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March 31, 2022

British Columbia Utilities Commission  
Suite 410, 900 Howe Street  
Vancouver, BC  
V6Z 2N3

Attention: Mr. Patrick Wruck, Commission Secretary

Dear Mr. Wruck:

**Re: FortisBC Energy Inc. (FEI)**  
**Natural Gas Demand-Side Management (DSM) – 2021 Annual Report**

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Attached please find the Natural Gas DSM Program 2021 Annual Report for FEI.

If further information is required, please contact Sarah Wagner, Regulatory Projects Manager at (250) 469-6081.

Sincerely,

**FORTISBC ENERGY INC.**

***Original signed:***

Diane Roy

Attachment



**FortisBC Energy Inc.**

**Natural Gas  
Demand-Side Management Programs  
2021 Annual Report**

**March 31, 2022**

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## 1. REPORT OVERVIEW

FortisBC Energy Inc. (FEI or the Company), is committed to delivering a broad portfolio of cost-effective natural gas Demand-side Management<sup>1</sup> (DSM) measures that address the expectations of customers while meeting the requirements for public utilities to pursue cost-effective DSM. In 2021, the Company achieved a combined portfolio Modified Total Resource Cost (MTRC)<sup>2</sup> of 1.4 on expenditures of \$106.844 million, meeting FEI's goal of cost-effective program delivery.

The FEI DSM Annual Report (the Report) outlines the Company's actual results and expenditures for 2021 as compared to the Company's 2019-2022 DSM Plan approved by the BCUC in its Decision and Order G-10-19 (the Decision) and subsequent amendments approved by BCUC Orders G-135-21, G-301-21 and G-345-21. The Report compares 2021 actual activity and results to these approved DSM Plan values for 2021. Where the details of individual programs vary substantially from the 2019-2022 DSM Plan, explanations are provided in the applicable Program Area sections of the Report.

### 1.1 PURPOSE OF REPORT: TRANSPARENCY, ACCOUNTABILITY AND UPDATE ON PROGRESS

The Report details the Company's activities for the overall DSM Portfolio and in each Program Area. Incentive and non-incentive expenditures are reported at the level of each program or measure, as well as at the Program Area and Portfolio levels. Results for the following cost effectiveness tests are provided for the overall Portfolio and each Program Area in Section 2, and for each program as appropriate in the respective Program Area sections:

- Total Resource Cost (TRC);
- Ratepayer Impact Measure (RIM);
- Participant Cost Test (PCT);
- Utility Cost Test (UCT); and
- Modified Total Resource Cost (MTRC). In accordance with British Columbia's Demand-Side Measures Regulation (DSM Regulation), results of the MTRC calculations are also provided where appropriate (see Section 2.1).

The Report also demonstrates that the Company is meeting the accountability mechanisms directed by the BCUC in Order G-10-19, which carries over a number of requirements from prior

<sup>1</sup> Throughout this Report the use of the term Demand-Side Management or "DSM" is intended to refer to demand-side measures in BC as defined in the BC Demand-Side Measures Regulation (DSM Regulation).

<sup>2</sup> Pursuant to the BC Demand-side Measures Regulation, the Portfolio level MTRC is calculated based on costs and benefits of all programs in the Portfolio as well as any Program Area and Portfolio level administration costs, and including the benefit adders for those programs for which the MTRC is relied upon to determine cost effectiveness on an individual program basis (i.e. those programs that have been designated as being under the MTRC Cap as presented in Section 2.1 of this report).

orders regarding DSM expenditures. One such mechanism contained in Order G-36-09 was the requirement to file DSM Annual Reports, which states:

A requirement that Terasen [now FEI] submit annually to the BCUC, by the end of the first quarter following year-end, for each year of the funding period, a report on all [DSM] initiatives and activities, expenditures and results...

This report shows that FEI's DSM portfolio meets the cost-effectiveness calculations and adequacy requirements set out in the DSM Regulation, as amended in March 2017.

## 1.2 ORGANIZATION OF THE DSM ANNUAL REPORT

The following describes how each section of the Report presents the results of 2021 DSM activities:

### Section 1: Report Overview

- Provides a high-level background for the Report.

### Section 2: Portfolio Overview

- Provides detail regarding the overall actual 2021 expenditures for DSM activities.
- Section 2.5 discusses any new requirements from the BCUC concerning information to be included in the 2021 DSM Annual Report.

### Section 3: Funding Transfers and Carryover

- Provides a discussion on funding transfers between Program Areas and amounts unspent in 2021 in each Program Area that are rolled over to 2020 planned expenditures.

### Section 4: Advisory Group Activities

- Provides information regarding Energy Efficiency and Conservation Advisory Group (EECAG) activities in 2021.

### Sections 5 - 9 provide information on:

- Residential, Low Income, Commercial, Innovative Technologies, and Industrial Energy Efficiency Program Areas, respectively;
- Each section contains a table summarizing the planned and actual expenditures for the respective Program Area in 2021, including incentive and non-incentive expenditures, annual and NPV gas savings, as well as TRC and other cost-effectiveness test results. Additional tables outline the individual 2021 programs, including program and measure descriptions, program assumptions and sources for these assumptions, and a breakdown of incentive and non-incentive expenditures.

**Section 10: Conservation Education and Outreach Initiatives**

- Provides both a summary and details regarding actual 2021 expenditures for the Conservation Education and Outreach (CEO) Program Area.

**Section 11: Enabling Activities**

- Provides both summary and detail regarding actual 2021 expenditures for the Enabling Activities that support the work of the DSM Portfolio as a whole.

**Section 12: Evaluation**

- Provides detail regarding pending and actual expenditures for 2021 program evaluation activities, as well as summary results from evaluations and studies completed in 2021.

**Section 13: Data Gathering, Reporting and Internal Control Processes**

- Provides a summary of the Company's data tracking, process control, and reporting for 2021 DSM activities, and a high-level description of the Company's internal approval process for programs.

**Section 14: 2021 DSM Annual Report Summary**

- Provides a summary conclusion for the Report and FEI's 2021 DSM activity.



## 2. PORTFOLIO OVERVIEW

In this Section, FEI provides its DSM energy savings, expenditures and cost-effectiveness test results at an overall Portfolio level and Program Area level for 2021. A summary of the overall Portfolio results is provided in Table 2-1, demonstrating that the Company achieved a combined Portfolio MTRC of 1.4. FEI achieved DSM expenditures of \$106.844 million and recorded annual natural gas savings of 1.15 million GJ in 2021. These energy savings resulted in carbon emission reductions of almost 69,000 tonnes of CO<sub>2</sub>e in 2021 and total reductions of almost 736,000<sup>3</sup> tonnes of CO<sub>2</sub>e over the life of all measures installed or undertaken in 2021. Expenditures and savings have increased over 2020 results by approximately \$31 million and approximately 116,000 GJ respectively.

**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 CO2e/yr)		68,323
NPV of Annual Gas Savings (GJ/yr.)		12,303,687
Measure Lifetime GHG Emission Reductions* (tonnes CO2e)		735,761
Benefit/Cost Ratios	TRC	0.9
	MTRC	1.4
	UCT	0.8
	PCT	2.3
	RIM	0.4

Tables 2-2 and 2-3 below provide the expenditures and cost-effectiveness test results by Program Area for the overall DSM Portfolio.

<sup>3</sup> Emission reduction value based on life cycle (well to burner tip) emission factor of 0.0598 tonnes CO<sub>2</sub>e/GJ for natural gas. Annual emission reductions are just those attributed to the first year following measure implementation. Lifetime reductions are the total reductions that occur over the life of all measures implemented (based on NPV of gas savings).

**Table 2-2: Overall DSM Portfolio Level Results by Program Area 2021 – Expenditures<sup>4</sup>**

Program Area	Utility Expenditures (\$000s)					
	Incentives		Non-Incentives		Total Expenditures	
	2021 Plan	2021 Actual	2021 Plan	2021 Actual	2021 Plan	2021 Actual
Residential	46,570	48,910	3,551	2,574	50,121	51,484
Commercial	16,900	18,479	3,835	2,830	20,735	21,309
Industrial	7,137	5,438	776	658	7,913	6,095
Low Income	8,043	7,467	2,279	1,575	10,322	9,043
Conservation Education and Outreach	0	0	8,578	4,517	8,578	4,517
Innovative Technologies	1,900	1,707	3,164	2,014	5,064	3,721
Enabling Activities	3,673	4,128	5,049	5,071	8,722	9,199
Portfolio Level Activities	0	0	943	1,477	943	1,477
<b>ALL PROGRAMS</b>	<b>84,223</b>	<b>86,129</b>	<b>28,175</b>	<b>20,715</b>	<b>112,398</b>	<b>106,844</b>

**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>

Portfolio Level Activities, shown in the tables above, are those activities for which the costs cannot be assigned to individual DSM programs. These activities are distinct from the Enabling Activities specifically listed in Section 11 of the 2019-2022 DSM Plan. These distinct Portfolio Level Activities include expenditures such as stakeholder engagement activities, portfolio level staff labour, staff training and conferences, research and association memberships, portfolio level research studies, and regulatory work including consulting fees.

Throughout the Report, the following general notes also apply to all the Program Areas:

- In the above table, and in tables throughout the Report, any difference in the totals between the Portfolio Overview, Program Area, and individual program tables is due to

<sup>4</sup> Carryover from the prior year is added to the current year plan. Information in Table 2-2 is net of such adjustments. Since FEI experienced a small over-spend in 2020, a negative carryover resulted as approved by Commission Order G-345-21. That negative carryover was allocated to the Enabling Activities and Portfolio Level Activities Areas in order that Program Areas with energy saving incentives not be impacted.

rounding. Where “zero” values occur, they may be a reflection of rounding to the nearest \$000 expenditure level when expenditures were under \$500.

- A “Non-Program Specific Expense” line item has been included for each Program Area in Sections 5 through 11. These expenditures support multiple programs within that Program Area and therefore, are not specific to only one program. Generally, these expenditures represent items such as training, travel, marketing collateral and consulting services that support the overall Program Area.

The expenditures, energy savings and cost effectiveness results presented in the Report are exclusive of third party funding such as CleanBC funding from the British Columbia Ministry of Energy, Mines and Low Carbon Innovation (EMLI). For measures that also receive third party incentive funding, attribution of energy savings among the parties has been accounted for in both the FEI claimed savings and cost test results.

## 2.1 *PORTFOLIO LEVEL MTRC CALCULATION AND RESULTS*

The DSM Regulation specifies that utilities can implement DSM with TRC values less than 1.0 but that meet an MTRC threshold of 1.0 provided expenditures on these activities do not exceed 40 percent of the total Portfolio expenditure. FEI refers to this 40 percent as the “MTRC Cap”. Table 2-3 above shows that in 2021, FEI met the conditions of the DSM Regulation, achieving a Portfolio MTRC value of 1.5. Table 2.4 below shows that 33.1 percent of the Portfolio was enabled by the MTRC cost-effectiveness test.

