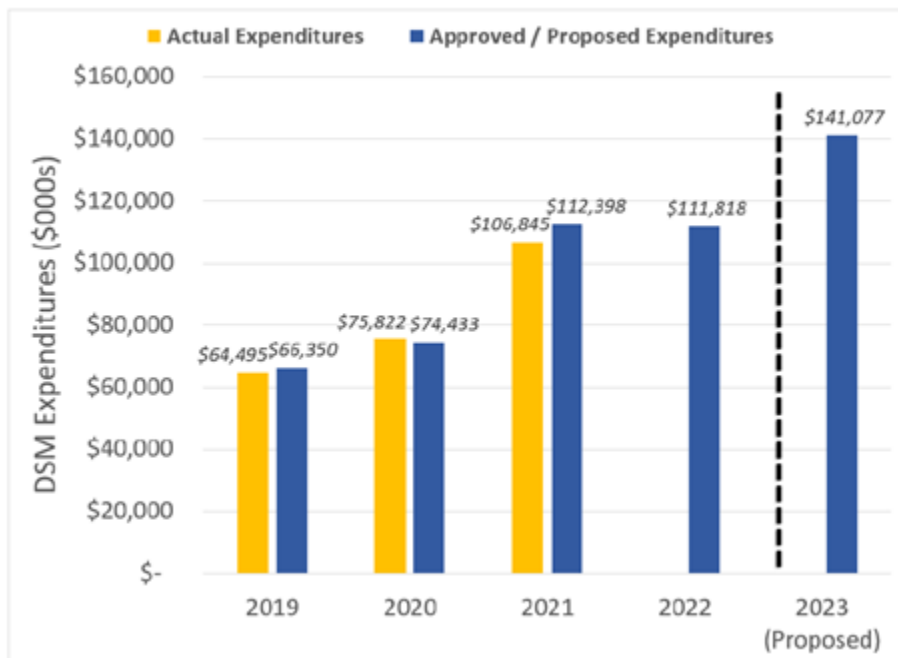
4 At the above-noted locations FEI provided Table 3-1 and Figure 4-1, respectively:

**Table 3-1: Comparison of 2023 Proposed DSM Expenditures to 2022 Accepted DSM Expenditures**

Program Area	Total Utility Expenditure (000's)		
	2023	2022	Variance
Residential	\$43,994	\$34,816	26%
Commercial	\$26,570	\$19,800	34%
Industrial	\$6,848	\$8,462	-19%
Low Income	\$13,251	\$10,984	21%
Conservation Education and Outreach	\$9,713	\$9,433	3%
Innovative Technologies	\$25,960	\$11,871	119%
Enabling Activities	\$12,010	\$8,921	35%
Portfolio Activities	\$2,730	\$1,979	38%
ALL Programs	\$141,077	\$106,266	33%

5 Accepted expenditures pursuant to Order G-138-18, Order G-135-21 and Order G-301-21

**Figure 4-1: FEI Annual Total DSM Expenditures 2019 to 2022<sup>9</sup>**



6  
7 1.1 Please reconcile the difference between 2022 accepted DSM expenditures of  
8 \$106,266 shown in Table 3-1 with the 2022 Approved Expenditures of \$111,818  
9 shown in Figure 4-1.  
10

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1    **Response:**

2    The \$106.266 million in Table 3-1 is the approved 2022 DSM expenditures as updated in  
3    applications filed with the BCUC on March 19, 2021, and July 2, 2021, for acceptance of updated  
4    DSM expenditure budgets for the Residential, Low Income, Commercial, Industrial and Innovative  
5    Technologies Program Areas.<sup>1</sup>

6    The \$111.818 million in Figure 4-1 is the same approved 2022 DSM Plan expenditures of  
7    \$106.266 million plus carry over from the preceding year. The \$5.554 million carried over to 2022  
8    can be seen in Table 3-1 of Appendix B to the Application. Please note that the small variance in  
9    total values is due to rounding.

10

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<sup>1</sup> FEI's Application for Updated DSM Expenditures for 2021 and 2022 for the Commercial, Industrial and Innovative Technologies Program Areas was filed March 19, 2021 and approved on May 5, 2021 pursuant to BCUC Order G-135-21. FEI's Application for Updated DSM Expenditures for 2021 and 2022 for the Residential and Low Income Program Areas was filed July 7, 2021 and approved on October 21, 2021 pursuant to BCUC Order G-301-21.

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## 2. Reference: Exhibit B-1 Application p.6

### Discount Rate

At the above-noted location FEI provided Table 3-2:

**Table 3-2: 2023 DSM Plan Energy Savings & GHG Emission Reductions**

Indicator	Year	Total Natural Gas Savings	GHG Emission Reductions
Net Incremental Annual Gas Savings (GJ/yr) and GHG Reductions (t CO <sub>2</sub> e/yr) <sup>1</sup>	2023	1,601,386	82,632
NPV of Net Gas Savings (GJ/yr) and GHG Reductions (t CO <sub>2</sub> e) <sup>2</sup>		14,433,377	744,762

Notes to Table:

<sup>1</sup> Net incremental gas savings are after consideration of free ridership and spill over. GHG reductions are based on long run combustion emission factor of 0.0516 t CO<sub>2</sub>e/GJ for natural gas from Ministry of Environment & Climate Change Strategy.

<sup>2</sup> NPV in this context refers to including the entire stream of savings into the future (by measure life) and annualizing that to present time to show the total value of the stream of savings.

2.1 What discount rate or rates does FEI use to calculate the NPV of Net Gas Savings and GHG Reductions?

2.1.1 Is the same discount rate used for all measures and programs? If not, explain why not.

2.1.2 Provide the basis and support for this discount rate.

### Response:

FEI uses its Weighted Average Cost of Capital (WACC) to calculate the benefits of its DSM programs, including the NPV of gas savings (from which GHG emission reductions are also calculated). Use of the WACC in this way is common industry practice as set out in the California Standards Practice Manual for calculating DSM activity cost effectiveness as it fairly represents the value of the utility's future energy purchases/energy savings benefits. Use of the WACC for this purpose has been reviewed during prior FEI DSM expenditure application proceedings. The WACC is subject to being updated and reviewed by the BCUC on an annual basis and, at the time the analysis for the 2023 DSM Plan was conducted, its value was 4.61 percent. The same discount rate is used for all measures and programs.

2.2 Over what period does FEI calculate the NPV of Net Gas Savings and GHG Reductions?

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2.2.1 Is the same period used for all measures and programs? If not, explain why not.

2.2.2 Provide the basis and support for this analysis period.

**Response:**

FEI calculates the NPV of Net Gas Savings and GHG Reductions for each measure separately. Table 3-2 represents the sum of net Gas Savings and GHG Reductions for all measures in the 2023 DSM Plan.

The period used to calculate the NPV for each individual measure is equal to its measure life. Measure lives are determined for each measure as a part of program design and revisited regularly with program evaluation. Appendix A-1 of the Application provides the measure life reference for each measure in the DSM Plan.

2.3 Provide any assumptions around continued or renewal of savings at the end of a measure's life in the NPV savings and calculations. For example, does FEI assume that the customer will reinstall the same measure or perform a like-for-like replacement? Does FEI assume it will fund the same incentives for this replacement at the same level as the measure was originally funded?

**Response:**

FEI clarifies that it does not assume any measure savings following the end of their assumed life in the NPV of Net Gas and GHG Saving Reductions calculations shown in Table 3-2. The NPV calculation in Table 3-2 only reflects the savings achieved for the original measure installed for the duration of their assumed life.

There are some cases after the end of a measure's assumed life where FEI may still be able to encourage the adoption of a replacement measure with a similar efficiency. As the life for most measures included in the 2023 DSM Plan tends to exceed the length of the plan itself, the savings are not forecast in this plan, but may be forecast as part of a future DSM plan. These cases are discussed further below.

FEI generally assumes that a customer will install a measure that meets the minimum code or energy efficiency requirements following the life of a retired measure. In some cases, that replacement measure will be like-for-like, if, at the time of retirement, the retired measure has become the minimum code requirement (i.e., not an improvement in efficiency). Where a code or energy efficiency requirement is in place, FEI can only provide incentives for measures that have a higher efficiency than code requirements. If the replacement measure has a higher efficiency than the code or the assigned base case, FEI can still offer incentives for that measure and may

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- 1 also have incentives available for replacing the retired measure with a higher efficiency option
- 2 depending on program activities at that time.
- 3 Where a measure is not subject to a code or efficiency requirements (e.g., recommissioning or
- 4 strategic energy management), FEI will provide incentives or programs for customers to continue
- 5 to implement the energy efficiency measure instead of the assigned base case.
- 6

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1     **3.     Reference:   Exhibit B-1 Application p.6**

2                             **Government Policy**

3             On page 6 of its Application, FEI states:

4                     “In FEI’s view, the BCUC’s consideration of government direction and policy must  
5                     weigh heavily in favour of FEI’s proposal to increase investment in DSM  
6                     programs.”

7             3.1     Confirm whether the provincial government consulted with FEI during the  
8                     development of the CleanBC Roadmap to 2030.

9                     3.1.1     If confirmed, summarize the input FEI gave to the provincial government.  
10                     Did FEI provide feedback with respect to rate impacts of the increased  
11                     DSM expenditures and savings reflected in the 2023 DSM Expenditures  
12                     Plan? Did FEI provide feedback with respect to the achievability of the  
13                     targets in the CleanBC Roadmap to 2030?

14  
15     **Response:**

16     The provincial government provided directional updates to FEI regarding the development of the  
17     CleanBC Roadmap in the summer of 2021. These updates were limited in scope and did not  
18     consist of substantive feedback or input from FEI. In particular, FEI did not provide substantive  
19     feedback on the rate impacts or the achievability of the targets prior to the release of the CleanBC  
20     Roadmap.

21

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**4. Reference: Exhibit B-1 Application p.8**

**BC Energy Objectives**

On page 8 of its Application, FEI states provides BC's Energy Objectives and FEI's activities:

“(g) to reduce BC greenhouse gas emissions

(i) by 2012 and for each subsequent calendar year to at least 6% less than the level of those emissions in 2007,

(ii) by 2016 and for each subsequent calendar year to at least 18% less than the level of those emissions in 2007,

(iii) by 2020 and for each subsequent calendar year to at least 33% less than the level of those emissions in 2007,

(iv) by 2050 and for each subsequent calendar year to at least 80% less than the level of those emissions in 2007, and

(v) by such other amounts as determined under the Greenhouse Gas Reduction Targets Act;

FEI's DSM programs will result in substantial natural gas savings and commensurate reductions in greenhouse gas emissions of 82,632 annual tonnes CO<sub>2</sub>e.”

4.1 Calculate the change in emissions from 2007 levels related to the gas supplied by FEI in 2020 and contrast with Objective (g)(iii).

**Response:**

As FEI is seeking acceptance in this Application of a one-year 2023 DSM expenditure schedule, and DSM is only one of FEI's initiatives that will contribute to provincial GHG emission reductions, FEI considers that the GHG reductions related to the gas supplied by FEI that are necessary to meet provincial GHG reduction targets for the province are well beyond the scope of this proceeding.

The BC's Energy Objectives (g) (iii) and (iv) present a 2020 and 2050 target for overall carbon emission reductions for BC as a whole and, as such, are not tied to a set level of required emissions reductions related to the gas supplied by FEI, either through its DSM programs alone or through all of its carbon reduction initiatives. Further, emissions have increased since 2007 as a result of many different carbon emitting activities in BC. To achieve the reduction targets set by the provincial objectives listed above, it will take many different initiatives by many different sectors of BC's economy.



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Please refer to the response to CEC IR1 6.2 for a discussion of the contribution from FEI's DSM activity to future provincial carbon emission reductions and Section 9 of the 2022 LTGRP for a discussion of how FEI's carbon reduction initiatives will contribute to the anticipated BC Greenhouse Gas Reductions Standard (GHGRS), which would be specific to gas utilities in BC. Ultimately, FEI believes it will be able to meet the GHGRS and that DSM will be an important contributor to that effort.

4.2 Calculate the estimated change in emissions from 2007 levels related to the gas expected to be supplied by FEI in 2025 and contrast with Objective (g)(iv).

**Response:**

Please refer to FEI's response to RCIA IR1 4.1.

4.3 Provide FEI's view whether its DSM programs and the emissions from the gas it supplies should meet or exceed these overall provincial targets.

**Response:**

Please refer to FEI's response to RCIA IR1 4.1.

FEI's DSM programs, as outlined in the Application, will assist in meeting the overall provincial GHG reduction targets.