**Table 2-4: Programs Subject to MTRC and the Relative Proportion of 2021 Portfolio Expenditures**

Program	Program TRC	Program MTRC	Expenditure (\$000s) subject to cap	% of Portfolio Spending
Home Renovation Rebate Program	0.4	1.5	\$29,966	28.0%
New Home Program	0.3	1.0	\$4,597	4.3%
Commercial Prescriptive Program	1.9	1.9	\$214	0.2%
Residential Customer Engagement Tool Program	0.2	1.3	\$575	0.5%
<b>Total</b>			<b>\$35,352</b>	<b>33.1%</b>

While FEI strives for TRC test results that approach or exceed 1.0 within each program and across all programs, there are benefits to implementing programs that do not meet this threshold. Some of these benefits include making programs available to those customers that would otherwise be underserved (such as Low Income and Residential customers), water savings, increased human health and comfort, and economic benefits such as job creation. These benefits are recognized in the DSM Regulation, which enables use of an MTRC in determining program and Portfolio cost effectiveness. The MTRC uses the long-run marginal cost of acquiring electricity generated from clean or renewable resources in British Columbia (referred to as the Zero Emission Energy

Alternative, or ZEEA) as a proxy for the avoided cost of natural gas and allows for the inclusion of non-energy benefits (NEBs).<sup>5</sup>

## 2.2 MEETING APPROVED EXPENDITURE LEVELS

FEI's 2021 DSM expenditure budget of \$112.398 million includes the original expenditure approval of \$88.803 million, accepted on January 17, 2019 pursuant to the Decision on FEI's 2019-2022 DSM Plan<sup>6</sup>, as well an increase of \$24.982 million as approved by BCUC Order G-301-21 and a carryover amount from 2020 of \$(1.388) million as approved by Commission Order G-345-21. This Annual Report also includes a reallocation of 2021 funding amounts for Residential and Low Income Program Areas as approved by BCUC Order G-135-21. 2021 DSM Plan amounts for Program Areas and the Portfolio as a whole shown in tables throughout this report reflect these approved amendments to the DSM Plan. FEI's actual 2021 expenditures of \$106.844 million for the total DSM portfolio shows that FEI's efforts to achieve the overall approved spending plan were successful. Incentive expenditures exceeded non-incentive expenditures by greater than a 3:1 margin<sup>7</sup> in 2021.

Section 3 discusses funding transfers between Program Areas in 2021 within the overall DSM funding envelope and within the rules for transferring funds between Program Areas as set out in the 2019-22 DSM Plan and approved in the Decision. Section 3 also reports 2021 carryover amounts for each Program Area.

## 2.3 MEETING ADEQUACY REQUIREMENTS OF THE DSM REGULATION

The adequacy requirements set out in the DSM Regulation are as follows:

A public utility's plan portfolio is adequate for the purposes of Section 44.1 (8) c of the Act only if the plan portfolio includes all the following:

a) A demand-side measure intended specifically to assist:

i. residents of low-income households to reduce their energy consumption; or

ii. to reduce energy consumption in housing owned or operated by

(A) a housing provider that is a local government, a society as defined in section 1 of the *Societies Act*, other than a member-funded society as defined in section 190 of that Act, or an

<sup>5</sup> As the DSM Regulation stipulates, the updated value that FEI has used for the ZEEA in 2020 in the MTRC calculation is \$106/MWh, or \$29.45/GJ.

<sup>6</sup> BCUC Order G-10-19.

<sup>7</sup> This ratio is temporarily higher than in previous years, largely as a result of the time-limited increase in incentives in 2021 that were supporting COVID-19 recovery efforts in the province.

association as defined in section 1 (1) of the *Cooperative Association Act*, or

(B) the governing body of a first nation,

if the benefits of the reduction primarily accrue to

(C) the low-income households occupying the housing,

(D) a housing provider referred to in clause (A), or

(E) a governing body referred to in clause (B) if the households in the governing body's housing are primarily low-income households;

b) If the plan portfolio is introduced on or after June 1, 2009, a demand-side measure intended specifically to improve the energy efficiency of rental accommodations;

c) An education program for students enrolled in schools in the public utility's service area;

d) If the plan portfolio is submitted on or after June 1, 2009, an education program for students enrolled in post-secondary institutions in the public utility's service area.

e) one or more demand-side measures to provide resources as set out in paragraph (e) of the definition of "specified demand-side measure", representing no less than

(i) an average of 1% of the public utility's plan portfolio's expenditures per year over the portfolio's period of expenditures, or

(ii) an average of \$2 million per year over the portfolio's period of expenditures;

f) one or more demand-side measures intended to result in the adoption by local governments and first nations of a step code or more stringent requirements within a step code.

Section 6 provides details regarding FEI's DSM programs for Low Income customers. FEI also continues to deliver the Rental Apartment Efficiency Program (RAP) through its Residential and Commercial programs as discussed in each of the respective Program Area sections (Sections 5 and 7). Sections 6 and 7 of the Report also provide details on a number of other Low Income and Commercial energy efficiency programs that are available for use by owners of rental buildings, including the Energy Specialist Program. In terms of education programs, FEI's School Education Program, Commercial and Residential customer education programs, and other energy conservation and education outreach initiatives are presented in Section 10.

FEI's DSM activities related to the codes and standards specified demand-side measure that are the subject of paragraph e) above are considered enabling activities by FEI and are discussed in Section 11. Finally, FEI's portfolio has supported the adoption of step codes in the Province in a number of ways, particularly through the Residential and Commercial Program Areas as discussed in Sections 5 and 7 respectively.

## 2.4 COLLABORATION & INTEGRATION

The Company continues to collaborate and integrate DSM programming among BC's largest energy utilities, as well as with other entities such as governments and industry associations. The Company recognizes that doing so will maximize program efficiency and effectiveness. Discussion of collaborative activity is captured in the individual Program Area sections and program descriptions found in Sections 5 through 11.

FEI, FortisBC Inc. (FBC) and BC Hydro and Power Authority (BC Hydro) (the BC Utilities) continued to collaborate on various programs and projects through their voluntary Memorandum of Understanding (MOU), the purpose of which is to develop enhanced utility integration in support of government legislation, policy and direction. The BC Utilities also continue to experience cost efficiencies from their collaboration efforts, including streamlined application processes for customers, extended program reach and consistent and unified messaging intended to improve energy literacy.

FEI, FBC and EMLI continued to collaborate in 2021. FEI's collaboration with EMLI on CleanBC programs includes administering incentives and enabling applications for CleanBC rebates through FEI's application processes to provide a streamlined customer experience. The tables contained throughout this Annual Report include only expenditure and savings information for FEI's expenditure portfolio. They do not include the CleanBC expenditures nor the savings attributed to the CleanBC incentives. In 2021, CleanBC incentives were administered alongside FEI incentives in the Residential Home Renovation Rebate Program, the Low Income Prescriptive and Support Programs, and the Commercial Existing Building Performance Program as noted in Sections 5, 6 and 7 respectively.

## 2.5 SUMMARY

The Company's DSM Portfolio met the goal of cost effectiveness with a Portfolio MTRC value of 1.4 in 2021. The Company is of the view that both energy savings accounted for in the Portfolio and the resulting TRC remain conservative. Benefits from non-incentive expenditures such as those activities in the CEO and Enabling Program Areas play a very important role in supporting the development and delivery of programs, while creating a culture of conservation in British Columbia. FEI continues to develop and maintain strong, collaborative relationships with other BC utilities and government partners, as well as key market players in providing its portfolio of DSM programs.



### 3. FUNDING TRANSFERS

The practice of transferring expenditure amounts within FEI's DSM portfolio applies to the tracking of actual versus approved spending amounts for each of the Program Areas. It acknowledges that the approved expenditure amount is a forecast and that actual spending in each Program Area will inevitably vary from the forecast to some degree. A Program Area in which annual expenditures are somewhat less than plan has availability within its approved program expenditure envelope to balance against a Program Area that might spend somewhat more than its approved amount. This balancing or 'transfer' allows FEI to maximize the use of its total approved portfolio expenditure amount while managing the uncertainties and external factors that can impact program development and delivery. The Decision approved the continuation of rules that allow FEI to transfer amounts equal to or less than 25 percent of the approved Program Area funding limit without further approval from the BCUC. Throughout the remainder of this report, expenditure tables that show 2021 Plan values report such values prior to consideration of the 2021 transfers discussed in this Section.

Carryover refers to any approved Program Area expenditure amount that was not spent in a given year (after accounting for funding transfers) and can therefore be spent in the following year within the approved DSM Plan timeframe. These amounts are 'rolled over' to the next years' annual approved spending limit. The ability to roll funds over from one year to the next also provides flexibility for FEI to manage uncertainties and external factors that can impact program development and delivery – in this case by making unspent expenditure amounts in one year available to benefit customers in the next year. The Decision approved FEI's request to carryover unspent Program Area amounts during the 2019-2022 DSM Plan.

Table 3-1 presents the transfers and carryover for 2021. This table identifies a transfer of greater than 25 percent into the Portfolio Level Activities Program Area. This transfer was caused by a negative carryover amount from 2020 in this category rather than spending above the original approval amount for Portfolio Level Activities. FEI is requesting approval of this funding transfer in a separate application filed concurrently with this Report.

**Table 3-1: Funding Transfers for 2021 and Calculation of Carryover Expenditures to 2022**

Program Area	2021 Plan Expenditures (incl. 2020 Carryover*)	2021 Actual Expenditures (\$000)	2021 Actual less Plan (\$000)	2021 Funding Transfer Amount In (Out) (\$000)	Plan Amount Carried Over to 2022 (\$000s)	Transfer as a percent of Approved
Residential	50,121	51,484	1,363	1,363	0	3%
Commercial	20,735	21,309	574	574	0	3%
Industrial	7,913	6,095	-1,818	-803	1,015	-10%
Low Income	10,322	9,043	-1,279	0	1,279	0%
Conservation Education and Outreach	8,578	4,517	-4,061	-2,144	1,917	-25%
Innovative Technologies	5,064	3,721	-1,343	0	1,343	0%
Enabling Activities	8,722	9,199	476	476	0	5%
Portfolio Level Activities	943	1,477	534	534	0	57%
<b>ALL PROGRAMS</b>	<b>112,398</b>	<b>106,844</b>	<b>-5,554</b>		<b>5,554</b>	

\* See Table 2-2 for 2020 Carryover amounts

## 4. ADVISORY GROUP ACTIVITIES

The Energy Efficiency and Conservation Advisory Group (EECAG) provides insight and feedback on FEI's Portfolio of DSM activities and related issues. While EECAG provides input on both the electric and natural gas portfolios for FBC and FEI (together, FortisBC), this section describes those 2021 activities that mainly pertain to the FEI portfolio.

EECAG members may be invited based on their relevant subject matter expertise, representation of a common interest shared by stakeholders, or representation of a particular organization/group and/or interest. Examples include governments, regions, Indigenous communities, customers, suppliers, industries, non-governmental organizations, research institutes and other groups that have historically intervened in FEI's regulatory proceedings. Since the formation of the EECAG in 2009, FEI has gained valuable insight on DSM program design and implementation and developed positive working relationships with stakeholders. EECAG input continues to be instrumental as FEI moves forward with DSM activities, helping to ensure that efforts are aligned with the interests and suggestions of stakeholders.

In 2021, FEI sought EECAG input on three key topics for which four partial day engagement sessions were hosted in June, September and December. Due to the COVID-19 pandemic and associated protocols, these sessions were hosted virtually and reduced to a few hours in length from the typical full-day workshops hosted in previous years. The first topic was a request for feedback on FEI's proposal for increased expenditure amounts into the Industrial, Residential and Innovative Technologies Program Areas. The expenditure application that followed this proposal was ultimately approved by the BCUC in Fall 2021. The second topic was a presentation and discussion on proposed new concepts for upcoming FBC and FEI DSM expenditure plans. FEI also took the opportunity to present and discuss opportunities in renewable gases that FortisBC is pursuing. EECAG members provided feedback on new concepts and generally supported the areas being considered for the upcoming expenditure plan. The third topic was a presentation and discussion on the proposed draft FBC DSM expenditure plan. This information was well received by members and their feedback was being taken into account in drafting the expenditure plan.



## 5. RESIDENTIAL ENERGY EFFICIENCY PROGRAM AREA

### 5.1 OVERVIEW

The Residential Energy Efficiency Program Area reduced annual natural gas consumption by 299,709 GJs, achieving an overall MTRC of 1.4. \$51.484 million was invested in Residential Energy Efficiency programs in 2021, and 95 percent of this investment was incentive spending<sup>8</sup>. Tables 5-1 and 5-2 summarize the expenditures for the Residential Energy Efficiency Program Area, including incentive and non-incentive spending and annual gas savings, as well as TRC/MTRC and other cost-effectiveness test results.

Residential programs serve over 954 thousand customers<sup>9</sup> in the FEI service territories. For DSM purposes, these customers predominantly include those living in single-family homes, row houses, townhomes or mobile homes<sup>10</sup>. Some in-suite measures, such as low flow fixtures and a small number of fireplaces and water heaters in multi-unit residential buildings are also included in this funding envelope.

For the 2019-2022 DSM Plan, the customer offerings for the Residential Energy Efficiency Program Area consist of consolidating measures within three overarching programs: Home Renovation, New Home and Rental Apartment Efficiency. These programs enable FEI customers to reduce their energy consumption and support industry in improving overall home performance. The combination of rebates, policy support, customer and industry engagement is instrumental in driving a culture of conservation and fostering market transformation in the residential sector.

**Table 5-1: Residential Energy Efficiency Program Area Results Summary - Expenditures**

Program Area	Utility Expenditures (\$000s)					
	Incentives		Non-Incentives		Total Expenditures	
	2021 Plan	2021 Actual	2021 Plan	2021 Actual	2021 Plan	2021 Actual
Home Renovation Program	39,162	40,390	2,226	1,465	41,388	41,856
New Home Program	7,158	8,430	844	856	8,002	9,285
Rental Apartment Efficiency Program	250	90	181	86	431	175
Non-Program Specific Expenses	0	0	300	167	300	167
<b>ALL PROGRAMS</b>	<b>46,570</b>	<b>48,910</b>	<b>3,551</b>	<b>2,574</b>	<b>50,121</b>	<b>51,484</b>

<sup>8</sup> Since actual expenditures were greater than plan, a funding transfer into the Residential Program Areas was required in 2021. Section 3 of this Annual Report discusses 2021 funding transfers.

<sup>9</sup> FEI Annual Review for 2020 and 2021 Rates, BCUC Order G-319-20 Compliance Filing.

<sup>10</sup> Programs for Multifamily Dwellings served under Rate Schedule 2 or 3 are included in the Commercial Energy Efficiency Program Area (please refer to Section 7) with a few exceptions as noted.

**Table 5-2: Residential Energy Efficiency Program Area Results Summary – Savings**

Program Area	Incremental Annual Gas Savings, Net (GJ)		Benefit/Cost Ratios				
	2021 Plan	2021 Actual	TRC	MTRC	UCT	PCT	RIM
Home Renovation Program	221,854	259,835	0.4	1.5	0.6	1.6	0.4
New Home Program	26,323	31,587	0.3	1.0	0.4	1.6	0.3
Rental Apartment Efficiency Program	23,935	8,287	2.7	2.7	2.5	12.2	0.6
Non-Program Specific Expenses	Savings Not Estimated		Savings Not Estimated				
<b>ALL PROGRAMS</b>	<b>272,112</b>	<b>299,709</b>	<b>0.4</b>	<b>1.4</b>	<b>0.5</b>	<b>1.6</b>	<b>0.4</b>

Notes:

- The 2019-2022 DSM Plan figures were adjusted in 2021. The 2021 Plan figures shown in Table 5-2 are the figures approved pursuant to Order G-301-21.
- Non-incentive expenditures consist of rebate administration, communications, evaluation and labour expenditures.

## 5.2 2021 RESIDENTIAL ENERGY EFFICIENCY PROGRAMS

This section outlines the specific Residential Energy Efficiency initiatives undertaken in 2021, including program and measure descriptions and a breakdown of non-incentive expenditures for each of the Home Renovations Rebate Program, the New Home Program, and the Rental Apartment Efficiency Program.

### Home Renovation Rebate Program

<b>Program Description</b>	The program promotes energy-efficiency home retrofits in collaboration with Utility Partners, EMLI, as well as federal and municipal governments. In addition to rebates, initiatives include capacity building for trades, ensuring high quality installations and providing opportunities to promote home labeling through EnerGuide home evaluations.
<b>Target Sub-Market</b>	Residential
<b>New vs. Retrofit</b>	Retrofit
<b>Partners</b>	BC Hydro, FortisBC Inc., EMLI, Municipal, and Federal Governments

Expenditures						
Home Renovation Rebate Program	Incentives	Administration	Communication	Evaluation	Labour	TOTAL
2021 Plan	39,162	720	280	226	1,000	41,388
2021 Actual	40,390	400	10	154	901	41,856

Participation		
Measure	2021 Plan	2021 Actual
<b>Space Heating</b>		
Furnace	16,393	17,225
Boiler	400	410
Combination System	1,533	1,776
<b>Secondary Heating</b>		
EnerChoice Fireplace	5,810	6,110
Direct Vent Wall Furnace	0	0

<b>Water Heating</b>		
0.67 EF Storage Tank Water Heater	1,500	1,513
Condensing Tankless Water Heater	6,000	6,038
Condensing Storage Tank Water Heater	100	72
<b>Building Envelope</b>		
Attic Insulation	1,500	1,912
Wall Insulation	250	328
Crawlspace and Basement Insulation	250	416
Other Insulation	100	132
Bonus Offers	5,640	5,791
<b>Water Conservation and Retail measures</b>		
Aerators & Showerheads	3,500	6,313
Draftproofing	20,000	47,757
ENERGY STAR Washer	2,000	2,445
ENERGY STAR Dryer	100	149
<b>Other</b>		
Drain Water Heat Recovery	0	0
Communicating Thermostat	8,557	9,174
HVAC Zone Controls	0	0
Appliance Maintenance services	0	1,645
<b>Total</b>	<b>73, 633</b>	<b>109,206</b>

## Notes:

- The Home Renovation Rebate program encourages customers to take a whole home approach to their energy efficiency upgrades by consolidating space heating, water heating and building envelope measures into an overarching program. In 2021, this program was a collaboration between the BC Utilities and the EMLI CleanBC Better Homes program.
- 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.
- Emphasis continued to be placed on Furnace Quality Installation. Rebate eligibility requirements include the installation of a two-pipe direct vent system and the completion of a commissioning sheet. An ENERGY STAR Verified Installation pilot (ESVI), launched in late 2019, which provides homeowners with a label that informs them that their installation conformed to best practices<sup>11</sup>. Due to COVID-19 implications and the desire to limit additional contractor time in the customers' homes, this pilot activity slowed. This provided the opportunity to launch the application software for ESVI and work with contractors to gain feedback and improve the software further. FEI is continuing to evaluate energy savings associated with Quality Installation. Virtual and onsite furnace inspections were conducted through the program to continue to support quality installation and contractor education.

<sup>11</sup> Please refer to Section 11, Enabling Activities for more information.

- Working with program partners, the Home Performance Stakeholder Council, and FEI's Trade Ally Network, FEI continues to promote the Home Performance industry through trades outreach, training, development of accredited contractor directories, site visits for program compliance quality installation and contractor accreditation initiatives. These activities provide value to customers through increased performance and longevity of installed equipment and improved comfort of their homes. Funding for these activities is outlined in Enabling Activities Section 11.2.

## New Home Program

<b>Program Description</b>	The New Home Program provides financial incentives in support of energy-efficient building practices for the Residential sector. The program supports the BC Energy Step Code, and educates builders and consumers about the benefits of high performance new homes.
<b>Target Sub-Market</b>	Residential
<b>New vs. Retrofit</b>	New
<b>Partners</b>	BC Hydro, FortisBC Inc., Municipal, Provincial and Federal Governments

Expenditures						
New Home Program	Incentives	Administration	Communication	Evaluation	Labour	TOTAL
<b>2021 Plan</b>	<b>7,158</b>	<b>130</b>	<b>45</b>	<b>84</b>	<b>585</b>	<b>8,002</b>
<b>2021 Actual</b>	8,430	76	122	100	557	<b>9,285</b>

Participation		
Measure	2021 Plan	2021 Actual
<b>BC Energy Step Code - Whole Home</b>		
STEP 2 (Single Family Dwelling)	350	206
STEP 2 (Townhome/Rowhome)	110	70
STEP 3 (Single Family Dwelling)	960	646
STEP 3 (Townhome/Rowhome)	410	383
STEP 4 (Single Family Dwelling)	115	134
STEP 4 (Townhome/Rowhome)	50	70
<b>Space and Water Heating Systems</b>		
0.67 EF Storage Tank Water Heater	210	126
Tankless Water Heater	860	1021
Condensing Storage Tank Water Heater	290	119
Combination System	700	483
<b>Secondary Heating</b>		
EnerChoice Fireplace	1,850	937
Direct Vent Wall Furnace	150	0
<b>Other</b>		
Drain Water Heat Recovery	200	15
Communicating Thermostat	750	591
HVAC Zone Controls	50	0
ENERGY STAR Dryer	50	452
<b>TOTAL</b>	<b>7,105</b>	<b>4,506</b>

### Notes:

- FEI, in collaboration with FBC, provides whole home incentives to align with the five tiers of the BC Energy Step Code for Part 9 buildings, as directed in the 2017 Amendment to the DSM Regulation. The amendment supports utilities' ability to provide incentives for builders who adopt the Energy Step Code in municipalities across BC.

- 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.
- Step Code incentives were distributed to 1,509 units for a total of \$6.1 million.
- Natural gas high efficiency equipment incentives were distributed for 3,819 measures for a total of \$2.3 million.
- FEI's Design Offer is available to builder's pursuing Step 3, 4 or 5 and is intended to educate and encourage higher performance construction and reduce builder time and risk. The Design Offer helps to offset the costs of engaging mechanical and building envelope designers and for pursuing an integrated design process (IDP). This offer assists in building the capacity and education of these service providers. This offer is funded through the Codes and Standards budget (Table 11.1).
- FEI collaborates with FBC, BC Hydro, EMLI and BC Housing to provide education to builders and energy advisors, and support policy regarding high performance homes in BC. These funds are discussed further in Section 11, and shown in Table 11.1 in the Codes and Standards budget.

## Rental Apartment Efficiency Program

<b>Program Description</b>	There are three components to this program. To start, participants are provided with direct install of in-suite energy efficiency upgrades completed by an agent of FortisBC. Next, participants are provided with energy assessments, which may recommend building-level energy efficiency upgrades such as condensing boilers, high efficiency water heaters and control upgrades. Lastly, participants are provided with support in implementing the energy efficiency recommendations and applying for rebates. All of the in-suite related expenses are included in the Residential Program Area, while the common area related expenses, including the energy assessment, implementation support, and common area upgrades, are included in the Commercial Program Area.
<b>Target Sub-Market</b>	Rental Apartment Buildings
<b>New vs. Retrofit</b>	Retrofit
<b>Partners</b>	N/A

Expenditures						
Rental Apartment Efficiency Program	Incentives	Administration	Communication	Evaluation	Labour	TOTAL
2021 Plan	250	106	45	14	16	432
2021 Actual	90	82	0	2	1	175

Participation		
Measure	2021 Plan	2021 Actual
Aerators & Showerheads	24,450	16,064

### Notes:

- 2021 was another challenging year for the Rental Apartment Efficiency Program with the COVID-19 pandemic continuing to dampen participation in this program.