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- 1 **5. Reference: Exhibit B-1 Application p.25; Appendix A FEI 2023 DSM Plan p.5;**  
2 **Appendix B FEI 2021 Annual DSM Report p.4**  
3 **Changes in Spending and Portfolio Cost Effectiveness from 2021**  
4 At the above-noted locations FEI provided Table 5-1, Exhibit 1, and Table2-1 respectively:

**Table 5-1: 2023 DSM Plan Portfolio Level Cost Effectiveness Results – All Tests**

	TRC	Portfolio	UCT	PCT	RIM
Total Portfolio	0.7	1.4	0.7	2.0	0.4

Note to Table: The cost effectiveness test result called 'Portfolio' in this Table reflects the use of the modified total resource cost test (MTRC) for up to 40 percent of the portfolio per the DSM regulation as explained in Section 7.1.3 below.

**Exhibit 1 - 2023 Total DSM Expenditures by Program Area (\$000s)**

Program Area	Incentives	Non-Incentives	Total Expenditures
Residential	39,196	4,798	43,994
Commercial	21,442	5,128	26,570
Industrial	5,787	1,061	6,848
Low Income	10,348	2,903	13,251
Conservation Education and Outreach	-	9,713	9,713
Innovative Technologies	18,838	7,122	25,960
Enabling Activities	5,662	6,349	12,010
Portfolio Activities	-	2,730	2,730
Total (\$000s)	\$101,273	\$39,804	\$141,077

5

**Table 2-1: Overall DSM Portfolio Results for 2021**

Indicator - 2021 Results	Total
Utility Expenditures, Incentives (\$000s)	86,129
Utility Expenditures, Non-Incentives (\$000s)	20,715
Utility Expenditures, Total (\$000s)	106,844
Net Incremental Annual Gas Savings (GJ/yr.)	1,142,533
Annual GHG Emission Reductions* (tonnes CO <sub>2</sub> e/yr)	68,323
NPV of Annual Gas Savings (GJ/yr.)	12,303,687
Measure Lifetime GHG Emission Reductions* (tonnes CO <sub>2</sub> e)	735,761
	TRC 0.9
	MTRC 1.4
Benefit/Cost Ratios	UCT 0.8
	PCT 2.3
	RIM 0.4

6

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5.1 Please explain the factors that result in the 2023 DSM Plan TRC declining to 0.7 compared to the 2021 DSM Actual TRC of 0.9.

**Response:**

The primary driver for a lower TRC in the 2023 DSM Plan is the higher percentage of costs that do not have associated planned savings – 36 percent in 2023 compared to 18 percent in 2021. This includes costs in the Innovative Technologies Program Area for which FEI does not forecast energy savings. Due to the preliminary and investigative nature of Innovative Technologies, it is challenging to effectively forecast energy savings from related pilot studies. However, when results from the Innovative Technologies Program Area become available, any material energy savings will be reported as part of FEI's DSM Annual Reports. As FEI pursues advanced DSM measures, the relative importance of the Innovative Technologies Program Area is reflected in its relatively larger share of the total 2023 DSM Plan investments.

5.2 Please explain the factors that result in the reduction in incentives as a proportion of portfolio spending from approximately 81% in 2021 to approximately 72% in 2023.

**Response:**

Please refer to the response to RCIA IR1 5.1. The primary factors that result in a reduction of incentives as a proportion of the overall portfolio are increased expenditures for supporting activities (e.g., Innovative Technologies), program administration and labour costs.

It should also be noted that 2021 was unusual in that it was influenced by the "Bigger Rebates" offer as part of the COVID-19 recovery response that was implemented to support the 2020 BC Restart Plan. Participation in the limited-time Bigger Rebates offer led to a higher percentage of incentives as a proportion of DSM portfolio spending. The approximately 72 percent of portfolio spending in the 2023 DSM Plan is in line with 2020 and higher than 2019.

	Actual Incentives (\$000's)	Actual Portfolio Expenditures (\$000's)	Incentives as a percent of total expenditure
2019	42,240	64,495	65
2020	54,607	75,821	72

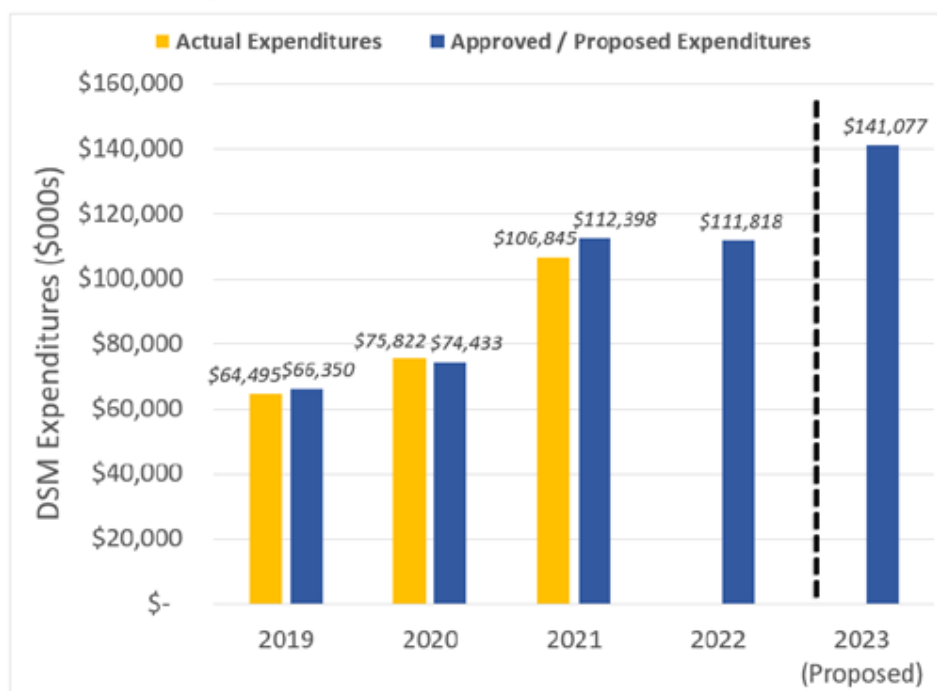
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**6. Reference: Exhibit B-1 Application p.14**

**Actual Versus Plan Spending During COVID-19 Pandemic**

At the above-noted location FEI provided Figure 4-1”

**Figure 4-1: FEI Annual Total DSM Expenditures 2019 to 2022<sup>9</sup>**



6.1 Considering potential barriers to implementing DSM programs resulting from the COVID-19 pandemic (e.g., limitations on FEI personnel, energy advisors, and contractors entering homes and businesses), please explain the factors that led to FEI being able to nearly spend its 2020 budget and exceeded its 2021 budget.

**Response:**

FEI clarifies that it exceeded its 2020 budget and nearly spent its 2021 budget. Factors that led to these results:

- FEI introduced a limited-time “Bigger Rebates” COVID-19 recovery offer beginning in 2020 that significantly influenced 2020 and 2021 spending.
- Program partners BC Hydro and the Ministry of Energy, Mines and Low Carbon Innovation (EMLI) introduced similar enhanced offers in alignment with FEI and the resulting spillover further bolstered uptake in the Residential Program Area.
- In many cases, customers’ travel and vacation plans were disrupted by the COVID-19 pandemic and they shifted their vacation budgets and time resources into home energy efficiency improvements.

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- 1
  - 2
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- FEI staff worked closely with commercial and industrial customers to follow through with their pre-pandemic energy efficiency plans, as much as possible.
  - Disruptions to supply chains resulted in some industrial operations and processes being disrupted which created an opportunity to implement energy efficiency measures.

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1     **B.       2023 DSM Plan and Proposed Expenditures**

2     **7.       Reference:   Exhibit B-1 Application p.20**

3                     **DSM Guiding Principles**

4       On page 20 of the Application, FEI states:

5                     “FEI’s DSM guiding principles are listed below.

6                     3 1. Programs will have a goal of being universal, offering access to energy  
7                     efficiency and conservation for all residential, commercial and industrial  
8                     customers, including low income customers.

9                     2. C&EM expenditures will have a goal of incentive costs exceeding 50 percent of  
10                    the expenditures in a given year.

11                    3. C&EM expenditure schedule plans and results will be analyzed on a program,  
12                    sector and portfolio level basis, with acceptance based at the portfolio level.

13                    4. The combined Total Resource Benefit/Cost, including the Modified Total  
14                    Resource Benefit/Cost where applicable, of the Portfolio will have a ratio of 1 or  
15                    higher.

16                    5. FEI will submit its annual DSM Report to the BCUC, by the end of the first quarter  
17                    of each year that details the results of the previous year’s activity.

18                    6. The DSM Plan will be compliant with the applicable sections of the UCA and the  
19                    Clean Energy Act, and with the DSM Regulation as amended from time to time.

20                    7. FEI will seek collaboration for programs from other parties, such as  
21                    governments, other utilities, and equipment suppliers and manufacturers in  
22                    recognition of the broader societal benefits resulting from successful program  
23                    development and implementation.

24                    8. Conservation Education and Outreach will be an integral part of FEI’s DSM  
25                    activities.

26                    9. DSM expenditure schedules will be multi-year so as to create the funding  
27                    certainty necessary to support effective implementation in the marketplace.<sup>11</sup>.

28                    10. Programs will support market transformation by incenting efficient measures  
29                    through customers and/or trade allies (contractors, equipment manufacturers,  
30                    distributors, retailers, etc.), developing trade ally capacity, and supporting codes  
31                    and standards development and implementation.

32                    11. FEI will retain a DSM stakeholder group (EECAG), comprised of government,  
33                    industry, trades, manufacturers, non-governmental organizations, advocacy

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groups, other utilities and customers to provide it with strategic advice. Additionally, FEI will undertake program area specific stakeholder consultation(s) on effective program design and implementation.”

7.1 For each guiding principle, confirm whether the BCUC has endorsed or otherwise accepted the principle and provide a reference to that endorsement.

**Response:**

FEI’s current DSM Guiding Principles have been in place since FEI’s 2014-2019 Performance Based Ratemaking Plan (2014-19 PBR Plan). FEI has not explicitly requested acceptance of its Guiding Principles from the BCUC, nor has the BCUC explicitly endorsed or accepted them. However, the DSM plans that are an outcome of the DSM Guiding Principles have been consistently approved by the BCUC.

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1     **C.     Cost-Effectiveness**

2     **8.     Reference:   Exhibit B-1 Application pp.7,24**  
3                                 **RIM Test and Ratepayer Impacts**

4             On page 24 of the Application, FEI states:

5                     “While the TRC and mTRC continue to be the governing tests that FEI uses to  
6                     determine the cost-effectiveness of its DSM Plan on a portfolio basis, the Company  
7                     has also historically reported and considered a range of other industry standard  
8                     cost-effectiveness tests, including the Ratepayer Impact Measure (RIM)<sup>17</sup>, the  
9                     Utility Cost Test (UCT)<sup>18</sup> and the Participant Cost Test (PCT)<sup>19</sup> applied at the  
10                    program, program area, and portfolio levels...Although the 2023 DSM Plan does  
11                    not pass the RIM test, the BCUC may not determine that a proposed DSM measure  
12                    is not cost effective based on the result of the RIM test.”

13            8.1     Explain whether and how the results of the Ratepayer Impact Measure test affect  
14                    the design of FEI’s DSM portfolio at the measure, program, or portfolio.

15  
16     **Response:**

17     The Ratepayer Impact Measure test does affect the design of FEI’s DSM portfolio.

18     FEI’s DSM portfolio supports cost-effective DSM measures with investments in programming that  
19     optimize DSM measure adoption to align with provincial government policy. While FEI does not  
20     consider the Rate Impact Measure test on an individual measure or program basis, rate impacts  
21     are calculated once total DSM Plan expenditures are drafted and FEI considers their impact to  
22     customers.

23  
24

25             On page 7 of the Application, FEI states:

26                     “In considering whether a demand-side measure expenditure schedule put forward  
27                     by a public utility other than BC Hydro and Power Authority (BC Hydro) is in the  
28                     public interest, the BCUC must consider the following criteria according to section  
29                     44.2(5):

30                     ...

- 31                     •   the interests of persons in British Columbia who receive or may receive service
- 32                     from the public utility.”

33            8.2     Explain whether and how FEI has taken the rate impacts of its DSM portfolio into  
34                    account in the design of its DSM portfolio. Please respond with specific references  
35                    to DSM program participants and non-participants.





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1

2 **Response:**

3 Please refer to the response to RCIA IR1 8.1.

4

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1     **9.       Reference:   Exhibit B-1 Application pp.21-25**

2                             **Impacts of DSM on Rates**

3             At the above-noted location FEI outlines the cost-effectiveness of its proposed DSM plan.  
4             At page 21 of the Application, FEI states:

5                     “FEI’s proposed DSM portfolio for 2023 is cost effective, with a Portfolio  
6                     (TRC/MTRC hybrid) cost effectiveness result of 1.4, based on the methodology set  
7                     out in section 4 of the DSM Regulation. FEI submits that the current approach to  
8                     determining the cost-effectiveness of its DSM programs is comprehensive,  
9                     benefits customers and should be used for 2023.”

10            9.1     Please explain the methodology for how DSM costs are allocated to FEI’s  
11               customer classes.

12  
13     **Response:**

14     Each year, as part of FEI’s Annual Review for Delivery Rates application, FEI includes the forecast  
15     annual cost of its DSM program as part of the utility’s overall revenue requirement. As such, the  
16     cost of the DSM program forms part of the overall rate change that is applied to all FEI’s non-  
17     bypass customers.

18     Further, when FEI prepares a Cost of Service Allocation (COSA) study, FEI allocates DSM costs  
19     based on DSM expenditures taken-up by customer classes and the energy volume delivered to  
20     a rate schedule within that customer class for determination of FEI’s Revenue to Cost (R/C) ratios.

21     As part of this COSA study, FEI first allocates between the Residential, Commercial and Industrial  
22     customer classes based on the DSM expenditures taken-up by those classes of customers  
23     (primary allocation), then uses the energy delivered to each of its rate schedules (secondary  
24     allocation) within the aforementioned customer classes to further allocate costs. Allocating DSM  
25     costs in this manner ensures that the revenue being collected from those rate schedules is  
26     sufficient to cover the DSM (and all other) costs which have been allocated to (caused by) the  
27     rate schedule.

28     In the table below FEI sets out the allocation made in its last COSA study filed with its 2016 Rate  
29     Design application.

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1

**Table 1: DSM Cost Allocation 2016 COSA Study**

Rate Schedule	Class	Primary Allocation Based on Expenditures	Secondary Allocation based on Volume	Final DSM Cost Allocation
1	Residential	57%	100.0%	57.0%
2	Commercial	40%	50.8%	20.3%
3			32.9%	13.2%
23			16.3%	6.5%
4	Industrial	3%	0.6%	0.0%
5			9.6%	0.3%
25			59.9%	1.8%
6			0.2%	0.0%
7			0.7%	0.0%
27			29.0%	0.9%
Total				100.0%

2

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9.2 Provide the one-time rate impact to residential customers that would result from approval and implementation of the 2023 DSM Plan.

7

8

9

**Response:**

10 Please refer to the response to BCOAPO IR1 9.4.

11

12

13

14

9.3 Provide the expected total annual bill savings that residential customers will realize if they implement the measures in the 2023 DSM Plan as forecasted.

15

16

17

**Response:**

18 Please refer to the response to CEC IR1 10.1.

19

20

21

22

9.4 Provide the incremental revenue requirement that will be allocated to residential customers assuming the 2023 DSM is implemented as forecasted.

23

24

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1    **Response:**

2    Please refer to the response to BCOAPO IR1 9.4.

3

4

5

6           9.5    Provide the average per-customer bill savings for residential participants according  
7                   to the participation forecasts in the 2023 DSM Plan, as well as the per-customer  
8                   additional annual bill impact for non-participants (i.e. those residential customers  
9                   that do not participate in any DSM program in

10

11   **Response:**

12   Please refer to the response to CEC IR1 10.1 for the average per-customer bill savings for  
13   residential participants as compared to non-participants according to the participation forecasts  
14   in the 2023 DSM Plan.

15   Please refer to the response to BCOAPO IR1 9.4 for the annual rate and bill impacts for a typical  
16   residential customer of the additional 2023 DSM spending.

17

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**10. Reference: Exhibit B-1 Application p. ; Exhibit A-3 BCUC IR1 3.2**

**Modified Total Resource Cost Test**

In IR1 3.2, the BCUC requests:

“Please indicate the measures in each program area that would remain cost effective and those that would not be cost effective when using the alternative ZEEA values for the calculation of the mTRC.”

In IR1 3.3, the BCUC requests:

“Please provide an overall analysis of the effects on the cost-effective program areas and the overall portfolio of using alternative ZEEA values.”

10.1 Please provide the overall portfolio cost effectiveness TRC and MTRC reflecting the alternative ZEEA values.

**Response:**

FEI provides the results of the requested cost-effectiveness analysis in the table below. Please refer to FEI’s response to BCUC IR1 3.4 regarding the appropriate ZEEA value for this Application.

	Current ZEEA of \$106/MWh	Alt. ZEEA of \$65/MWh	Alt. ZEEA of \$54/MWh
Portfolio Blended TRC*	1.4	1.0	0.9
Portfolio TRC	0.7	0.7	0.7
Portfolio MTRC **	3.3	2.0	1.7

**Notes to Table:**

\* Portfolio Blended TRC rate is calculated using TRC values for programs that pass the TRC and MTRC values for programs that use the MTRC cap. In this plan, two programs use the MTRC cap, the Home Renovation Program and New Home Program.

\*\* Portfolio MTRC rate is calculated using MTRC values for all programs and the overall portfolio.

10.2 Please confirm whether the MTRC cap is exceeded and by how much using the alternative ZEEA values.

**Response:**

The MTRC cap is not exceeded when using either of the alternative ZEEA values. Lowering the ZEEA value does not change the cost-effectiveness of programs that are currently cost-effective

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1 under the TRC, and so does not cause programs to require the use of the MTRC and contribute  
2 to the MTRC cap.

3 Changing ZEEA values only impacts the MTRC cost-effectiveness of Residential, Commercial,  
4 or Industrial Program Areas and, to a lesser extent, impacts the cost-effectiveness of the Low  
5 Income Program Area under the TRC. Please refer to the response to BCUC IR1 3.1.

6

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**D. Additional Approvals**

**11. Reference: Exhibit B-1 Application p.29**

**Approval to Transfer Funds**

On page 29 of its Application, FEI states:

“Remove the requirement for approval of transferred funds into a program area: FEI is proposing that only the transfer of funds greater than 25 percent out of a program area should be required. This change ensures that the limits on the amount any one program area can lose funding are still in place but eliminates the limits on how much one program area can gain. FEI submits that the greater concern in executing the portfolio is ensuring that no program area is reduced significantly to the benefit of another program area. FEI would still report on transfers into and out of program areas in its annual reporting to the BCUC.”

- 11.1 Confirm whether the transfer of funds from one program to another could affect the cost effectiveness of the portfolio, if funds are shifted from a program with higher cost effectiveness to a program with lower cost effectiveness.

**Response:**

Confirmed. For example, if increased expenditures occur as a result of higher than anticipated participation in a higher cost-effectiveness program area, using available budget from a program area that has a lower cost-effectiveness will increase the overall portfolio cost-effectiveness. The reverse is also true. For either funding transfer scenario, FEI would still need to meet the portfolio cost effectiveness requirements described in Section 5 of the Application.

- 11.2 Explain any concerns that FEI would have if the BCUC eliminated the requirement for approval of a transfer of more than 25% into a program's budget without prior approval, so long as the program receiving the increased funds is at least as cost effective as the program where the funds are being transferred from.

**Response:**

FEI does not believe that the cost-effectiveness of a program is a useful condition of a funding transfer. As explained in the response to BCUC IR1 15.2, FEI will only transfer funds out of a program area if those funds are not needed in that program area due to lower than forecast activity and those funds could be appropriately used in another program area in that year. Adding a requirement to only transfer budget from a program area with lower cost-effectiveness to a program area with higher cost-effectiveness would not address the goal of meeting market demand in programs with lower cost effectiveness without a supplemental expenditure application

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1 being required. Finally, FEI notes that it monitors cost-effectiveness throughout the year by  
2 reviewing expenditures and savings across the portfolio, ensuring that FEI maintains cost-  
3 effectiveness at the portfolio level.

4  
5  
6  
7 11.2.1 Provide possible reasons why FEI would transfer funds from a more cost-  
8 effective program to a less cost-effective program.

9  
10 **Response:**

11 FEI would transfer funds from a more cost-effective program to a less cost-effective program if  
12 the more cost-effective program was experiencing lower than forecast market demand, while the  
13 less cost-effective program was experiencing higher than forecast market demand, assuming  
14 each program area continued to meet the cost-effectiveness requirements of the DSM Regulation.



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**12. Reference: Exhibit B-1 Application p.29**

**Transferring Funds Into and Out of Innovative Technologies**

On page 30 of its Application, FEI states:

“Including Innovative Technologies within the Funding Transfer Rules will allow FEI the same flexibility it currently has for the rest of its program areas to respond to changes in the market within 25 percent of the overall approved budget.”

On page 55 of Appendix A – FEI 2023 DSM Plan, Posterity Group states:

“Furthermore, due to the preliminary and investigative nature of Innovative Technologies, it is challenging to effectively forecast energy savings from related pilot studies.”

12.1 Confirm whether transferring funds into the Innovative Technologies program means transferring funds out of a program that is projected to have energy savings.

12.1.1 If confirmed, further confirm whether such a transfer could or would negatively affect the cost effectiveness of the portfolio.

**Response:**

For clarity, the Innovative Technologies Program Area incurs and reports material energy savings. As stated in Section 8 of the 2023 DSM Plan (Appendix A of the Application), due to the preliminary and investigative nature of Innovative Technologies, it is challenging to effectively forecast energy savings from related pilot studies. As such, projected savings from the Innovative Technologies Program Area have not been included in the 2023 DSM Plan; however, when results become available, any material energy savings will be reported as part of FEI's DSM Annual Reports.

With that clarification, FEI confirms the statement above. Transferring funds into the Innovative Technologies Program Area may require transferring funds out of a program area that is projected to have energy savings. While the overall cost-effectiveness of the portfolio may be reduced as a result of such a transfer, as explained in the response to BCUC IR1 15.2, FEI will only transfer funds out of a program area if: (1) those funds are not needed in that program area due to lower than forecast activity; and (2) those funds could be appropriately used in another program area in that year. Moreover, FEI would also not make a transfer if the transfer resulted in the portfolio no longer being cost-effective, as described in Section 5 of the Application.

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1    **13.    Reference:    Exhibit B-1 Application p.29**

2                                    **Total Portfolio Variance Allowance**

3                    On page 30 of its Application, FEI states:

4                    “Therefore, FEI is requesting the following variance allowance rule be in place for  
5                    its 2023 DSM Plan:

6                                    FEI is permitted to exceed total accepted expenditures in the final year of  
7                                    a DSM expenditure schedule by no more than five percent without prior  
8                                    approval from the BCUC.”

9                    13.1    Explain the current rule that addresses variances between approved and actual  
10                    spending in a given year under an approved DSM plan.

11                    13.1.1    Are variances carried forward into the next year of a multi-year plan, with  
12                    the exception of the final year of the multi-year plan?

13

14    **Response:**

15    In the case of a variance below plan, under the 2019-22 DSM Plan, FEI is permitted to carryover  
16    unspent DSM expenditures in a program area to the following year, except in the case of the final  
17    year of the 2019-22 DSM Plan (i.e., any unspent expenditures in the year 2022 cannot be carried  
18    over to the next DSM Plan year of 2023).

19    There are currently no rules with respect to a variance above plan and FEI would be required to  
20    request approval from the BCUC to carryover an overspend in a program area to the following  
21    year, or in the case of the final year of the DSM Plan (2022), to request acceptance of additional  
22    DSM budget to address the over-expenditure.

23

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## E. Appendix A - 2023 DSM Plan

### 14. Reference: Exhibit B-1 Application Appendix A p.7; Application pp.17,18 Changes Between 2022 and 2023 DSM Expenditures Plans

At the above-noted location FEI provided Exhibit 4:

Exhibit 4 – Portfolio Natural Gas Savings and Cost-Effectiveness by Program Area

Program Area	Incremental Annual Gas Savings, Net (GJ)	NPV Gas Savings, Net (GJ)	TRC	MTRC	UCT	PCT	RIM
Residential	250,319	3,096,575	0.4	1.6	0.5	1.2	0.3
Commercial	563,816	5,881,225	1.2	5.4	1.6	2.1	0.7
Industrial	628,423	4,658,207	2.8	14.2	4.7	3.5	1.0
Low Income	77,408	797,369	2.1 <sup>3</sup>		0.4	2.2	0.3
Conservation Education and Outreach	81,420 <sup>4</sup>						
Enabling Activities		Savings Not Estimated					
Innovative Technologies		Savings Not Estimated					
Portfolio Level Activities		Savings Not Estimated					
<b>Total</b>	<b>1,601,386</b>	<b>14,433,377</b>	<b>0.7</b>	<b>3.3</b>	<b>0.7</b>	<b>2.0</b>	<b>0.4</b>

In the Application on pages 17 and 18, FEI explains the reasons for the changes in expenditures between the 2022 and 2023 DSM Expenditure Plans.