### 5.3 SUMMARY

Residential Energy Efficiency Program Area activity in 2021 resulted in over 299,709 GJ/year of natural gas savings. These programs enabled customers to increase their home's performance while reducing their energy consumption. The program area continues to expand relationships with the trades and builders for education on energy efficiency and quality installation. The combination of financial incentives, policy support, contractor outreach, and customer education is instrumental to the ongoing success of these programs in generating natural gas savings and fostering market transformation in the residential sector.

## 6. LOW INCOME ENERGY EFFICIENCY PROGRAM AREA

### 6.1 OVERVIEW

The Low Income Program Area serves Low Income customers, Indigenous housing, co-operative housing, non-profit housing, and charities that aid Low Income customers. In 2021, DSM investments in the Low Income Program Area were \$9 million and annual gas savings were 50,660 GJ/yr. Tables 6-1 and 6-2 summarize the planned and actual expenditures for the Low Income Program Area in 2021, including incentive and non-incentive expenditures and annual gas savings, as well as the cost-effectiveness test results. The TRC for Low Income programs uses the same inputs as the MTRC without impacting the MTRC Cap in accordance with the DSM Regulation.

Key milestones in 2021 include:

- The Program Area experienced higher than expected investments in the Direct Install Program and the Prescriptive Program which led to the filing and subsequent approval from the BCUC through Order G-301-21 to increase the Program Area budget for 2021 and 2022. The planned figures in the tables below reflect the recently approved expenditures and savings.
- 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.
- FEI continued developing energy efficiency retrofit opportunities for manufactured homes through the Direct Install Program and increased the number of measure installations completed.
- 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 Prescriptive Program gaining momentum in 2021.
- The Prescriptive Program was expanded as we introduced new incentives for Indigenous communities building high-performance homes and for small buildings.

**Table 6-1: 2021 Low Income Program Results Summary – Expenditures**

Program Area	Utility Expenditures (\$000s)					
	Incentives		Non-Incentives		Total Expenditures	
	2021 Plan	2021 Actual	2021 Plan	2021 Actual	2021 Plan	2021 Actual
Direct Install Program	3,386	4,133	1,613	928	4,999	5,061
Self Install Program	491	381	66	81	557	462
Prescriptive Program	3,939	2,778	316	315	4,255	3,093
Support Program	227	176	22	12	249	188
Non-Program Specific Expenses	0	0	262	239	262	239
<b>ALL PROGRAMS</b>	<b>8,043</b>	<b>7,467</b>	<b>2,279</b>	<b>1,575</b>	<b>10,322</b>	<b>9,043</b>

**Table 6-2: 2021 Low Income Program Area Results Summary – Savings**

Program Area	Incremental Annual Gas Savings, Net (GJ)		Benefit/Cost Ratios				
	2021 Plan	2021 Actual	TRC	MTRC	UCT	PCT	RIM
Direct Install Program	8,553	10,907	1.4	1.4	0.1	2.6	0.2
Self Install Program	26,568	20,295	17.7	17.7	2.5	8.3	0.6
Prescriptive Program	22,426	19,457	3.2	3.2	0.6	2.2	0.4
Support Program	Savings Not Estimated		Savings Not Estimated				
Non-Program Specific Expenses	Savings Not Estimated		Savings Not Estimated				
<b>ALL PROGRAMS</b>	<b>57,547</b>	<b>50,660</b>	<b>3.0</b>	<b>3.0</b>	<b>0.4</b>	<b>2.6</b>	<b>0.3</b>

Notes:

- EMLI also contributed funds through their CleanBC programs towards some Low Income programs as noted in the partnership details in Section 6.2. EMLI funding is excluded from the above financials and energy savings.

More details for each of the programs within the Low Income Program Area follow.

## 6.2 2021 LOW INCOME PROGRAMS

This section outlines the specific Low Income programs undertaken in 2021, including program and measure descriptions and a breakdown of non-incentive expenditures for each of the Direct Install Program, Self Install Program, Prescriptive Program and Support Program.

### Direct Install Program

<b>Program Description</b>	Recognizing that some Low Income customers do not have the expertise and/or physical capabilities to install energy efficient measures, this program aims to remove that barrier by having a program delivery agent/contractor perform the installation
<b>Target Sub-Market</b>	Low Income single family dwellings, row homes, manufactured homes and apartments
<b>New vs. Retrofit</b>	Retrofit
<b>Partners</b>	BC Hydro, FBC, EMLI



Expenditures						
Direct Install Program	Incentives	Administration	Communication	Evaluation	Labour	TOTAL
2021 Plan	3,386	415	726	151	321	4,999
2021 Actual	4,133	133	287	204	303	5,061

Participation		
Measure	2021 Plan	2021 Actual
Energy Conservation Assistance	1,793	1,544

Notes:

- The Direct Install Program achieved 101 percent of the expenditure target. Expenditures were driven by an increase in the installation of more impactful measures such as insulation and furnaces as well as the work completed in manufactured homes. This also resulted in achieving 128 percent of planned energy savings in 2021.
- Participation increased slightly from 1,391 in 2020 but remained lower than pre-pandemic levels.

## Self Install Program

<b>Program Description</b>	Participants that have the capability to perform basic installations on their own can receive a bundle of basic energy efficiency measures to install themselves
<b>Target Sub-Market</b>	Low income home owners and renters
<b>New vs. Retrofit</b>	Retrofit
<b>Partners</b>	BC Hydro, FBC

Expenditures						
Self Install Program	Incentives	Administration	Communication	Evaluation	Labour	TOTAL
2021 Plan	491	7	45	4	12	558
2021 Actual	381	0	52	0	29	462

Participation		
Measure	2021 Plan	2021 Actual
Energy Savings Kit	12,300	14,084

Notes:

- The Self Install Program achieved 115 percent of the participation target. This is partially due to a re-engagement campaign for previous participants to receive additional energy measures.

## 1 Prescriptive Program

<b>Program Description</b>	Enable a straight-forward path towards a rebate for specific residential or commercial energy efficiency measure
<b>Target Sub-Market</b>	Residential Low Income customers, Indigenous housing providers, non-profit housing providers, charities
<b>New vs. Retrofit</b>	New construction and retrofit
<b>Partners</b>	EMLI

Expenditures						
Prescriptive Program	Incentives	Administration	Communication	Evaluation	Labour	TOTAL
2021 Plan	3,939	11	16	0	290	4,255
2021 Actual	2,778	8	9	0	298	3,093

Participation		
Measure	2021 Plan	2021 Actual
<b>Residential Retrofit</b>		
Boiler	55	39
Furnace	758	578
Health and Safety	46	141
Insulation (Attic, Wall, and Other)	65	7
Thermostat	261	156
Ventilation	3	5
Water Heater	277	185
Windows and Doors	77	0
<b>Residential New Construction</b>		
STEP 2	6	0
STEP 3	20	6
STEP 4	0	0
<b>Commercial</b>		
Boiler	12	20
Bundled Measures	42	46
Furnace	36	24
Water Heater	20	20
<b>TOTAL</b>	<b>1,678</b>	<b>1,227</b>

### Notes:

- The Prescriptive Program achieved 73 percent of planned participation. Participation was aided by the time-limited Bigger Rebates offer on select measures as well as the continued uptake of residential rebates in Indigenous communities. While these offers have continued to build momentum within Indigenous communities, COVID-19 continued to impact many communities, which in turn affected project completion and program participation.
- Additional rebates were introduced in 2021 to support the building of energy efficient homes in Indigenous communities and small buildings.

## Support Program

<b>Program Description</b>	Seek to enhance energy efficiency retrofit skills, provide direction to non-profit housing providers looking at enhancing the energy efficiency of their housing stock and motivate behavioural change through education and engagement
<b>Target Sub-Market</b>	Low Income customers and non-profit housing providers
<b>New vs. Retrofit</b>	New construction and retrofit
<b>Partners</b>	BC Hydro, FBC, EMLI

Expenditures						
Support Program	Incentives	Administration	Communication	Evaluation	Labour	TOTAL
2021 Plan	227	0	0	0	22	249
2021 Actual	176	0	0	0	12	188

Participation		
Measure	2021 Plan	2021 Actuals
Residential Energy Efficiency Works	0	0
Non-Profit Custom Studies and Implementation Support	67	50
<b>TOTAL</b>	<b>67</b>	<b>50</b>

### Notes:

- The Residential Energy Efficiency Works (REnEW), a training program geared towards people facing barriers to employment, involves several weeks of in-class training for participants. Due to COVID-19 concerns, this program was out of market in 2021.
- Although there were a greater number of energy studies performed in non-profit housing than was planned, there was less uptake than expected for implementation support.

## 6.3 SUMMARY

In spite of the COVID-19 pandemic and extreme weather events having some negative impact on programs, the strong performance in the Direct Install Program and the momentum built in the Prescriptive Program lead to the highest ever investment to date in the Low Income Program Area with \$9 million in expenditures and 50,660 GJ/yr gas savings.

## 7. COMMERCIAL ENERGY EFFICIENCY PROGRAM AREA

### 7.1 OVERVIEW

In 2021, Commercial Energy Efficiency programs continued to encourage commercial customers to reduce their overall consumption of natural gas and associated energy costs. The Commercial Energy Efficiency Program Area reduced annual natural gas consumption by approximately 413,600 GJs annually and achieved an overall TRC of 1.3. \$21.309 million was invested in Commercial Energy Efficiency, of which 87 percent was incentive spending.

Key highlights include:

- Changes to the Commercial Energy Assessment offer following customer feedback received positive response from small and medium business customers, including higher than expected participation.
- 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.

**Table 7-1: 2021 Commercial Energy Efficiency Program Results Summary - Expenditures**

Program Area	Utility Expenditures (\$000s)					
	Incentives		Non-Incentives		Total Expenditures	
	2021 Plan	2021 Actual	2021 Plan	2021 Actual	2021 Plan	2021 Actual
Prescriptive Program	7,100	8,298	1,277	1,324	8,377	9,622
Performance - Existing Buildings	6,200	8,959	916	499	7,116	9,458
Performance - New Buildings	3,000	709	501	354	3,501	1,063
Rental Apartment Efficiency Program	600	513	340	174	940	687
Non-Program Specific Expenses	0	0	800	478	800	478
<b>ALL PROGRAMS</b>	<b>16,900</b>	<b>18,479</b>	<b>3,835</b>	<b>2,830</b>	<b>20,735</b>	<b>21,309</b>

**Table 7-2: 2021 Commercial Energy Efficiency Program Results Summary – Savings**

Program Area	Incremental Annual Gas Savings, Net (GJ)		Benefit/Cost Ratios				
	2021 Plan	2021 Actual	TRC	MTRC	UCT	PCT	RIM
Prescriptive Program	188,100	182,109	1.9	1.9	1.7	4.5	0.6
Performance - Existing Buildings	110,000	200,215	1.1	1.1	1.7	2.2	0.5
Performance - New Buildings	60,341	7,929	1.0	1.0	1.1	1.2	0.3
Rental Apartment Efficiency Program	29,600	23,336	1.0	1.0	1.0	3.0	0.6
Non-Program Specific Expenses	Savings Not Estimated		Savings Not Estimated				
<b>ALL PROGRAMS</b>	<b>388,041</b>	<b>413,589</b>	<b>1.3</b>	<b>1.3</b>	<b>1.6</b>	<b>2.8</b>	<b>0.5</b>

## 7.2 2021 COMMERCIAL ENERGY EFFICIENCY PROGRAMS

This section outlines the specific Commercial Energy Efficiency programs undertaken in 2021, including program and measure descriptions and a breakdown of non-incentive expenditures for each of the Prescriptive Program, Performance Programs (Existing and New Buildings) and Rental Apartment Efficiency Program.