14.1 Provide a table showing the TRC, MTRC, UCT, PCT, RIM, and cost of conserved energy by program area for 2022 and 2023.

#### **Response:**

FEI provides the requested table below. Please note that the cost of conserved energy (CCE) in the table is shown for the overall 2021-2022 DSM portfolio (planned). The calculation of the CCE requires the NPV of Natural Gas Savings which the applications that were filed with the BCUC on March 19, 2021, and July 2, 2021, for acceptance of updated DSM expenditure budgets in 2021 and 2022 do not present for individual years. Therefore, FEI used the 2021-2022 planned total NPV to calculate the average CCE.

Further, FEI has not included the Conservation Education and Outreach, Innovative Technologies, Enabling Activities, and Portfolio Level activities in the table as these program areas do not report on cost-effectiveness.

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Program Area	TRC		MTRC		UCT		PCT		RIM		CCE (\$/GJ)	
	2022	2023	2022	2023	2022	2023	2022	2023	2022	2023	2021/ 2022	2023
	Plan	Plan	Plan	Plan	Plan	Plan	Plan	Plan	Plan	Plan	Plan	Plan
Residential	0.4	0.4	1.5	1.6	0.6	0.5	1.5	1.2	0.3	0.3	\$13.2	\$14.2
Commercial	1.2	1.2	1.9	5.4	1.6	1.6	1.9	2.1	0.6	0.7	\$3.9	\$4.5
Industrial	3.1	2.8	3.1	14.2	4.0	4.7	3.7	3.5	0.8	1.0	\$1.6	\$1.5
Low Income	3.1	2.1			0.4	0.4	2.5	2.2	0.2	0.3	\$16.6	\$16.6
<b>Total Portfolio</b>	<b>1.0</b>	<b>0.7</b>	<b>1.5</b>	<b>3.3</b>	<b>1.0</b>	<b>0.7</b>	<b>2.3</b>	<b>2.0</b>	<b>0.4</b>	<b>0.4</b>	<b>\$7.7</b>	<b>\$10.0</b>

14.1.1 Explain the reasons for any significant changes in the cost-effectiveness metrics between 2022 and 2023.

**Response:**

For clarity, cost-effectiveness metrics are similar between 2022 and 2023 at the portfolio level.

The most significant change between 2022 and 2023 is the ratio of program expenditures in the 2023 DSM Plan that have historically not forecast energy savings (i.e., Conservation Education Outreach, Enabling Activities, Innovative Technologies). The largest proportion of the expenditure increases versus historical expenditures in these areas are in support of the transition to advanced DSM. Please also refer to the response to RCIA IR1 5.1 for further details on comparison to historical cost-effectiveness.

14.2 Provide a table showing annual gas savings and NPV gas savings by program area for 2022 and 2023.

**Response:**

The requested values are provided in the below table. Please note the following:

- The 2022 annual gas savings and NPV gas savings are updated as per the applications filed by FEI with the BCUC for acceptance of updated DSM expenditure budgets for the Commercial, Industrial, Innovative Technologies, Residential, and Low Income Program

Areas on March 19, 2021, and July 2, 2021.<sup>2</sup> These sources have been identified and colour coded in the below table.

- Planned NPV values are calculated over the plan period which is typically greater than one year in length. In the below table the 2022 DSM Plan cost-effective values include both 2021 and 2022.

Program Area	Incremental Annual Gas Savings, Net (GJ)		NPV Net (GJ)	
	2022	2023	2021 - 2022	2023
	Plan*	Plan	Plan*	Plan
Residential	238,323	250,319	6,415,000	3,096,575
Commercial	381,421	563,816	10,447,427	5,881,225
Industrial	466,317	628,423	10,253,212	4,658,207
Low Income	64,128	77,408	1,279,659	797,369
<b>Programs Sub-Total</b>	<b>1,150,189</b>	<b>1,519,966</b>	<b>28,395,298</b>	<b>14,433,376</b>
Conservation Education and Outreach	-	81,420	-	-
Innovative Technologies	-	-	-	-
Enabling Activities	-	-	-	-
Portfolio Level Activities	-	-	-	-
<b>Programs Sub-Total</b>	<b>-</b>	<b>81,420</b>	<b>-</b>	<b>-</b>
<b>Total Portfolio</b>	<b>1,150,189</b>	<b>1,601,386</b>	<b>28,395,298</b>	<b>14,433,376</b>

\* Plan values are pursuant to:

Order G-301-21 Appendix D

Order G-135-21 Appendix C

9

14.2.1 Explain the reasons for any significant changes in the savings between 2022 and 2023.

### **Response:**

Please refer to the response to BCOAPO IR1 2.3.

<sup>2</sup> FEI's Application for Updated DSM Expenditures for 2021 and 2022 for the Commercial, Industrial and Innovative Technologies Program Areas was filed March 19, 2021 and approved on May 5, 2021 pursuant to BCUC Order G-135-21. FEI's Application for Updated DSM Expenditures for 2021 and 2022 for the Residential and Low Income Program Areas was filed July 7, 2021 and approved on October 21, 2021 pursuant to BCUC Order G-301-21.

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**15. Reference: Exhibit B-1 Application Appendix A p.1**

**Measures Included in the DSM Plan**

On page 1 of the 2023 DSM Plan, Posterity Group states:

“Many of the programs in this DSM plan are part of FEI’s existing DSM portfolio previously accepted in the 2019 – 2022 DSM Expenditure Plan and subsequent applications for updated and additional DSM expenditures for 2021 to 2022. The activities and measures within some of the programs have been updated, and several new initiatives have been added within the approved program areas. The updates reflect FEI’s on-going efforts to respond to changing market conditions and to integrate operational lessons learned from current implementation activities.”

15.1 Provide a list of measures that FEI and Posterity Group contemplated or analyzed for inclusion in the 2023 DSM Plan and briefly explain why each measure was rejected.

**Response:**

In the table below, FEI provides the measures that were identified in the Conservation Potential Review (CPR) and considered, but not included, in the 2023 DSM Plan.

Program Area	Measure	Rational
Residential	Pipe Wrap	This measure is to be considered for next plan period. Additional time is needed to design an offer on these measures under the Home Renovation Rebate Program Area.
Residential	Fireplace Timers	This measure is to be considered for next plan period. Additional time is needed to design an offer on these measures under the Home Renovation Rebate Program Area.
Commercial	ENERGYSTAR® Dishwashers	This measure was not included in the DSM Plan due to limited applicability.
Commercial	Boiler or Furnace Tune-Up	This measure was not rejected, but is to be further considered. Additional program development is needed.
Commercial	Window Film	This measure was not rejected, but is to be further considered. FortisBC has focused on window replacements as a part of deep retrofits.
Commercial	Direct Vented Fireplace	This measure was not included in the DSM Plan due to limited applicability as it is a harder to install measure.
Commercial	Strip Curtains	This measure was not included in the DSM Plan due to limited applicability.
Commercial	Air Sealing	This measure is to be considered as part of a bundle of measures within a Deep Retrofit.

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Program Area	Measure	Rational
Industrial	Combustion Testing	This measure was not rejected, but is to be further considered. Additional program development is needed.
Industrial	Boiler Tune-up	This measure was not rejected, but is to be further considered. Additional program development is needed.
Industrial	HVAC Boiler Tune Up	This measure was not rejected, but is to be further considered. Additional program development is needed.

15.2 Provide a table listing all measures, organized by program and program area, showing the annual gas savings, GHG emissions reductions, measure life, persistence, NPV gas savings, and NPV emissions reductions.

**Response:**

The following table provides savings and emissions reductions for the measures included in the 2023 DSM Plan. Total plan savings/emissions reductions per measure are provided (per unit savings x number of installed units).

Measure	Measure Life or Persistence (Years)	Annual Gas Savings, Net (GJ/yr.)	NPV Gas Savings (GJ)	GHG Emissions Reduction (tCO <sub>2</sub> e/yr.)	NPV Emissions Reduction (tCO <sub>2</sub> e)
<b>RESIDENTIAL</b>					
<b><i>Home Renovation</i></b>					
Furnace	18	38,651	465,897	1,994	24,040
Communicating Thermostat	12	6,669	60,431	344	3,118
Communicating Thermostat – Retail	12	6,240	56,544	322	2,918
Boiler	18	1,581	19,058	82	983
Combination System	20	2,530	32,593	131	1,682
EnerChoice Fireplace	15	20,313	216,512	1,048	11,172
Condensing Storage Tank Water Heater	13	798	7,674	41	396
Condensing Tankless Water Heater	20	66,194	852,900	3,416	44,010
Attic Insulation	30	13,965	224,552	721	11,587
Wall Insulation	30	4,931	79,288	254	4,091
Crawlspace and Basement Insulation	30	1,357	21,824	70	1,126
Other Insulation	30	838	13,480	43	696
Drain Water Heat Recovery	25	414	6,075	21	313

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Measure	Measure Life or Persistence (Years)	Annual Gas Savings, Net (GJ/yr.)	NPV Gas Savings (GJ)	GHG Emissions Reduction (tCO <sub>2</sub> e/yr.)	NPV Emissions Reduction (tCO <sub>2</sub> e)
Bonus Offers	1	0	0	0	0
Appliance Maintenance	1	0	0	0	0
Air Sealing - Contractor Incentive	15	32,905	350,727	1,698	18,098
Draftproofing - Door Sweeps and Frame Kits	6	176	905	9	47
Draftproofing - Caulking, Foam, Tapes, Foam Rope	6	520	2,673	27	138
EnergyStar Washer (\$25)	14	240	2,436	12	126
EnergyStar Dryer	12	7	63	0	3
Showerheads and Aerators	10	8,797	69,233	454	3,572
High Performance Windows and Doors	18	3,168	38,187	163	1,970
<b>New Home</b>					
STEP 2 (Single Family Dwelling)	30	1,440	23,160	74	1,195
STEP 2 (Townhome/Rowhome)	30	366	5,889	19	304
STEP 3 (Single Family Dwelling)	30	9,242	148,613	477	7,668
STEP 3 (Townhome/Rowhome)	30	5,108	82,144	264	4,239
STEP 4 (Single Family Dwelling)	30	3,112	50,039	161	2,582
STEP 4 (Townhome/Rowhome)	30	2,246	36,117	116	1,864
STEP 5 (Single Family Dwelling)	30	1,526	24,545	79	1,267
STEP 5 (Townhome/Rowhome)	30	286	4,602	15	237
Condensing Storage Tank Water Heater	13	997	9,593	51	495
Condensing Tankless Water Heater	20	9,907	127,645	511	6,586
Combination Systems	18	2,108	25,410	109	1,311
Drain Water Heat Recovery	30	96	1,544	5	80
EnerChoice Fireplace	15	2,288	24,382	118	1,258
Communicating Thermostat	12	1,268	11,485	65	593
ENERGY STAR Dryers	14	35	355	2	18
<b>COMMERCIAL</b>					
<b>Prescriptive</b>					
Condensing Boiler Heating Plant Optimization	20	99,090	1,276,758	5,113	65,881
Domestic Water Heater System Optimization	20	5,592	72,052	289	3,718
Condensing Volume Boiler	15	4,045	43,115	209	2,225
Condensing Tankless Water Heater	17	4,278	49,667	221	2,563
Food Services Efficiency Measures	20	72,000	927,708	3,715	47,870
Low Flow Spray Valves	12	640	5,796	33	299
Condensing Make Up Air Unit	18	5,225	62,983	270	3,250



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Measure	Measure Life or Persistence (Years)	Annual Gas Savings, Net (GJ/yr.)	NPV Gas Savings (GJ)	GHG Emissions Reduction (tCO <sub>2</sub> e/yr.)	NPV Emissions Reduction (tCO <sub>2</sub> e)
Furnace	18	483	5,822	25	300
HVAC Controls - Kitchen DCV	8	5,567	36,555	287	1,886
Condensing Unit Heaters	18	595	77,175	31	370
Vortex DeAerators	18	4,950	59,668	255	3,079
Gas Underfired Broilers	12	3,972	35,995	205	1,857
Air Curtains	15	1,808	19,272	93	994
Pipe and Tank Insulation	11	1,640	13,906	85	718
Steam Boilers	20	9,865	127,104	509	6,559
Hybrid Systems	13	4,000	38,472	206	1,985
Gas Heat Pump	15	20,080	214,028	1,036	11,044
Connected Thermostats	15	32	341	2	18
Boiler Additives	5	31,775	139,065	1,640	7,176
<b>Performance - Existing Buildings</b>					
Studies - Retrofit	1	0	0	0	0
Capital Upgrades - Retrofit	15	156,288	1,665,840	8,064	85,957
Recommissioning (Studies & O&M)	6	53,280	273,839	2,749	14,130
Commercial Energy Assessments	1	975	932	50	48
<b>Performance - New Construction</b>					
Step Code - Whole Building	17	17,280	200,617	892	10,352
Non Step Code - Whole Building	17	17,280	200,617	892	10,352
Early Engagement	-	0	0	0	0
Small Commercial New Construction	17	1,249	14,501	64	748
Step Code Capacity Building - Charettes	-	0	0	0	0
<b>Residential Apartment and Hospitality Program (RAP)</b>					
RAP - Energy Assessments (Common Area)	1	13,930	13,316	719	687
RAP - Implementation Support Partial (Common Area)	1	0	0	0	0
RAP - Implementation Support Full (Common Area)	1	0	0	0	0
RAP - Condensing Boilers (Common Area)	20	4,637	59,748	239	3,083
RAP - Water Heaters (Common Area)	12	900	8,155	46	421
RAP - Recirculation Controls (Common Area)	15	3,120	33,255	161	1,716
1.5GPM Showerheads (Gas) (Unit)	25	7,826	114,743	404	5,921
1.5GPM Handheld Showerhead (Gas) (Unit)	25	2,049	30,039	106	1,550
1.5GPM Bathroom Aerators (Gas) (Unit)	25	4,388	64,336	226	3,320

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Measure	Measure Life or Persistence (Years)	Annual Gas Savings, Net (GJ/yr.)	NPV Gas Savings (GJ)	GHG Emissions Reduction (tCO <sub>2</sub> e/yr.)	NPV Emissions Reduction (tCO <sub>2</sub> e)
1.5GPM Kitchen Aerators (Gas) (Unit)	25	4,978	72,980	257	3,766
<b>INDUSTRIAL</b>					
<b>Prescriptive</b>					
Process Boiler (Hot Water and Steam)	20	11,218	144,537	579	7,458
Air Curtains - Small Door	15	0	0	0	0
Air Curtains - Medium Door	15	0	0	0	0
Air Curtains - Large Door	15	1,794	19,117	93	986
Direct Contact Water Heater	20	153	1,965	8	101
Steam Traps Survey	-	0	0	0	0
Steam Traps Replacement	6	4,729	24,306	244	1,254
1" insulation 0.5-1" HW pipe	11	662	5,610	34	289
1" insulation ≥ 1" HW pipe	11	1,283	10,880	66	561
1" insulation 0.5-1" LPS pipe	11	1,978	16,773	102	866
1" insulation ≥ 1" LPS pipe	11	3,849	32,640	199	1,684
1" insulation 0.5-1" HPS pipe	11	3,448	29,240	178	1,509
1" insulation ≥ 1" HPS pipe	11	6,683	56,667	345	2,924
Tank Insulation 1" Low Temp	11	35,744	303,080	1,844	15,639
Tank Insulation 1" High Temp	11	63,280	536,564	3,265	27,687
Tank Insulation 2" High Temp	11	61,162	518,604	3,156	26,760
Other Prescriptive Measures	10	40,455	318,382	2,087	16,429
Thermal curtains	10	103,660	815,814	5,349	42,096
Single Stage Infrared Heater	17	246	2,856	13	147
Two Stage Infrared Heater	17	4,920	57,120	254	2,947
Condensing Infrared Heater	18	6,560	79,075	338	4,080
<b>Performance</b>					
Technology Implementation	10	135,800	1,068,759	7,007	55,148
Feasibility Study	10			0	0
Plant Wide Audit	10			0	0
<b>Strategic Energy Management (SEM)</b>					
Individual, Large Customer	5	128,000	560,199	6,605	28,906
Cohort, Medium Customers	5	12,800	56,020	660	2,891
<b>LOW INCOME</b>					
<b>Self-Install</b>					
Energy Savings Kit	9	25,920	187,477	1,337	9,674
Re-engagement Kit	1	1,200	1,147	62	59

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Measure	Measure Life or Persistence (Years)	Annual Gas Savings, Net (GJ/yr.)	NPV Gas Savings (GJ)	GHG Emissions Reduction (tCO2e/yr.)	NPV Emissions Reduction (tCO2e)
<b>Direct Install</b>					
Energy Conservation Assistance	15	15,620	166,490	806	8,591
<b>Prescriptive</b>					
Furnace	18	2,322	27,990	120	1,444
Boiler	18	220	2,652	11	137
Communicating Thermostat	12	247	2,238	13	115
Condensing Tankless Water Heater	20	2,098	27,027	108	1,395
Condensing Storage Tank Water Heater	13	17	163	1	8
Two Upgrade Bonus	-	0	0	0	0
Attic Insulation	30	435	6,995	22	361
Wall Insulation	30	227	3,644	12	188
Ventilation	-	0	0	0	0
Crawlspace and Basement Insulation	30	42	682	2	35
Other Insulation	30	26	425	1	22
EnerChoice Fireplace	15	163	1,735	8	90
Combination System	18	134	1,615	7	83
Appliance Maintenance	-	0	0	0	0
Commercial - Non-profit bundled measures	20	19,965	257,246	1,030	13,274
Commercial - Condensing Volume Boiler	20	5,389	69,436	278	3,583
Commercial - Condensing Tankless Water Heater	17	1,162	13,493	60	696
Commercial - Gas Heat Pump	15	1,177	12,546	61	647
Commercial - Furnace	18	138	1,663	7	86
Windows & Doors Tier 1	25	7	99	0	5
Windows & Doors Tier 2	25	9	132	0	7
Health & Safety	-			0	0
<b>Performance</b>					
Commercial - Small Commercial New Construction (SCNC)	17	260	3,019	13	156
STEP 2 (Single Family Dwelling)	30	12	198	1	10
STEP 2 (Townhome/Rowhome)	30	19	306	1	16
STEP 3 (Single Family Dwelling)	30	88	1,423	5	73
STEP 3 (Townhome/Rowhome)	30	90	1,452	5	75
STEP 4 (Single Family Dwelling)	30	105	1,685	5	87
STEP 4 (Townhome/Rowhome)	30	83	1,338	4	69

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Measure	Measure Life or Persistence (Years)	Annual Gas Savings, Net (GJ/yr.)	NPV Gas Savings (GJ)	GHG Emissions Reduction (tCO <sub>2</sub> e/yr.)	NPV Emissions Reduction (tCO <sub>2</sub> e)
STEP 5 (Single Family Dwelling)	30	127	2,045	7	106
Bundled residential new home measures	13	105	1,007	5	52

15.3 Does FEI favour measures with longer lives over measures with shorter lives? Explain why or why not.

**Response:**

FEI does not favour measures with longer lives over measures with shorter lives. Measure selection is primarily driven by: (1) the Conservation Potential Review; (2) cost-effectiveness; (3) barriers to adoption; (4) commercial availability; (5) market readiness; and (6) market size. As such, a measure life has little influence over these other factors and thus does not carry significant weight in terms of inclusion in the DSM Plan.

15.4 Explain how measure life and persistence affect FEI's compliance with the DSM Regulation.

**Response:**

Measure life and persistence do not affect FEI's compliance with the DSM Regulation. The DSM Regulation does not indicate any requirements for measure life or persistence.

15.5 Explain how measure life and persistence affect FEI's achievement of the targets in the CleanBC Roadmap to 2030.

**Response:**

Currently, FEI takes a conservative approach for estimating energy savings and hence greenhouse gas reductions applicable to 2030 targets. For targets related to the year 2030, FEI only accounts for measures that will still be active in 2030. For persistency, FEI takes persistence

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- 1 of energy savings into account when calculating the average measure life. FEI does not account
- 2 for measures that exceed their estimated life. FEI assumes that measures are either replaced or
- 3 removed after the end of their life cycle.

4

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**16. Reference: Exhibit B-1 Application Appendix A pp.12,13,15,20**

**Measures With High Free Ridership**

In Exhibit 9, Posterity Group shows the free ridership associated with Furnaces as 31%, Boilers as 31%, Combination Systems as 32%, EnerChoice Fireplaces as 39%, and High Performance Windows and Doors as 34%.

In Exhibit 12, Posterity Group shows the free ridership associated with EnerChoice Fireplaces as 39% and Combination Systems as 32%.

In Exhibit 17, Posterity Group shows the free ridership associated with Condensing Tankless Water Heaters as 38%.

16.1 Confirm whether FEI has considered any changes to the program and measure designs in an effort to reduce high levels of free ridership.

16.1.1 If confirmed, explain whether these changes have been able to reduce the free ridership.

**Response:**

Confirmed. FEI considers the feedback and recommendations from program evaluations to improve different aspects of existing programs, including free ridership. These recommendations include, but are not limited to, changes to the: (1) measures offered; (2) program qualifying criteria; (3) timing in market; and (4) incentive levels. Other recommendations include collecting enough information from participants and market actors using qualitative and quantitative research methods to inform impact evaluations specific to free ridership and spillover and operating behaviors, and to support information collected at the program application stage.

FEI identifies and quantifies free rider and spillover on a program-by-program basis in its program evaluations. Free rider estimates are calculated using a series of questions that probe at the participants' purchasing motivations, upgrade efficiency level, and timing of the upgrade. Depending on the accuracy and consistency of the responses provided by the participants, the free ridership estimates can be positively or negatively impacted. Program changes alone may not directly reduce the free ridership as it is dependent on the combination of the participants' self-reported responses, the type of measure being incented, program area, timing of the program changes, and type of program changes.

For example, FEI has observed free ridership rates improving over time with furnaces in the Residential Home Renovation Program. However, it is difficult to determine the extent of improvement that can be attributable to changes from program evaluation versus other market effects.

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16.2 Confirm whether FEI has an upper limit of free ridership, above which the measure is not included in the program or portfolio.

16.2.1 If confirmed, provide the upper limit(s).

**Response:**

FEI is not aware of any industry guideline that identifies an upper limit value of free ridership that would be the deciding factor on whether a measure is excluded from the program. Similarly, FEI does not have its own deciding guideline. FEI applies free ridership and spillover values as inputs in its cost-effectiveness calculations, which may impact FEI's decision to implement a measure or program.

16.3 Explain why FEI includes the above-noted measures in the DSM Plan considering the high levels of free riders exceeding 30%.

**Response:**

FEI included the above-noted measures in the 2023 DSM Plan as they continue to be cost-effective. While a free ridership rate above 30 percent could be viewed as higher than other measures proposed, the result still implies that the majority of measure implementation decisions were as a result of FEI's DSM program influence.

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**17. Reference: Exhibit B-1 Application p.5; Appendix A Exhibits 17, 48, 65**

**Gas Heat Pumps**

On page 5 of the Application, FEI states:

This one-year DSM Plan includes activities that support the transition to advanced DSM programming such as deep retrofits, gas heat pumps and dual fuel hybrid heating systems.”

In Appendix A Exhibit 17, Posterity Group lists gas heat pumps under the Commercial Prescriptive Program with a forecast of 40 units.

In Appendix A Exhibit 48, Posterity Group lists gas heat pumps under the Low Income Prescriptive Program with a forecast of 7 units.

In Appendix A Exhibit 65, Posterity Group lists gas heat pumps as a pilot project under the Innovative Technologies area.

17.1 Explain why gas heat pumps are incorporated into FEI’s Commercial and Low Income program areas while FEI still intends to conduct pilot projects with gas heat pumps.

**Response:**

There are several manufacturers developing different types of gas heat pumps that vary in complexity, end use applications, thermal output and commercialization status. The Gas Absorption Heat Pump (GAHP) technology incorporated into FEI’s commercial and low income prescriptive programs (as described in the response to BCSEA IR1 9.1) is just one specific type of gas heat pump. However, information gaps still exist for other types of gas heat pumps. The gas heat pump pilots shown in Exhibit 65 in Appendix A to the Application refer to other technology types such as engine-driven vapor compression gas heat pumps, residential absorption and adsorption gas heat pumps, and thermal compression gas heat pumps.

17.2 Provide the TRC, MTRC, UCT, PCT, annual gas savings, NPV gas savings, and NPV costs for the Commercial Gas Heat Pump measure, the Low Income Gas Heat Pump measure, and for the pilot project gas heat pump measure.

**Response:**

At the time of filing this response, the measure assumptions that inform the TRC, MTRC, UCT, PCT, annual gas savings, NPV gas savings are available for the Commercial and Low Income Program Area but are not yet determined for pilot project gas heat pumps (listed in Appendix A,



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Exhibit 65) as they are not yet complete. Further, technologies evaluated through the Innovative Technologies Program Area are considered to be a specified demand-side measure, which means that these investments are only subject to the cost-benefit test at the DSM portfolio as a whole.