### Prescriptive Program

<b>Program Description</b>	This program provides rebates for the installation of high efficiency natural gas burning equipment, heat-loss reduction items and controls. Simple rebates are provided for equipment and products that meet specific performance standards. The program makes use of midstream and downstream rebate delivery approaches, as warranted by the particularities of each appliance type and the market it is intended to serve.
<b>Target Sub-Market</b>	All commercial sub-sectors
<b>New vs. Retrofit</b>	New construction and retrofit
<b>Partners</b>	FBC

Expenditures						
Prescriptive Program	Incentives	Administration	Communication	Evaluation	Labour	TOTAL
2021 Plan	7,100	591	244	32	411	8,377
2021 Actual	8,298	50	280	0	994	9,622

Participation		
Measure	2021 Plan	2021 Actual
Condensing Boiler	280	231
Mid Efficiency Boiler	15	4
Water Heater	371	258
Deep Fryer	121	46
Large Vat Deep Fryer	14	7
Griddle	51	5
Combination Oven	17	36
Convection Oven	90	33
Rack Oven	6	2
Conveyor Oven	14	16
Steam Cooker	10	0
Low Flow Spray Valve	100	0
Condensing Make Up Air Unit	200	20
Furnace Replacement (Baseline: Std.)	1,300	43
Furnace Replacement (Baseline: Mid)	1,300	85
Connected Thermostat	0	1

Roof Insulation	200	0
HVAC Controls	40	30
Condensing Unit Heaters	187	45
Vortex Deaerators	28	13
Gas Underfired Broilers	85	0
Air curtains	0	5
Pipe and Tank Insulation	0	36
Steam Boilers	0	7
Steam Traps	0	5
Steam Trap Survey	0	2
Contractor SPIFF	0	37
<b>TOTAL</b>	<b>4,429</b>	<b>967</b>

## Notes:

The measures with the most significant deviation from the plan are the following:

- Furnace measures achieved increased participation compared to 2020 as the rebate offer has now been in market for several years and customers and contractors are aware of the rebate.
- 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 to increase awareness of the rebate offer.
- Commercial kitchen/restaurant measures continued to have mixed performances. While measures such as Combination Oven and Conveyor Ovens over performed, Griddle and Convection Oven measures underperformed in 2021. Underfired Broilers are not yet included in the Energy Star certification program, as a qualifying requirement for the program. As such, FEI did not provide rebates for Underfired Broilers in 2021.

## Performance Program – Existing Buildings

<b>Program Description</b>	The program provides incentives to encourage participants to pursue a performance based approach to achieving natural gas savings in existing buildings. The program encourages detailed analysis of integrated energy saving measures to help identify all technically feasible and cost effective energy savings, and then follows up by providing support for the implementation of those measures.
<b>Target Sub-Market</b>	Medium to large commercial, institutional and multifamily residential
<b>New vs. Retrofit</b>	Retrofit
<b>Partners</b>	FBC
<b>Notes</b>	

Expenditures						
Performance - Existing Buildings	Incentives	Administration	Communication	Evaluation	Labour	TOTAL
2021 Plan	6,200	526	18	82	290	7,116
2021 Actual	8,959	4	1	147	347	9,458

Participation		
Measure	2021 Plan	2021 Actual
Studies - Retrofit	35	64
Capital Upgrades - Retrofit	18	37
Recommissioning - Studies	26	16
Recommissioning - O&M	13	8
Commercial Energy Assessments	35	113
<b>TOTAL</b>	<b>127</b>	<b>238</b>

## Notes:

- FEI administered CleanBC incentives supporting non-cost effective commercial natural gas energy efficiency projects, not eligible for existing FEI programs. The cost for administering additional CleanBC offers are administered separately and are not included in the program reporting herein.
- Both, “Studies – Retrofit” and “Capital Upgrades – Retrofit”, experienced an increased uptake due to increased demand in the market. We also experienced accelerated project completions by our customers due to the deadline for the COVID-19 recovery 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.

**Performance Program – New Buildings**

<b>Program Description</b>	The program provides incentives to encourage participants in pursuing a performance based approach to achieving natural gas savings in new buildings. The program encourages detailed analysis of integrated energy saving measures to help identify technically feasible and cost effective energy savings, and then follows up by providing support for the implementation of those measures. The program provides pathways for both buildings subject and not subject to the BC Energy Step Code.
<b>Target Sub-Market</b>	Medium to large commercial, institutional, and multifamily residential
<b>New vs. Retrofit</b>	New construction
<b>Partners</b>	FortisBC Inc.

Expenditures						
Performance - New Buildings*	Incentives	Administration	Communication	Evaluation	Labour	TOTAL
2021 Plan	3,000	298	10	28	165	3,500
2021 Actual	709	14	7	120	214	1,063

Participation		
Measure	2021 Plan	2021 Actual
BC Energy Step Code - Whole Building	11	5
Non-BC Energy Step Code - Whole Building	5	5
Early Engagement	20	0
Non-BC Energy Step Code - Engineered	45	0
BC Energy Step Code Capacity Building - Charrettes	2	0
Existing Program Participants	0	4
<b>TOTAL</b>	<b>83</b>	<b>14</b>

## Notes:

- 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.
- FEI continued with the outreach activities to architects, engineers, developers and energy modellers in 2021 and the increased intake of projects in 2021 is a result of these outreach activities.
- Legacy participants in the now out-of-market joint BC Hydro and FortisBC New Construction Program continued to receive incentives from existing rebate commitments.

## Rental Apartment Efficiency Program (RAP)

<b>Program Description</b>	There are three components to this program. To start, participants are provided with direct install of in-suite energy efficiency upgrades completed by an agent of FortisBC. Next, participants are provided with energy assessments, which may recommend building-level energy efficiency upgrades such as condensing boilers, high efficiency water heaters and control upgrades. Lastly, participants are provided with support in implementing the energy efficiency recommendations and applying for rebates. All in-suite related expenses are included in the Residential Program Area, while the common area related expenses, including the energy assessment, implementation support, and common area upgrades, are included in the Commercial Program Area.
<b>Target Sub-Market</b>	Rental Apartment Buildings
<b>New vs. Retrofit</b>	Retrofit

Expenditures						
Rental Apartment Efficiency Program	Incentives	Administration	Communication	Evaluation	Labour	TOTAL
2021 Plan	600	204	75	31	31	941
2021 Actual	513	113	34	1	26	687

Participation		
Measure	2021 Plan	2021 Actual
Energy Assessments	120	135



Implementation Support Partial	5	5
Implementation Support Full	25	11
Condensing Boilers	25	19
Water Heaters	5	5
Recirculation Controls	100	0
<b>TOTAL</b>	<b>280</b>	<b>175</b>

Notes:

- 2021 was another challenging year for the Rental Apartment Efficiency Program with COVID-19 continuing to dampen participation in this program.

### 7.3 SUMMARY

Commercial Energy Efficiency Program Area activity in 2021 resulted in approximately 413,600 GJ/year of natural gas savings. These programs enabled commercial and institutional customers to conduct both simple and comprehensive energy efficiency upgrades at their buildings. The combination of financial incentives, consultant and contractor outreach, and effective marketing in these programs is instrumental to the ongoing success of these programs in generating natural gas savings and fostering market transformation in the commercial sector.

## 8. INNOVATIVE TECHNOLOGIES PROGRAM AREA

### 8.1 OVERVIEW

A primary objective of the Innovative Technologies Program Area is to identify technologies that are not yet widely adopted in British Columbia, and that are suitable for inclusion in the Portfolio of ongoing DSM programs in other Program Areas. This is accomplished through pilot and demonstration projects, pre-feasibility studies and the use of Industry Standard Evaluation, Measurement and Verification (EM&V) protocols to validate manufacturers' claims related to equipment and system performance. Results from Innovative Technologies activities are used in making future DSM programming decisions and technology inclusions.

All 2021 activities undertaken in this Program Area meet the definition of technology innovation programs as set out in the DSM Regulation. It should be noted that Innovative Technologies 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. Innovative Technologies expenditures are also not subject to the MTRC cap set out in subsection 4(4) of the DSM Regulation according to Request for Clarification of Order G-44.

Table 8-1 summarizes expenditures for the Innovative Technologies Program Area in 2021, including incentive and non-incentive expenditures.

**Table 8-1: 2021 Innovative Technologies Program Area Results Summary – Expenditures<sup>12</sup>**

Program Area	Utility Expenditures (\$000s)					
	Incentives		Non-Incentives		Total Expenditures	
	2021 Plan	2021 Actual	2021 Plan	2021 Actual	2021 Plan	2021 Actual
Technology Screening	0	0	838	178	838	178
Pilot Project Expenditures	1,700	1,554	882	862	2,582	2,416
Deep Retrofits - Residential (New)	N/A	0	N/A	42	1,072	42
Deep Retrofits - Commercial (New)	N/A	153	N/A	324	387	477
Non-Program Specific Expenses	0	0	185	608	185	608
<b>ALL PROGRAMS</b>	<b>1,700</b>	<b>1,707</b>	<b>1,905</b>	<b>2,014</b>	<b>5,064</b>	<b>3,721</b>

### 8.2 2021 INNOVATIVE TECHNOLOGIES ACTIVITIES

This section outlines the specific Innovative Technologies Screening, Pilot Projects and Deep Energy Retrofit activities undertaken in 2021, including program and measure descriptions and a breakdown of non-incentive expenditures for each area.

<sup>12</sup> In 2021, the Innovative Technologies Program Area received approval from the BCUC to increase the total budget to \$5.064 million to explore deep energy retrofits and gas heat pump technologies.