Below is a table providing the TRC, MTRC, UCT, PCT, annual gas savings, NPV gas savings, and planned expenditures for the Commercial and Low Income Gas Absorption Heat Pump measures. Please note that the NPV costs are unavailable as this is a one-year plan with expenditures happening during the first and only year. Based on the rationale that there are no expenditures beyond 2023 that can be discounted to get to a present value, the NPV of costs in this context is represented by planned expenditures.

The values for the Commercial and Low Income program areas were informed by industry data and from the Commercial Gas Absorption Heat Pump pilot project which were completed through the Innovative Technology Program Area – as varied to reflect different end use assumptions based on differing archetypes. Please note that the pilot project that was transitioned to those program areas is different than the Gas Absorption Heat Pump pilot projects planned in Appendix A, Exhibit 65 and is explained further in response to RCIA IR1 17.1.

Program Area	Annual Gas Savings (GJ)	NPV of Natural Gas Savings (GJ)	NPV of Natural Gas Savings (\$)	Planned Expenditures (\$)	TRC	MTRC	UCT	PCT
Commercial	502	214,028	1,525,667	1,165,043	0.4	1.9	1.3	0.8
Low Income	168	12,546	89,432	196,678	0.4	1.8	0.5	1.5

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**18. Reference: Exhibit B-1 Application p.5; Appendix A Exhibits 17, 65**

**Hybrid Heating Systems**

On page 5 of the Application, FEI states:

“This one-year DSM Plan includes activities that support the transition to advanced DSM programming such as deep retrofits, gas heat pumps and dual fuel hybrid heating systems.”

In Appendix A Exhibit 17, Posterity Group lists hybrid systems under the Commercial Prescriptive Program with a forecast of 10 units.

In Appendix A Exhibit 65, Posterity Group lists gas heat pumps as a pilot project under the Innovative Technologies area.

18.1 Explain why gas heat pumps are incorporated into FEI’s Commercial program area while FEI still intends to conduct pilot projects with hybrid systems.

**Response:**

Please note that the preamble and question refer to two separate measures, namely, gas heat pumps and hybrid systems, which are independent of one another. FEI addresses each in turn below.

First, with respect to gas heat pumps, in the response to RCIA IR1 17.1, FEI explains how one type of gas heat pump is included in the Commercial Program Area as a program, while another type of gas heat pump is included in the Innovative Technologies Program Area as a pilot project.

FEI’s assessment of a technology or a technology category from a pilot to a program depends on factors such as technology complexity and maturity, measurement of the energy savings, customer acceptance and any associated installation and maintenance challenges. If the information already exists to fill key information gaps, then FEI may decide to transition the technology into a program without first conducting a pilot project.

Second, with respect to hybrid heating systems, the level of information gaps varies between both a residential and a commercial application given the complexity of the building system design, controls and customer behavior. For residential homes, there are several information gaps that exist, and a pilot will be performed under the Innovative Technologies Program Area. For commercial applications, and more specifically hybrid dual fuel rooftop units (RTU), the information is available and the measure is included under FEI’s Commercial Prescriptive program.

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18.2 Provide the TRC, MTRC, UCT, PCT, annual gas savings, NPV gas savings, and NPV costs for the Commercial Hybrid Systems measure and for the pilot project Hybrid Heating measure.

**Response:**

Below is the table illustrating the TRC, MTRC, UCT, PCT, annual gas savings, NPV gas savings, and planned expenditures for the Commercial Hybrid Systems measure as referenced under the Commercial Prescriptive Program (see Appendix A, Exhibit 17).

The NPV costs are unavailable as this is a one-year plan with expenditures occurring during the first and only year. Based on the rationale that there are no expenditures beyond 2023 that can be discounted to get to a present value, the NPV of costs in this context is represented by the Planned Expenditures.

The measure assumptions for the Hybrid Systems measure are based on commercial hybrid dual fuel rooftop units (RTU) whereby industry data is readily available. This contrasts with the Hybrid Heating pilot projects intended to serve the residential market (see Appendix A, Exhibit 65). In particular, at the time of filing, the measure assumptions that inform the TRC, MTRC, UCT, PCT, annual gas savings, NPV gas savings are yet to be determined as the pilot projects are not yet completed. Please refer to the response to BCSEA IR1 13.3 where FEI summarizes some of the Hybrid Heating pilot project activities currently underway.

Finally, technologies evaluated through the Innovative Technologies Program Area are considered to be a specified demand-side measure, which means that Innovative Technologies program area investments are only subject to the cost-benefit test at the DSM portfolio as a whole.

Program Area	Annual Gas Savings (GJ)	NPV of Natural Gas Savings (GJ)	NPV of Natural Gas Savings (\$)	Planned Expenditures (\$)	TRC	MTRC	UCT	PCT
Commercial	500	38,472	271,088	96,261	0.7	3.0	2.8	1.1

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**19. Reference: Exhibit B-1 Application p.5; Appendix A Exhibit 65**

**Deep Retrofits**

On page 5 of the Application, FEI states:

“This one-year DSM Plan includes activities that support the transition to advanced DSM programming such as deep retrofits, gas heat pumps and dual fuel hybrid heating systems.”

19.1 Confirm whether the Deep Retrofit pilot project will pertain to residential or commercial buildings or both.

**Response:**

The Deep Retrofit pilot project is targeting both residential and commercial buildings. In particular, the pilot project is intended to recruit up to 20 residential buildings and approximately 4 commercial buildings to reduce building consumption and related GHG emissions by 50 percent or more.

19.2 Identify the technologies that would be considered in a deep retrofit of a residential building.

**Response:**

A deep retrofit looks at a residential building as a system and combines multiple energy conservation measures and technologies in a holistic approach with implementation support in order to achieve energy and GHG emission reductions of 50 percent or more. Although there may be other technologies identified via the pilot process, the primary technologies considered in a deep retrofit of a residential building include:

- High performance windows and doors to improve building envelope's thermal performance;
- Roof, wall, and floor thermal insulation to improve building envelope's thermal performance;
- Air sealing technologies to improve the building airtightness;
- High efficiency space and water heating systems including condensing tankless and storage tank water heaters and condensing furnaces and boilers;
- Smart learning controls for high efficiency space heating systems; and
- High efficiency Heat Recovery Ventilation systems (HRV).

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19.2.1 Are these technologies established and available to residential customers under existing DSM programs?

**Response:**

FEI's current residential programs include incentives for some of the measures noted in the response to RCIA IR1 19.2, with the exception of high efficiency heat recovery ventilation systems and air sealing.

It is important to note that even though some of those rebates are available for the retrofit of individual equipment or end-uses, none of them take the same comprehensive approach as a deep retrofit. In particular, while individual prescriptive measures continue to serve their purpose for equipment upgrades and smaller renovations, deeper retrofits integrate the design and implementation of a bundle of upgrades to improve the overall building performance to optimize energy savings and achieve GHG emission reductions of 50 percent or more. Research has shown that customers rarely undertake the comprehensive mechanical and building envelope retrofits necessary to attain deep energy savings due to barriers such as:

- Cost;
- Risk and liability;
- Permitting;
- Technology knowledge of building owners and trades;
- Project timing; and
- Impact on occupants.

FEI's experience shows that a pilot will provide information to FEI to better understand those barriers and help FEI to determine the viability of designing and offering a deep energy retrofit program for residential customers in the future. The pilot aims to gather the following information:

- Better understanding of the overall process for conducting a deep retrofit, such as points of intervention and integration of measures;
- Phasing of the assessments and detailed upfront design work;
- Identifying existing or innovative energy efficiency bundles across building archetypes, vintages and sector;
- Gauging project costs and energy savings for cost benefit calculations;
- Overseeing the construction phase;
- Assessing and mitigating risks associated with the construction such as asbestos removal and tenant safety;

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- Gauging the customer acceptance of deep retrofits;
- Identifying the specific educational gaps across stakeholders involved in the retrofit; and
- Determining building owner understanding of the energy savings opportunities and how to better communicate and support its adoption.

19.3 Explain whether the idea behind the Deep Retrofits pilot project is to convince homeowners or property owners to incorporate many of the existing and established technologies at the same time.

**Response:**

Please refer to the response to RCIA IR1 19.2.1.

19.4 Provide the TRC, MTRC, UCT, PCT, annual gas savings, NPV gas savings, and NPV costs for the Deep Retrofit pilot project. If there are both residential and commercial components of the Deep Retrofit pilot project, provide the requested metrics for each.

**Response:**

These values are yet to be determined for those measures being studied under Innovative Technologies Program Area pilot projects. These pilot projects are intended to assist in determining these measure assumptions as FEI proceeds through the different pilot phases. Both residential and commercial deep energy retrofit pilots are currently underway at the detailed design phase and will go through construction in 2023 and 2024. This will be followed by a full year of formal Measurement & Verification (M&V) which will determine a realistic result for the above metrics.

Also, it is important to note that a deep energy retrofit pilot project meets the definition of a technology innovation program as set out in the DSM Regulation. These are considered a “specified demand-side measure”, meaning that the Program Area or the measures therein are not subject individually to a cost-effectiveness test. Instead, the cost effectiveness of these expenditures is evaluated as part of the DSM Portfolio as a whole.

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**F. Appendix B – 2021 Annual DSM Report**

**20. Reference: Exhibit B-1 Application Appendix B p.18**

**Low Income Program Cost Effectiveness**

On page 18 of Appendix B to the Application, FEI states:

“The TRC for Low Income programs uses the same inputs as the MTRC without impacting the MTRC Cap in accordance with the DSM Regulation.”

20.1 With reference to the DSM Regulation, explain why the calculation of MTRC using the zero emission energy alternative is not included in the MTRC cap of 40%.

**Response:**

The 2014 BC Ministry of Energy and Mines document Guide to the Demand-Side Measures Regulation discusses when to use the MTRC cap under the DSM Regulation.<sup>3</sup> It states on page 10 that “*the [MTRC] cap does not apply to low-income measures that pass the TRC using the [ZEEA] adder in s. 4(2).*”

Please refer to sections 4(1.), 4(1.5) and 4(2) of the DSM Regulation.

<sup>3</sup> [Issues Paper: Greenhouse Gas Reduction Measures Regulation under the Clean Energy Act \(gov.bc.ca\).](#)

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**21. Reference: Exhibit B-1 Application Appendix B p.5**

**Actual Versus Plan Savings, Expenditures, and Cost-Effectiveness Ratios**

At the above-noted location FEI provides Table 2-3:

**Table 2-3: Overall DSM Portfolio Level Results by Program Area 2021 – Savings**

Program Area	Incremental Annual Gas Savings, Net (GJ)		Benefit/Cost Ratios				
	2021 Plan	2021 Actual	TRC	MTRC	UCT	PCT	RIM
Residential	272,112	299,709	0.4	1.4	0.5	1.6	0.4
Commercial	388,041	413,589	1.3	1.3	1.6	2.8	0.5
Industrial	458,768	297,760	2.7	2.7	3.9	4.9	0.8
Low Income	57,547	50,660	3.0	3.0	0.4	2.6	0.3
Conservation Education and Outreach	0	58,204	0.2	1.3	0.2	2.2	0.2
Innovative Technologies	Savings Not Estimated		Savings Not Estimated				
Enabling Activities	0	22,612	Calculated at Portfolio Level				
Portfolio Level Activities	Savings Not Estimated		Savings Not Estimated				
<b>ALL PROGRAMS</b>	<b>1,176,468</b>	<b>1,142,533</b>	<b>0.9</b>	<b>1.4</b>	<b>0.8</b>	<b>2.3</b>	<b>0.4</b>

21.1 Expand Table 2-3 to also show the 2021 Plan TRC, MRTC, UCT, PCT, and RIM.

**Response:**

Table 2-3 cannot be updated with the requested information for 2021 as cost tests are completed for the duration of the plan period, which are typically longer than one year.

Appendix D Exhibit 5 of FEI's Application for additional DSM expenditures for 2021 to 2022 (approved by BCUC Decision and Order G-301-21) provided below, shows the 2021-2022 Plan TRC, MRTC, UCT, PCT, and RIM over the plan period. As noted above, planned cost tests are not broken down annually.