## 1 Technology Screening

<b>Program Description</b>	Technology screening activities includes conducting prefeasibility studies, small field demonstrations or lab tests in order to understand the availability of the technology, applicable codes and testing standards, current adoption rate, technical barriers, measure assumption data and to determine the market opportunity. The data is used to determine whether the technology meets the requirements of a technology innovation program as defined in the DSM Regulation and used determine the feasibility of launching a pilot or to make future Program Area inclusion decisions.
<b>Target Market</b>	Variable
<b>New vs. Retrofit</b>	Variable
<b>Burner Management Controls</b>	The objective of this prefeasibility study is to assess the energy and non-energy benefits of innovative burner management technologies (burners and controls) for commercial applications. The study will recommend different pathways to evaluating and providing a future prescriptive rebate for this technology category. Study results were handed off in Q1 2021 to the C&I program team. With the positive TRC/MTRCs and applicability of a prescriptive program, commercial is moving forward with introducing this measure as a rebate program. They will continue to work with the vendor to develop a program.
<b>Envelope and Duct Sealing</b>	The objective of this prefeasibility study is to identify the energy savings and non-energy benefits of Air Barrier and Duct Sealing for residential and small commercial buildings. Study results were handed off in Q4 2021. The results of the study concluded that the air barrier measure would be difficult to implement in a retrofit scenario unless the building was emptied for full renovation or between occupants. Duct sealing had a more positive result. Air Barrier will be piloted in 2022 with the City of Vancouver and both measures will be included in the deep energy retrofit pilot program.
<b>Hybrid Heating System Controls</b>	The objective of this prefeasibility study is to identify the energy savings and non-energy benefits of residential hybrid heating controls. The results of the study identified opportunities to reduce energy consumption and to validate performance of the controls through conducting pilot measurement and verification activities. Study results were handed off in Q4 2021 to the Residential program team.
<b>Connected Homes</b>	The objective of this prefeasibility study is to update the 2018 connected homes study and to identify new or improved energy savings and non-energy benefits. Study results were handed off in Q3 2021. The study reviewed stand along technologies as well as home energy management systems. The results did not present net new technologies or significant improvements in energy savings or cost reductions for connected devices. Although the results we not cost effective further work may be required to assess non-energy benefits.
<b>Gas Heat Pump Lab Testing: Thermal Compression Heat Pump</b>	FortisBC provided funding for a European gas heat pump manufacturer in partnership with the Natural Gas Innovation Fund to conduct efficiency and performance lab testing for a residential gas heat pump to support the business case for expansion into the North American market. This project was put on hold due to a manufacturer decision to revisit research and development efforts and will be revisited in 2022.
<b>Gas Heat Pump Lab Testing: Residential Gas Absorption Heat Pump</b>	FortisBC is providing funding to the Gas Technology Institute to test and verify system performance for both a residential and commercial gas absorption heat pump manufacturer to support the business case for expansion into the North American market. Results expected Q3 2022.
<b>Gas Heat Pump Combi Characterization Report</b>	FortisBC is a founding member of the North American Gas Heat Pump Collaborative. In 2021, FortisBC co-funded a gas heat pump combi market characterization report to identify opportunities to advance gas heat pumps in the residential sector. The results of the report will be used to inform strategic communication and education strategies for contractors and customers to adopt gas heat pump combi units. Study results were handed off in Q4 2021 to the Residential program team.

2

Expenditures						
Technology Screening	Incentives	Administration	Communication	Evaluation	Labour	TOTAL
2021 Plan	0	348	393	0	97	838
2021 Actual	0	153	0	0	25	178

3

4

## 1 Pilot Project Expenditures

<b>Program Description</b>	The Pilot Program focused on conducting field demonstrations to gather data and validate manufacturer's claims about measure system performance and energy savings. The data from pilots can also be used to help improve the quality and installation of future systems, and to understand and reduce market barriers. Technologies that successfully emerge from Innovative Technologies Program will be considered for inclusion in the various Program Areas within the larger C&EM portfolio.	
<b>Target Market</b>	Variable	
<b>New vs. Retrofit</b>	Variable	
<b>Carbon Capture Pilot</b>	FortisBC partnered with Clean02 to test and demonstrate energy efficiency and GHG reduction for 10 carbon capture and conversion technology installations in the Lower Mainland and Vancouver Island. The pilot will test if the Clean02 Carbon Capture Technology can meet the energy conservation and greenhouse gas (GHG) reduction objectives of commercial and small business clients. In 2021, FortisBC provided incentives for one customer site. Pilot results are expected Q4 2023.	
	2021	Participants
	Total	1
<b>New Construction Combo Unit Demo Pilot</b>	FortisBC previously conducted a pilot program for the retrofit specific market on Combination systems. Although the pilot results were promising, they were only indicative of the retrofit market. The New Construction Combination Pilot was conducted to assess the technical characteristics, market opportunity and projected energy savings of combination systems in the new construction market. The project targeted two townhome development projects located in FortisBC service territories. Survey results revealed a need for education and awareness for engineering firms and contractors to better understand the integration, costs and value of adding combination systems into new construction developments. Results were handed off in Q2 2020 to the Residential program area to inform program decisions. Final participant rebates were delivered in 2021.	
	2021	Participants
	Total	6
<b>Commercial Gas Absorption Heat Pump Pilot</b>	FortisBC further investigated two existing participant sites to identify system performance enhancements for both domestic hot water and space heating applications. Pilot results are summarized in Table 12.2: Summary of Key Findings and Methodology for 2021 Completed C&EM Program Evaluation Studies.	
	2021	Participants
	Total	2
<b>Gas Technology Institute: Residential Gas Absorption Heat Pump Water Heater Pilot</b>	FortisBC is funding Gas Technology Institute's North American Residential Gas Heat Pump Water Heat Pilot ("GHPWH") evaluating a GHPWH prototype for residential applications. The GHPWH will be an 80 gallon tank with efficiencies greater than 100%. Collectively, the pilot project will install 61 GHPWH across North America with 10 units being installed in FortisBC's service territory. The overall end goal is to provide evaluation results to support DSM program development and commercialization of gas heat pump water heaters. Due to manufacturing delays this pilot was put on hold for 2021 and will be reassessed in Q1 2022.	
	2021	Participants
	Total	0
<b>Residential Gas Absorption Heat Pump Pilot ("RGHP")</b>	FortisBC is evaluating the energy savings, installation and customer acceptance of a pre-production residential gas absorption heat pump unit for residential space and water heating applications. Installations across 10 sites is expected to be complete by Q2 2022, with monitoring and evaluation taking place from Q2 2022 to Q2 2023. Post evaluation of the pre-production unit, the Manufacturer will be responsible to replace the unit with a certified market ready product. In 2021, FortisBC incented the manufacturer for parts and materials to produce 10 certified pre-production units.	
	2021	Participants
	Total	10

<b>Step 5 Homes Pilot</b>	The objectives of the pilot is to evaluate incremental costs and customer acceptance of achieving Step 5 of the BC Energy Step Code utilizing natural gas energy efficiency measures to support the Residential New Construction program development. In 2021, there were thirty three Step 5 applicants.		
	2021 Total	Participants 33	
<b>Thermal Compression Heat Pump Pilot ("TCHP")</b>	FortisBC is evaluating the energy savings, installation and customer acceptance of a thermal compression heat pump (TCHP) prototype for residential space and water heating applications. Installations of up to 10 sites is expected to be complete by Q4 2022, with monitoring and evaluation taking place from Q4 2022 to Q4 2023. Post evaluation of the TCHP prototype, the Manufacturer will be responsible to replace the prototype with a certified product which be further evaluated from Q4 2023 to Q4 2024 for quality assurance. Prototype results are expected in Q1 2024. Final results of the certified product expected in Q1 2025. In 2021, FortisBC incented two installations.		
	2021 Total	Participants 2	
<b>Commercial Gas Heat Pump Pilot: Heritage Gas</b>	FortisBC is funding a commercial gas absorption heat pump pilot with Heritage Gas to identify the energy savings, installation and customer acceptance of a pre-commercial gas absorption heat pump technology. Results expected Q2 2023.		
	2021 Total	Participants 1	
<b>Gas Technology Demonstration Pilot ("GTD")</b>	The Gas Technology Demonstration ("GTD") pilot provides funding to FortisBC Energy Specialists and Climate Action Partners to explore innovative technologies through three main program offerings: Technology Feasibility Study, Technology Demonstration, Technology Measurement and Verification. In 2021, GTD provided funding for LUX laundry, integrated fault detection and diagnostic systems, and feasibility assessment for innovative building envelopes.		
	2021 Total	Participants 5	
<b>Participants</b>	2021 Total	Projected n/a	Actual 60

Expenditures						
Pilot Project Expenditures	Incentives	Administration	Communication	Evaluation	Labour	TOTAL
2021 Plan	1,700	225	0	157	500	2,582
2021 Actual	1,554	499	0	324	39	2,416

## Deep Energy Retrofits

<b>Deep Retrofit Demonstration – Commercial</b>	FortisBC in partnership with the City of Vancouver, BC Housing and BC Non-profit Housing Association are identifying the feasibility of reducing up to 80 per cent greenhouse gas emissions in an existing multi-unit residential building by undergoing a comprehensive deep energy retrofit utilizing natural gas energy efficiency. In 2021, FortisBC completed several project milestones including the selection of both a pilot participant and a prime consultant to initiate detailed design. A building condition assessment was completed to identify the building's current state and highlight the greatest opportunities for energy and non-energy upgrades. In addition, FortisBC conducted measurement and verification analysis to establish baseline energy consumption, occupant comfort and indoor air quality metrics. Furthermore, FortisBC supported the development of a tenant communications strategy including funding support of a tenant liaison position to lead building logistics and tenant communications efforts during the project. In 2022, the project is targeting to complete detailed design and will focus on procurement of a general contractor to support
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	construction activities throughout 2022-2024. Completion of the retrofit construction and evaluation results is expected by Q4 2025.
<b>Drone Assisted Thermographic Study</b>	The objective of this study is to identify the efficiency opportunities of utilizing innovative thermal imaging drone technologies compared to standard thermal imaging equipment. Study results provided insights into the advantages and limitations for thermal drones and were handed off in Q4 2021 to inform future deep energy retrofit assessments.
<b>Deep Retrofit Implementation Approaches Study</b>	The objective of this study is to understand the various design and construction methods of which a retrofit building project could be delivered and how these methods could impact a project to optimize the customer experience through a pilot program. Study results expected Q1 2022.
<b>Deep Energy Retrofit Energy and Cost Modelling Study</b>	The two objectives of this study were to identify and evaluate all industry accepted energy modelling platforms as well understand the potential cost of the deep energy retrofit for both Single Family Dwelling (SFD) and Multi-Unit Residential Buildings (MURB). The result of this study was used in developing the business case for deep energy retrofit pilot program.
<b>Deep Energy Retrofit Pilot- Part 3 Commercial and Part 9 Residential buildings</b>	FortisBC is evaluating the potential energy savings, GHG emission reduction, customer and industry acceptance and implementation challenges of deep energy retrofits within its natural gas based customer based. This pilot focuses on two streams. The first stream is Part 3 Multi-Unit Residential Buildings (MURB) and the second stream is Part 9 Single Family Dwellings (SFD), all located in BC Climate Zone 4, 5 and 6. The business case for this pilot program was developed and approved and the contract with two individual implementation contractors was awarded during 2021. A deep energy retrofit costing and energy modelling study was also conducted in 2021 to provide information to define the estimated budget and methodology. In December 2021, a separate study was also conducted to develop educational collateral about deep energy retrofits in both Part 3 and Part 9 buildings. The main purpose of the collateral is to raise awareness and encourage participation. The balance of activities in the pilot program are planned for 2022 through the end of 2025.
<b>Reframed Initiative Partnerships</b>	FortisBC has entered into a partnership with Pembina Institute to promote a natural gas based deep energy retrofit pathway with Pembina Institute's reframed Initiative. Reframed Initiative is a partnership between Pembina Institute, City of Vancouver, BC Housing and BC Non-profit Housing Association. The main objective of Reframed Initiative is to create a business case around scalable deep energy retrofit of the existing building stock in BC and including a natural gas based solution is an important step for FortisBC as one of the leaders in the future of BC's deep energy retrofit industry.

Expenditures						
Deep Retrofits	Incentives	Administration	Communication	Evaluation	Labour	TOTAL
<b>2021 Plan</b>	<b>200</b>	<b>686</b>	<b>0</b>	<b>157</b>	<b>416</b>	<b>1,459</b>
<b>2021 Actual</b>	153	304	4	49	9	<b>519</b>

\*The Variance is attributed to the time required to develop and approve the deep energy retrofit pilot program business case and the selection of implementation contractors.