**Exhibit 5 - Gas Savings and Cost-Effectiveness Results for Each of the Program Areas and the Total DSM Portfolio**

Program Area	Incremental Annual Gas Savings, Net (GJ)		Cumulative Annual Gas Savings, Net (GJ)	NPV Gas Savings, Net (GJ)	Benefit/Cost Ratios				
	2021	2022			TRC	Portfolio*	Utility	Participant	RIM
Residential	272,112	238,323	510,434	6,415,000	0.4	1.5	0.6	1.5	0.3
Commercial	442,533	471,200	913,733	10,447,427	1.4	1.5	1.9	2.7	0.4
Industrial	467,328	534,268	1,001,596	10,253,212	3.1	3.1	4.5	4.9	0.6
Low Income	57,547	64,128	121,675	1,279,659	3.1**	3.1	0.4	2.5	0.2
Conservation Education and Outreach	Savings Not Estimated		Savings Not Estimated						
Innovative Technologies	Savings Not Estimated		Savings Not Estimated						
Enabling Activities	Savings Not Estimated		Savings Not Estimated						
Portfolio Level Activities	Savings Not Estimated		Savings Not Estimated						
<b>ALL PROGRAMS</b>	<b>1,239,520</b>	<b>1,307,918</b>	<b>2,547,438</b>	<b>28,395,299</b>	<b>1.0</b>	<b>1.5</b>	<b>1.0</b>	<b>2.3</b>	<b>0.4</b>

\*Includes the MRTC adder for measures that require it (i.e., TRC/MTRC hybrid)

\*\*Section 4 of the BC Demand-Side Measures Regulation, as amended in March 2017, requires the use of the Zero Emission Energy Alternative and a 40% benefit adder in calculating the TRC for Low Income programs.



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21.2 Provide a table showing both the Plan and Actual annual gas savings by program area for the years 2017 through 2021. Explain any material variances.

**Response:**

Please refer to the table below showing plan and actual gas savings from 2017 to 2021. Please note that the planned gas savings are from the original DSM Plan of the respective year unless otherwise indicated.

Please refer to the Attachment 21.2 for material variances, which summarizes the variances from the respective DSM Annual Reports.

Program Area	Incremental Annual Gas Savings, Net (GJ)									
	2017		2018		2019		2020		2021	
	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan*	Actual
Residential	136,672	137,161	157,890	223,507	238,946	192,534	271,677	336,473	272,112	299,709
Commercial	237,665	238,688	182,258	234,228	280,314	281,205	295,004	334,485	388,041	413,589
Industrial	190,300	105,516	189,465	123,356	280,651	301,668	269,863	269,354	458,769	297,760
Low Income	27,768	47,263	28,190	45,135	76,022	53,236	76,590	76,388	57,547	50,660
Conservation Education and Outreach	-	-	-	-	-	1,184	-	-	-	58,204
Innovative Technologies	5,343	4,910	29,468	-	-	-	-	-	-	-
Enabling Activities	-	-	-	-	-	2,133	-	16,021	-	22,612
Portfolio Level Activities	-	-	-	-	-	-	-	-	-	-
<b>Total Portfolio</b>	<b>597,748</b>	<b>533,538</b>	<b>587,271</b>	<b>626,226</b>	<b>875,933</b>	<b>831,959</b>	<b>913,134</b>	<b>1,032,721</b>	<b>1,176,469</b>	<b>1,142,533</b>

\*Updated planned values are taken from the following:

Order G-301-21 Appendix D

Order G-135-21 Appendix C

21.3 Provide a table showing both the Plan and Actual annual DSM expenditures by program area for the years 2017 through 2021. Explain any material variances.

**Response**

Please refer to the table below showing plan and actual expenditures from 2017 to 2021. Please note that the planned expenditures are from the original DSM Plan of the respective year, excluding budget transfers and carry over, unless otherwise indicated.

Please refer to the response to RCIA IR1 21.2 for the requested material variances.

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Program Area	Total Expenditures (\$000s)									
	2017		2018		2019		2020		2021	
	Plan	Actual	Plan	Actual	Plan*	Actual	Plan*	Actual	Plan*	Actual
Residential	\$ 10,700	\$ 12,203	\$ 11,383	\$ 12,584	\$ 23,521	\$ 22,084	\$ 25,722	\$ 32,880	\$ 50,121	\$ 51,484
Commercial	\$ 10,416	\$ 10,834	\$ 10,051	\$ 10,098	\$ 13,837	\$ 11,709	\$ 17,355	\$ 13,571	\$ 20,735	\$ 21,309
Industrial	\$ 2,983	\$ 2,099	\$ 2,983	\$ 3,195	\$ 3,103	\$ 6,481	\$ 3,152	\$ 6,124	\$ 7,913	\$ 6,095
Low Income	\$ 3,247	\$ 2,644	\$ 3,483	\$ 2,713	\$ 6,630	\$ 6,719	\$ 6,795	\$ 7,176	\$ 10,322	\$ 9,043
Conservation Education and Outreach	\$ 2,400	\$ 2,590	\$ 2,400	\$ 3,122	\$ 7,155	\$ 6,059	\$ 7,353	\$ 5,165	\$ 8,578	\$ 4,517
Innovative Technologies	\$ 1,218	\$ 928	\$ 1,210	\$ 1,049	\$ 2,043	\$ 2,027	\$ 2,202	\$ 2,142	\$ 5,064	\$ 3,721
Enabling Activities	\$ 925	\$ 1,181	\$ 765	\$ 1,260	\$ 8,426	\$ 8,077	\$ 8,322	\$ 7,761	\$ 9,231	\$ 9,199
Portfolio Level Activities	\$ -	\$ 1,559	\$ -	\$ 1,450	\$ 1,635	\$ 1,339	\$ 1,676	\$ 1,003	\$ 1,822	\$ 1,477
<b>Total Portfolio</b>	<b>\$ 31,889</b>	<b>\$ 34,039</b>	<b>\$ 32,275</b>	<b>\$ 35,472</b>	<b>\$ 66,350</b>	<b>\$ 64,495</b>	<b>\$ 72,578</b>	<b>\$ 75,821</b>	<b>\$ 113,786</b>	<b>\$ 106,844</b>

\*Updated planned values are taken from the following:

Order G-138-18 Appendix A Errata

Order G-301-21 Appendix D

Order G-135-21 Appendix C

\*\* Planned Cost effective values are over plan period (2021 to 2022)

1 \*\*\*1.4 presents the blended MTRC and TRC value at the Portfolio level unadjusted from Appendix A of the Application

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**G. Consistency with the 2022 LTGRP**

**22. Reference: Exhibit A-3 BCUC IR1 10.4; Exhibit B-1 Application p.10**

**Incentive Levels**

In IR 10.4, the BCUC requests:

“Please estimate the forecasted energy savings in 2023 if FEI had designed its programs, as outlined in the 2023 DSM plan, covering up to 100 percent of incremental costs.”

On page 10 of the Application, FEI states:

“The 2023 DSM Plan total expenditure is less than the LTGRP DSM high setting in 2023 for the following reasons:

The high DSM setting in the LTGRP assumed incentives covering up to 100 percent of incremental costs, or maximum market potential, in order to speed market transition and accelerate retrofits for energy and emission reductions, whereas for this transitional one-year 2023 period the DSM Plan focused more on optimizing the costs of energy savings and maintains an average incentive level which is closer to the historical benchmark of 50 percent of incremental cost for high efficiency equipment...”

22.1 What percentage of the incremental measure costs do the incentives in the 2023 DSM Plan represent?

**Response:**

The average incentive levels for each program in the DSM Plan are shown in the table below. Please also refer to the response to BCUC IR1 10.3 for further detail on incentives with regards to the 2022 LTGRP and the 2023 DSM Plan.

Program	Weighted Program Incremental Cost (\$)	Weighted Program Incentive, FortisBC (\$)	Average Program Incentive Level
Res - Home Renovation	\$499	\$212	42%
Res - New Home	\$3,079	\$2,127	69%
Com - Prescriptive	\$14,628	\$6,639	45%
Com - Performance Retrofit	\$115,603	\$71,767	62%
Com - Performance NC	\$246,750	\$134,550	55%
Com - RAP	\$37	\$35	95%
Ind - Performance	\$94,524	\$78,754	83%



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Program	Weighted Program Incremental Cost (\$)	Weighted Program Incentive, FortisBC (\$)	Average Program Incentive Level
Ind - Prescriptive	\$62,966	\$7,287	12%
Ind - SEM	\$32,000	\$32,000	100%
LI - Self Install	\$29	\$29	100%
LI - Direct Install	\$2,118	\$2,960	140%
LI - Prescriptive	\$1,908	\$1,988	104%
LI - Performance	\$5,746	\$5,746	100%

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## MATERIAL VARIANCES 2017 – 2021 DSM PLAN EXPENDITURE AND SAVINGS

The following points have been taken from the respective FEI DSM Annual Reports

### 2017

- 2017 Low Income experienced high participation in the Low Income Rental Efficiency Program (RAP Low Income) as the program continued to address several of the objectives of the Non-Profit Custom Program. As well, additional development was completed including multiple meetings with key stakeholders to identify gaps, gaining clarity on the needs of the non-profit housing sector, and expanding the scope of the Non-Profit Custom Program to include more electrical measures by partnering with BC Hydro and FBC.
- FEI has not used the MTRC for Commercial programs as the low TRC value observed in the Customized Equipment Program is due in large part to timing between energy study payments and recording of implemented measures and thus recording of savings.
- Innovative Technologies Heat Reflector Pilot participants were enrolled and reported in 2016, therefore no (new) participants reported in 2017. Participants and savings in the Smart Learning Thermostat Pilot will be attributed when final incentive payments are provided. No final incentive payments made in 2017, therefore no participants reported. Combination Space and Water Heating (CURP) pilot wrapped up in 2017, therefore no (new) participants reported in 2017.
- For the purpose of cost-effectiveness tests, the Industrial program area has claimed 105,516 GJ in savings. As a project's total incentive can be made across multiple years, the annual natural gas savings are pro-rated based on the proportion of the project's incremental cost that is reported in that year.
- Depending on the size of the incentive, Technology Implementation project incentive payments are either paid fully on project commissioning or are paid across several years after commissioning and based on the natural gas saving performance. Hence, for larger incentives, only a portion of the incentive is paid on project commissioning. For consistency in performing cost benefit analyses, only a prorated portion of the natural gas savings and project costs are included in the determination of the cost benefit ratios. In 2016, FEI reviewed and revised the proration methodology adopted in 2013. The revised methodology results in a more accurate reflection of program cost effectiveness by mitigating the risk of not fully reporting a project's incremental cost and more accurately presenting natural gas savings in a given year. The revised approach is used for the 2017 reporting period.
- In 2017, FEI worked to align the incentive and M&V approach for Technology Implementation projects signed between 2013 and 2016 with the approach adopted in 2016. This alignment was done to simplify the payment structure and condense the program participation period.

## 2018

- The March 2018 Regulatory Bulletin,<sup>1</sup> Energy Efficiency Standards Regulation Amendment, outlines increased efficiency standards for fireplaces manufactured on or after January 1, 2019. The regulatory change in increasing the fireplace minimum efficiency standards presents an opportunity for FEI to claim attribution savings, pursuant to the DSM Regulation, as a result of FEI's efforts towards advancing fireplace standards. FEI has estimated the attributed savings as 103,000 GJs as of 2018. With the fireplace regulation in effect January 1, 2019, FEI will claim the program attributed savings in this 2018 report and will update cost effectiveness inputs for 2019 and onwards reflecting the new baseline. The approach to attributing savings from codes and standards, similar to reporting DSM program savings, will continue to be done through the annual DSM report and will be applied to the Program Area for each respective measure.
- Low Income expenditures in 2018 were lower than the 2014-2018 DSM Plan due to a transition in program contractors. However, changes made in 2018 have resulted in increased program delivery capacity as the program has transitioned from just one contractor to two contractors.
- The Energy Saving Kit (ESK) Program performed well in 2018 with participation well beyond the projected participation in the 2014-2018 EEC Plan. Participation increased nearly 30 percent over 2017. One factor influencing these results is the pilot initiative FEI undertook in 2018 to re-engage past ESK participations for measures that are temporary in nature; specifically window film. This pilot resulted in 1,639 past participants taking up new measures.
- The Low Income Space Heat Top Up program participation was higher than anticipated in the 2014-2018 EEC Plan and nearly double 2017 participation. 2018 was only the second full year in market. The results achieved are likely attributable to the greater awareness that comes with program continuity as well as to strong partnerships with BC Non-Profit Housing Association and BC Housing.
- In 2018, the Non-Profit Custom Program was introduced to the market in mid-February and fully launched at the end of June. Program participation has been strong with a total of 90 program applicants (57 seeking natural gas energy efficiency measures and eight seeking electrical energy efficiency measures in the FBC territory. The remainder are seeking electrical energy efficiency measures in the BC Hydro territory.) Retrofit projects in this program require a longer timeline for completion (between one and two years) depending on whether an energy study is being conducted. For this reason, costs in the Non-Profit Custom Program were low in 2018.