Notes:

- 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.

### 8.3 SUMMARY

Innovative Technologies represent a key component of FEI's overall commitment to DSM activities by identifying viable technologies and projects that have the potential to support the

1 development of new programs within the larger DSM Portfolio. Overall, the Innovative  
2 Technologies initiatives achieved results in evaluating the feasibility of new technologies and  
3 providing insights used towards the design of future DSM programs. The Innovative Technologies  
4 Program Area continues to use consistent criteria to ensure the greatest potential for screening  
5 technologies for further development as full programs in other areas of the DSM Portfolio.

6 The Innovative Technologies Program Area conducted several technology screening, pilot  
7 projects and deep energy retrofit activities as noted in section 8.2 above, to investigate innovative  
8 solutions to reduce emissions in existing buildings by over 50 percent and to support the  
9 commercialization of natural gas heat pumps whereby the technologies can achieve system  
10 efficiencies greater than 100 percent.

11 The completed research from the Innovative Technologies Program Area helped transition  
12 commercial gas absorption heat pumps into FortisBC's first commercial gas heat pump rebate  
13 program. Furthermore, the team was recognized for their leadership in the evaluation and  
14 advancement of gas heat pumps across the Pacific Northwest and was the recipient of the North  
15 West Efficiency Alliance's 2021 Leadership in Energy Efficiency Award for Innovation.



## 9. INDUSTRIAL ENERGY EFFICIENCY PROGRAM AREA

### 9.1 OVERVIEW

In 2021, the Industrial Energy Efficiency Program Area continued to encourage industrial customers to use natural gas more efficiently, achieving an overall TRC of 2.7. As a result, net natural gas savings of approximately 297,800 GJ/yr were achieved. Table 9-1 summarizes expenditures for the Industrial Energy Efficiency Program Area in 2021, including incentive and non-incentive spending, annual and NPV gas savings, as well as all cost-effectiveness test results.

During 2021, the Industrial Energy Efficiency Area experienced a continuation of the increased 2020 participation levels in all industrial program offerings. In 2020, FortisBC introduced COVID-19 recovery offers to the market which included time-limited increased incentives for some of the programs and an accelerated payment structure to support capital upgrades in an economic downturn. In May 2021, the COVID-19 recovery offers for FEI's industrial customers were phased out, which led to accelerated completion of some of the projects in the Performance Program, since the participants wanted to benefit from those temporary offers before their expiry. Some of the projects (Performance and Prescriptive Programs) did not complete and this only became evident very late in 2021. The most common reasons were supply chain issues and events that were outside of the participant's control. Hence, the Industrial expenditure was below plan in 2021.

**Table 9-1: 2021 Industrial Energy Efficiency Program Results Summary**

Program Area	Utility Expenditures (\$000s)					
	Incentives		Non-Incentives		Total Expenditures	
	2021 Plan	2021 Actual	2021 Plan	2021 Actual	2021 Plan	2021 Actual
Performance Program	4,297	2,982	351	408	4,648	3,390
Prescriptive Program	2,500	2,122	90	166	2,590	2,288
Strategic Energy Management Program	340	333	145	49	485	382
Non-Program Specific Expenses	0	0	190	35	190	35
<b>ALL PROGRAMS</b>	<b>7,137</b>	<b>5,438</b>	<b>776</b>	<b>658</b>	<b>7,913</b>	<b>6,095</b>

**Table 9-2: 2021 Industrial Program Results Summary – Savings**

Program Area	Incremental Annual Gas Savings, Net (GJ)		Benefit/Cost Ratios				
	2021 Plan	2021 Actual	TRC	MTRC	UCT	PCT	RIM
Performance Program	282,656	181,539	3.2	3.2	4.8	5.7	0.8
Prescriptive Program	120,112	78,718	2.1	2.1	2.7	3.7	0.8
Strategic Energy Management Program	56,000	37,503	3.7	3.7	3.0	6.5	0.9
Non-Program Specific Expenses	Savings Not Estimated		Savings Not Estimated				
<b>ALL PROGRAMS</b>	<b>458,768</b>	<b>297,760</b>	<b>2.7</b>	<b>2.7</b>	<b>3.9</b>	<b>4.9</b>	<b>0.8</b>



## 9.2 2021 INDUSTRIAL ENERGY EFFICIENCY PROGRAMS

### Performance Program

<b>Program Description</b>	The Performance Program is a custom program to help industrial customers use natural gas more efficiently for process-related activities. The program provides funding for walkthrough-level plant wide audits, detailed engineering feasibility studies and custom capital incentives to implement cost effective energy conservation measures (ECMs). Formerly submitted as the Industrial Optimization Program.
<b>Target Sub-Market</b>	Industrial Customers
<b>New vs. Retrofit</b>	New construction and retrofit
<b>Partners</b>	FortisBC Inc.

Expenditures						
Performance Program	Incentives	Administration	Communication	Evaluation	Labour	TOTAL
2021 Plan	4,297	61	20	50	220	4,648
2021 Actual	2,982	2	0	112	294	3,390

Participation		
Measure	2021 Plan	2021 Actual
Technology Implementation	9	8
Feasibility Study	11	16
Plant Wide Audit	8	3
<b>TOTAL</b>	<b>28</b>	<b>27</b>

#### Notes:

- The Performance Program continues to experience solid participation, owing to present market demands and referrals from the Strategic Energy Management (SEM) program.
- Towards year-end, a number of customers informed FEI that the completion of their 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.

### Prescriptive Program

<b>Program Description</b>	Prescriptive initiatives to encourage the implementation of technologies for specific industrial processes using natural gas as an energy source.
<b>Target Sub-Market</b>	Large, medium and small industrial facilities
<b>New vs. Retrofit</b>	All measures available for both new construction and retrofit, except for the steam trap surveys and steam trap replacement (retrofit only)
<b>Partners</b>	FortisBC Inc.

Expenditures						
Prescriptive Program	Incentives	Administration	Communication	Evaluation	Labour	TOTAL
2021 Plan	2,500	3	3	41	43	2,590
2021 Actual	2,122	27	0	0	139	2,288

Participation		
Measure	2021 Plan	2021 Actual
Process Boiler (Hot Water and Steam)	12	6
Air Curtains - Small Door	2	0
Air Curtains - Medium Door	2	0
Air Curtains - Large Door	2	0
Direct Contact Water Heater	5	0
Steam Traps Survey	13	0
Steam Traps Replacement	13	1
1" insulation 0.5-1" HW pipe	3	2
1" insulation ≥ 1" HW pipe	3	2
1" insulation 0.5-1" LPS pipe	3	0
1" insulation ≥ 1" LPS pipe	3	2
1" insulation 0.5-1" HPS pipe	3	0
1" insulation ≥ 1" HPS pipe	3	0
Tank Insulation 1" Low Temp	1	0
Tank Insulation 1" High Temp	1	0
Tank Insulation 2" High Temp	1	0
Thermal Curtains	0	9
Single Stage Infrared Heater	0	3
Two Stage Infrared Heater	0	37
Condensing Unit Heater	0	4
Other Prescriptive Measures	5	18
SPIFF	0	42
<b>TOTAL</b>	<b>75</b>	<b>130</b>

## Notes:

- 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 to due to the flooding the province experienced in November 2021.

## Strategic Energy Management Program

<b>Program Description</b>	A comprehensive approach to energy management to achieve sustainable energy and cost savings over the long term for larger FEI natural gas industrial customers. Components include operation energy analytics, energy expert expertise and support, assistance with applications for other program offers, industry collaboration and support for conservation initiatives. Includes pay-for-performance aspect for verified energy savings at the end of the program period or for achieving identified milestones.
<b>Target Sub-Market</b>	Large and medium industrial facilities
<b>New vs. Retrofit</b>	Retrofit
<b>Partners</b>	BC Hydro

Expenditures						
Strategic Energy Management Program	Incentives	Administration	Communication	Evaluation	Labour	TOTAL
2021 Plan	340	13	13	50	70	486
2021 Actual	333	15	0	0	35	382

Participation		
Measure	2021 Plan	2021 Actual
Individual, Large Customer	5	6
Cohort, Medium Customers	10	23
<b>TOTAL</b>	<b>15</b>	<b>29</b>

## Notes:

- FEI offers Strategic Energy Management (SEM) as a supplementary offer to the Strategic Energy Management program offered by BC Hydro. FEI's SEM support is focused on natural gas efficiency for participants who are already enrolled in BC Hydro's SEM program and consume significant volumes of natural gas.
- FEI offered natural gas efficiency support to five cohorts (BC Hydro Cohort 1, 2, 3, 5 and the Industrial Energy Manager cohort)
- Non-incentive spending in the SEM program was lower than the DSM Plan due to easier than anticipated participant recruitment in the Cohort and the Industrial Energy Manager offers.

### 9.3 SUMMARY

Industrial Energy Efficiency Program Area activity in 2021 resulted in approximately 297,800 GJ/year of natural gas savings. These programs enabled industrial customers to conduct both simple and comprehensive energy efficiency upgrades at their facilities. The combination of financial incentives, increased Point-of-Sale trade ally partners, Strategic Energy Management program, and effective marketing in these programs is instrumental to the ongoing success of these programs in generating natural gas savings and fostering market transformation in the industrial sector.

## 10. CONSERVATION EDUCATION AND OUTREACH INITIATIVES

### 10.1 OVERVIEW

The CEO Program Area continues to support the DSM Portfolio goals of energy conservation in a variety of ways. In order to foster a culture of conservation, several initiatives and campaigns were undertaken/continued in 2021, providing information about behaviour change and customer attitudes on energy efficiency. Educating all types of customers and students (who are future customers) remains a strong priority and FEI is continuing to ensure steps are taken to make the information provided relevant and timely. Adjustments made to CEO initiatives addressing COVID-19 pandemic restrictions and related customer response are described in this section. Table 10-1 presents the CEO expenditures for 2021.