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<sup>1</sup> [https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/electricity-alternative-energy/energy-efficiency/eesr\\_amendment\\_6\\_regulatory\\_bulletin\\_march\\_7\\_2018.pdf](https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/electricity-alternative-energy/energy-efficiency/eesr_amendment_6_regulatory_bulletin_march_7_2018.pdf)

- Rebates for commercial condensing rooftop units were considered for 2018 but not offered. Measure development work related to condensing rooftop units started in 2018 so that the rebate offer can be launched in 2019 as part of FEI's 2019-2022 DSM Plan.
- At the time of writing the 2014-2018 DSM Plan, FEI was unsure whether the Provincial Government's Business Energy Advisor (BEA) Program would continue or not. A contingency measure was planned for this program to ensure small businesses had access to energy analysis if the BEA Program was discontinued. Participation from small business customers was foreseen in the 2014-2018 DSM Plan. As the BEA Program was continued, the scope of the Commercial Energy Assessment Program was not expanded to include small businesses.
- The number of Energy Assessment participants in 2018 is significantly less than was estimated in the 2014-2018 DSM Plan. In anticipation of the 2019-2022 FEI DSM Plan approval it was decided not to make any changes to existing program structure or to proceed with active promotion of the program. With the approval of the 2019-2022 DSM Plan the prescriptive program area will be completely re-designed. Once the re-design is completed, the Commercial Energy Assessment will be re-designed to support small and medium commercial customers with high-level energy assessments with rebate recommendations of the re-designed suites or prescriptive rebates. Note that in 2018 a significant number of multi-family apartment customers received energy assessments through the RAP Program.

## 2019

In 2019, a budget transfer was accepted per Order G-273-19, which reallocated the previously accepted 2020 budgets between Program Areas.

- The Residential Program Area achieved 94 percent of its expenditure target and 82 percent of its energy savings target while achieving a 175 percent increase in expenditure activity over 2018. The overall UCT of 0.7 is somewhat lower than anticipated in the 2019-2022 DSM Plan. This result might be attributed to a number of factors including uptake of furnace and tankless water heater rebates performing over plan, as well as non-incentive expenditures (such as communications activities to drive participation) being higher than anticipated in the 2019-2022 DSM Plan.
- The Low Income Direct Install Program achieved 152 percent of planned participation. This was due to enhanced outreach initiatives and partially to some pent up demand from 2018 when there was a transition in the program's contractors. The Self Install Program achieved 113 percent of planned participation. This was partially due to successful marketing tactics and a re-engagement campaign at the beginning of the heating season for participants to receive additional energy savings measures.
- The Low Income Prescriptive Program achieved 46 percent of planned participation. Many of the measures in the Low Income Prescriptive Program were not in market for the entire



year and it takes time to build awareness. The Low Income Prescriptive Program participation increased considerably towards the end of the year and there are indications that participation will continue to grow in 2020.

- Although there were a greater number of energy studies performed in non-profit housing apartments than was planned, there were fewer than expected implementation support measures performed.
- The Commercial measures with the most significant deviation from the 2019-2022 DSM Plan are the following:
  - Furnace Replacement: promotion and marketing of this new rebate offer through the existing Trade Ally Network (TAN) did not yield the participation as expected.
  - Addition of roof insulation measure was delayed beyond 2019, pending further study, as a result of new market information acquired by FEI.
  - The Commercial Energy Assessment was offered in 2019 to customers who enrolled in the program before the end of 2018. These energy assessments were completed and issued to the customers in 2019. The program has two different external vendors under contract to deliver the energy assessments and their contracts expired as of the end of 2018. FortisBC is currently developing a new Commercial Energy Assessment offer, anticipated to launch in 2020. The Performance Program – New Buildings saw lower than anticipated participation due to softening demand for construction of Part 3 buildings and other new construction programs in market.
- 2019 had higher than anticipated participation in all industrial program offerings and saw the Launch of the Strategic Energy Management program with both Cohort and Industrial Energy Manager offerings.
- The Technology Implementation offer of the Performance Program experienced higher than anticipated levels of participation, owing to increased market demand and referrals from the Strategic Energy Management program. The 2019 participation for the industrial prescriptive rebate offer was significantly higher than planned, primarily driven by thermal curtains and infrared heaters
- The 2019 participation for the remainder of the industrial prescriptive rebate offers was relatively aligned with the 2019 plan except for the steam trap survey and replacement. FEI engaged service providers for steam trap surveys to increase participation.
- Several factors caused the 2019 expenditure on the reporting tool and customer application portal to be higher than planned for FEI in 2019. Aspects of the tool development were pushed into 2019 from 2018 due to increased complexities as the timing of integrations with other FortisBC technical solutions were brought forward to coincide with the timing of the tool development. These integrations allowed further customer facing enhancements to the system and to the DSM programs that will rely on the tool, resulting in an increase in the scope of the implementation. FEI also took

advantage of an opportunity to reduce overall licensing costs by advancing payment for licensing fees from future years into 2019. Finally, as a result of the above noted delays, FEI needed to continue its maintenance contract with the vendor of the existing tracking system for another year.

## 2020

In 2020, a budget transfer was accepted per Order G-286-20 that reallocated previously accepted 2020 budgets between the Program Areas.

- The Residential Program Area achieved almost 128 percent of its expenditure target and 124 percent of its energy savings target. The expenditure target was surpassed largely due to the success of COVID-19 economic recovery offers in market. For the Home Renovation Program, program partners FortisBC, BC Hydro and CleanBC launched a heating system “Double Rebates” campaign with a 90-day pre-qualification period from October 1, 2020 to December 31, 2020. The New Home Program provided COVID-19 economic recovery enhanced rebates to ensure builders remained focused on high performance homes during an economic downturn.
- The energy savings target was surpassed due to the one-time attribution of furnace savings due to the federal Amendment 15 of the Energy Efficiency Act put into effect December 2019.
- A bonus incentive was introduced for customers using a Program Registered Insulation Contractor to ready the market for an upcoming program requirement for customers to use program registered contractors in order to receive insulation rebates. The promotion was successful. In 2020, FEI distributed an incremental \$2.586 million to 3,567 British Columbians who upgraded their heating systems, fireplaces and thermostats to high efficiency models at a time when they were spending more time in their homes than ever before.
- The energy savings for furnaces, boilers and combination systems were adjusted from those used to develop the 2019-2022 DSM Plan based on findings from the Sampson and Associates impact evaluation referred to in Section 12-2 of the 2019 Annual Report.
- As part of FortisBC's COVID-19 Recovery offers in support of the provincial BC Restart Plan, and to ensure builders keep high performance homes top of mind in an economic downturn, the New Home program provided enhanced incentives of \$2,000 per Step Code level.
- Combination system energy savings values were reduced from those used to develop the 2019-2022 DSM Plan to account for Minimum Efficiency Performance Standards base lines for new construction.

- Combination system energy savings were adjusted for a small number of incentives issued in the City of Vancouver to account for the higher efficiency standards of the Vancouver Building Bylaw.
- 2020 was a challenging year for the RAP program due to COVID-19 safety restrictions. Direct installation of in-suite measures was largely suspended in 2020.
- The Low Income Direct Install Program achieved 58 percent of the participation target. This was primarily due to the program being out of market for approximately 6 months. While the program was out of market, new COVID-19 safe operating procedures were developed and work continued on developing energy saving opportunities for manufactured homes (a relatively new archetype to be serviced by the Direct Install Program). The program re-started work in August and has been building back up to pre-COVID-19 service levels since then.
- Commercial Furnace promotion and marketing of this new rebate offer through the existing Trade Ally Network (TAN) contractor upon release of this rebate offer did not yield the participation as expected as discussed further in Section 11 of the 2020 Annual Report.
- The Performance Program – New Buildings achieved lower than anticipated participation in 2020 due to softening demand for construction of Part 3 buildings and other new programs in market targeting New Buildings. FEI launched increased outreach activities to architects, engineers, developers and energy modellers to support awareness of natural gas new construction energy efficiency opportunities and DSM programs.
- The 2020 participation for the industrial prescriptive rebate offer was similar to the participation in this program for 2019. The Performance Program continues to experience solid participation, owing to present market demand and referrals from the Strategic Energy Management program.
- CEO continued to provide information to customers and the public on natural gas conservation and energy literacy. In collaboration with FBC, to continue to support and engage small to medium size businesses, FEI funded 593 energy assessments across the province. Customers received advice on saving energy and learned about rebates on high-efficiency upgrades. With the onset of COVID-19 in March 2020, FEI worked with its vendor to pivot the program to a virtual model to ensure continued support for small business customers. The virtual model expanded the reach to all FortisBC customers across the province. The virtual assessments focused on low cost, no cost measures to reduce business's energy consumption, as well as turn-down procedures for those who had needed to close their businesses during the COVID-19 pandemic. Customers were referred to the program through the FortisBC contact centre, and Energy Solutions Managers, in addition to outbound calling by the vendor.

## 2021

- As part of the Double Rebates offer which launched in fall of 2020, the deadline for double rebate eligible installations occurred on June 30, 2021. The deadline was previously extended from March 31, 2021 to enable higher quality installations, as well as to respond to equipment shortages related to high customer demand and COVID-19 supply chain interruptions.
- In fall 2020, the New Home program provided enhanced incentives of \$2,000 per Step Code level which will remain in market until the end of 2022 allowing for builders to plan for the incorporation of energy efficient measures and execute plans over the life of the project.
- 2021 was another challenging year for the Rental Apartment Efficiency Program with the COVID-19 pandemic continuing to dampen participation in this program.
- In spite of the COVID-19 pandemic and extreme weather impacts on programming and customer priorities, the Low Income Program Area performed well and exceeded 2020 expenditures of \$7.2 million. With additional safety protocols in place, the Direct Install Program was in market all year.
- As part of the Double Rebates offer which launched in fall of 2020, the deadline for double rebate eligible installations occurred on June 30, 2021. The deadline was previously extended from March 31, 2021 to enable higher quality installations, as well as to respond to equipment shortages related to high customer demand and COVID-19 pandemic supply chain interruptions. This contributed to the Low Income Prescriptive Program gaining momentum in 2021.
- In 2020, FortisBC introduced COVID-19 recovery offers to the market which included increased incentives for some of the programs or an accelerated payment structure to support capital upgrades in an economic downturn. In May 2021, C&EM phased out the COVID-19 recovery offers, which accelerated the project completions prior to the end date and resulted in increased participation in some of our offers, most notably in the Performance Program – Existing Buildings.
- Certain commercial measures experienced significant deviation from the planned expenditure and savings the:
  - The Roof Insulation measure continues to perform below plan, as FEI has not yet identified a practical approach to engage the market players and deliver this offer as a prescriptive rebate.
  - Condensing Make Up Air Units and Condensing Unit Heaters measures continue to underperform compared to plan and FortisBC identified the opportunity for promotion and marketing in increase awareness of the rebate offer.
  - The Commercial Energy Assessment offer, which was re-introduced to the market in 2020 after customer feedback, received higher than expected participation. FEI's

changes to the offer received positive feedback from small and medium business customers. Implementation support was also introduced as an additional service, which is one of the reasons for increased interest in the program.

- The Performance Program – New Buildings underperformed in 2021 in incentives and savings. However, beginning in mid-2021, this program experienced an increased intake of projects for which agreements have been issued for the customers to proceed with energy modelling. Some of these projects progressed into the Capital Incentive agreement issuance stage in 2021, while other projects needed more time to reach that stage and therefore, will receive their Capital Incentive Agreements from FEI in 2022. Increase in incentives and savings is expected for 2022 and the years to come due to the longer lifecycle of the New Construction sector.
- 2021 was another challenging year for the Rental Apartment Efficiency Program with COVID-19 continuing to dampen participation in this program.
- Towards year-end, a number of Industrial customers informed FEI that the completion of their Industrial performance projects were delayed due to supply chain issues, triggered by the COVID-19 pandemic, and that they would not complete their projects in 2021 as planned.
- The 2021 participation for the industrial prescriptive rebate offer was similar to the participation in this program for 2020. Towards year-end, a number of customers informed FEI that the completion of their projects were delayed due to the flooding the province experienced in November 2021.
- In 2021, the Innovative Technologies program area received additional expenditures in order to expand technology research and evaluation for gas heat pumps and deep energy retrofits. However, expenditures were impacted by supply chain delays and resource constraints due to the COVID-19 pandemic, postponing installation schedules and pilot activities for 2021 to 2022.
- Conservation Education and Outreach underspend is attributed to the pausing of our “We’ve got rebates” campaign during the fall season, and a smaller campaign in the spring due to higher than anticipated participation following the fall 2020 campaign and double rebates offer.
- Underspend in Education programs was due to less than anticipated participation in interactive school program activities, primarily as a result of COVID-19.
- The Codes and Standards expenditure was higher than planned, primarily due to an increase in activity in energy modelling and blower door testing.