**Table 10-1: 2021 CEO Initiative Results Summary – Expenditures**

Program Area	Utility Expenditures (\$000s)					
	Incentives		Non-Incentives		Total Expenditures	
	2021 Plan	2021 Actual	2021 Plan	2021 Actual	2021 Plan	2021 Actual
General Residential Education Program	0	0	3,145	1,497	3,145	1,497
Residential Customer Engagement Tool	0	0	3,144	1,542	3,144	1,542
Commercial Education Program	0	0	891	754	891	754
School Education Program	0	0	1,294	679	1,294	679
Non-Program Specific Expenses	0	0	105	45	105	45
<b>ALL PROGRAMS</b>	<b>0</b>	<b>0</b>	<b>8,578</b>	<b>4,517</b>	<b>8,578</b>	<b>4,517</b>

**Table 10-2: 2021 CEO Initiative Results Summary- Savings**

Program Area	Incremental Annual Gas Savings, Net (GJ)		Benefit/Cost Ratios				
	2021 Plan	2021 Actual	TRC	MTRC	UCT	PCT	RIM
General Residential Education Program	Savings Not Estimated		Savings Not Estimated				
Residential Customer Engagement Tool	0	58,204	0.2	1.3	0.2	2.2	0.2
Commercial Education Program	Savings Not Estimated		Savings Not Estimated				
School Education Program	Savings Not Estimated		Savings Not Estimated				
Non-Program Specific Expenses	Savings Not Estimated		Savings Not Estimated				
<b>ALL PROGRAMS</b>	<b>0</b>	<b>58,204</b>	<b>0.2</b>	<b>1.3</b>	<b>0.2</b>	<b>2.2</b>	<b>0.2</b>

## 10.2 2021 CEO PROGRAMS

### Residential General Education Program

<b>Program Description</b>	<p>This program provides information to Residential customers and the general public on natural gas conservation and energy literacy by seeking opportunities to engage with customers directly (either face-to-face or through online tools). This audience includes Low Income and multilingual customers.</p> <p>Promotional activities include a multimedia general rebates awareness campaign, engagement campaigns, and participation in home shows and community events. This Program also includes the production of energy efficiency education materials and prizing for events, which are used to start conversations and further engage audiences.</p> <p>FEI's partnership with Empower Me focused on reaching non-English speaking customers to drive participation to FortisBC's income qualified programs. Collaborations between internal departments and FortisBC Inc. continue to be sought to achieve cost efficiencies in the budget, particularly for advertising and outreach events.</p> <p>FEI will continue to focus on behavioural change opportunities that may result in energy savings.</p>
<b>Target Sub-Market</b>	Residential, local governments and general public
<b>New vs. Retrofit</b>	New construction and retrofit
<b>Partners</b>	BC Hydro, FortisBC Inc., local governments

Expenditures						
General Residential Education Program	Incentives	Administration	Communication	Evaluation	Labour	TOTAL
2021 Plan	0	510	2,212	110	312	3,145
2021 Actual	0	748	397	0	351	1,497

#### Notes:

- 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.
- FEI, in partnership with BC Hydro, continued to partner with Empower Me, focusing on income-qualified non-English speaking customers driving participation to the utility's income qualified programs. Participants also learned about their utility bills, safety, and behaviour change initiatives to help them save energy and money. FortisBC continued with its "We've got rebates" general marketing campaign which continued to increase awareness of its rebate programs.

### Residential Customer Engagement Tool Program

<b>Program Description</b>	<p>This program provides customers with an online portal and home energy reports where customers can access targeted energy conservation content. Other engagement measures may be included in future years to foster behavior change.</p> <p>FortisBC's Customer Engagement Tool, My Energy Use, is an enhancement to Account Online providing customers with a better understanding of their home's energy use. Through the My Energy Use portal, customers can receive personalized insights into their individual home energy use, rebates, and earn</p>
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	reward points for participating in energy-savings activities. Through the portal, FortisBC is able to use the data collected to enhance program recruitment and participation in its programs. In addition to the portal, FEI sent six home energy reports during the year to approximately 80,000 customers. The reports help customers understand their energy usage in comparison to energy used by similar homes and encourages customers to reduce their energy use through actionable advice.
<b>Target Sub-Market</b>	Residential
<b>New vs. Retrofit</b>	Retrofit
<b>Partners</b>	FortisBC Inc.

Expenditures						
Residential Customer Engagement Tool	Incentives	Administration	Communication	Evaluation	Labour	TOTAL
2021 Plan	0	2,657	208	40	239	3,144
2021 Actual	0	1,335	33	49	125	1,542

Notes:

- Underspend is a result of the program launch being delayed into late 2020. As a result, the program expenditures are operating behind the current FEI DSM plan.

## Commercial Education Program

<b>Program Description</b>	<p>This program provides ongoing communication and education about energy conservation initiatives as well as encouraging behavioural changes that help Commercial customers reduce their organization's energy consumption. The Commercial sector is made up of small and larger businesses in a variety of sub sectors such as retail, offices, multi-family residences, schools, hospitals, hospitality services and municipal/institutions.</p> <p>Promotional activities included virtual, face-to-face, print and online communications, and industry association meetings. FEI and FBC jointly hosted its eight Efficiency in Action Awards, which recognizes Commercial customers for their innovation in energy efficiency and achieved natural gas savings.</p> <p>FEI continued to support behavior education campaigns delivered by energy specialists in their respective organizations. Collaborations between internal departments, FortisBC Inc. as well as other utilities continued to achieve cost efficiencies such as the Energy Wise Network joint initiative with BC Hydro.</p> <p>CEO continued to provide information to customers and the public on natural gas conservation and energy literacy. In collaboration with FBC, FEI supported and funded 742 small to medium size business energy assessments. Customers received advice on saving energy and learned about rebates on high-efficiency upgrades. With the constantly changing COVID-19 restrictions, FEI worked with its vendor to deliver the program both with a virtual and in-person model to ensure continued support. 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. Customers were referred to the program through the FortisBC contact center, and Energy Solutions Managers, in addition to outbound calling by the vendor.</p>					
<b>Target Sub-Market</b>	Commercial customers, multi-family, energy specialists, energy management staff, municipalities					
<b>New vs. Retrofit</b>	New construction and retrofit					
<b>Partners</b>	BC Hydro, Municipalities, FortisBC Inc.					
<b>Expenditures</b>						
<b>Commercial Education Program</b>	<b>Incentives</b>	<b>Administration</b>	<b>Communication</b>	<b>Evaluation</b>	<b>Labour</b>	<b>TOTAL</b>
<b>2021 Plan</b>	0	402	221	60	209	891
<b>2021 Actual</b>	0	162	386	0	207	754

## Notes:

- 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.
- FEI’s partnership with BC Hydro continued in 2021. This included collaboration on the Energy Wise Network Program for commercial customers that led to 31 natural gas behaviour change projects being submitted in 2021 (with a completion date of March 31, 2022).

## School Education Program

<b>Program Description</b>	<p>This program responds to meeting the “adequacy” component of the Demand-Side Measures Regulation whereby a utility’s DSM portfolio is considered adequate if it includes an education program for students enrolled in [K-12] schools and post-secondary schools in the Company’s service area.</p> <p>Activities included supporting FEI’s corporate school initiatives, including but not limited to Energy is Awesome and the kindergarten to grade 12 curriculum-connected resource Energy Leaders. Additionally, the assembly style Energy Champions presentation which continued in partnership with the BC Lions.</p> <p>Partnerships and funding support for post-secondary initiatives included in-class presentations, as well as supporting education campaigns delivered by energy specialists (or an energy manager).</p>
<b>Target Sub-Market</b>	Students and teachers
<b>New vs. Retrofit</b>	New Construction and Retrofit
<b>Partners</b>	BC Lions, FortisBC Inc.

Expenditures						
School Education Program	Incentives	Administration	Communication	Evaluation	Labour	TOTAL
2021 Plan	0	750	261	53	229	1,294
2021 Actual	0	165	342	0	172	679

## Notes:

- Underspend was due to less than anticipated participation in interactive school program activities, primarily as a result of COVID-19.
- FEI’s Energy Leaders initiative offers curriculum-connected lesson plans for grades K-12 that focus on energy literacy and conservation and efficiency. To further support teachers and parents through the COVID-19 pandemic, 53 grade 11 and 12 lessons were translated to French and/or modified for distance learning, and 40 Grade 6 and 7 French and English worksheets with PDF fillable forms were added to the Energy Leaders site. Additionally, 40 professional development webinars were delivered to help teachers become acquainted with the Energy Leaders lesson materials.
- To better support teachers during the pandemic, the BC Lions Energy Champions and FEI’s Energy is Awesome programs were delivered virtually.

- For students enrolled in post-secondary institutions, FEI delivered virtual presentations about demand side management policies and programs in British Columbia, as well as employment opportunities within the energy management sector. It also provided funding support for the BCIT high performance building lab to provide hands-on training on zero energy buildings using an envelope-first approach and its SEMAC (Sustainable Energy Management) program. It co-sponsored a UBC Okanagan Smart Energy research chair to study optimal energy use and resilient and green infrastructure (Wilden Living Lab2 project).

### 10.3 SUMMARY

The CEO Program Area continues to support the DSM Portfolio goals of energy conservation in a variety of ways. In order to foster a culture of conservation, several initiatives and campaigns were undertaken in 2021, providing information about behaviour change and customer attitudes on efficiency. Educating all types of customers, and students remains a strong priority. FEI is continuing to ensure steps are taken to make the information provided relevant and timely.

FEI continued its collaboration with FBC in 2021 to maximize efficiencies across both utilities. Costs continue to be shared on school, residential and commercial outreach as applicable. The eighth annual Efficiency in Action awards were delivered jointly by both utilities virtually. The awards recognize FEI and FBC commercial and community-based customers that have most effectively used C&EM programs and achieved significant natural gas and electricity savings.

FEI continues to focus on behavioural change opportunities to foster a culture of conservation in British Columbia while driving program awareness and participation. CEO costs are included at the Portfolio level and incorporated into the overall DSM Portfolio cost-effectiveness results.



## 11. ENABLING ACTIVITIES

### 11.1 OVERVIEW

Table 11-1: 2021 Enabling Activities Results – Expenditures

Program Area	Utility Expenditures (\$000s)					
	Incentives		Non-Incentives		Total Expenditures	
	2021 Plan	2021 Actual	2021 Plan	2021 Actual	2021 Plan	2021 Actual
Trade Ally Network	0	0	2,346	1,339	2,346	1,339
Codes and Standards	523	1,668	1,721	1,508	2,244	3,177
Reporting Tool & Customer Application Portal	0	0	564	1,169	564	1,169
Conservation Potential Review	0	0	365	302	365	302
Customer Research	0	0	177	264	177	264
Commercial Energy Specialist Program	2,400	1,950	314	305	2,714	2,254
Community Energy Specialist Program	750	509	73	185	823	695
2020 Carryover Expenditures	0	0	-509	0	-509	0
<b>ALL PROGRAMS</b>	<b>3,673</b>	<b>4,128</b>	<b>5,049</b>	<b>5,071</b>	<b>8,722</b>	<b>9,199</b>

Table 11-2: 2021 Enabling Activities Results - Savings

Program Area	Incremental Annual Gas Savings, Net (GJ)		Benefit/Cost Ratios				
	2021 Plan	2021 Actual	TRC	MTRC	UCT	PCT	RIM
Trade Ally Network	Savings Not Estimated		Savings Not Estimated				
Codes and Standards	Savings Not Estimated		Savings Not Estimated				
Reporting Tool & Customer Application Portal	Savings Not Estimated		Savings Not Estimated				
Conservation Potential Review	Savings Not Estimated		Savings Not Estimated				
Customer Research	Savings Not Estimated		Savings Not Estimated				
Commercial Energy Specialist Program	0	22,612	Savings included in portfolio level C/B ratio				
Community Energy Specialist Program	Savings Not Estimated		Savings Not Estimated				
<b>ALL PROGRAMS</b>	<b>0</b>	<b>22,612</b>					

### 11.2 2021 ENABLING ACTIVITIES BY PROGRAM

#### Trade Ally Network

<b>Activity Description</b>	<p>The Trade Ally Network (TAN) is FEI's contractor network whose main objective is to advance energy efficiency messaging and to promote the company's DSM programs. The TAN comprises of contractors, equipment manufacturers, distributors and Point of Sale partners who offer rebates at the point of sale to commercial customers. FEI recognizes the critical role these industry groups play when it comes to influencing the end-use Residential and Commercial customers who make energy efficiency decisions.</p> <p>TAN is an important initiative under Enabling Activities that supports and supplements DSM program development and delivery, by providing FEI with a direct communication channel with industry stakeholders. TAN also supports FEI by:</p> <ul style="list-style-type: none"> <li>providing trade allies with co-op funding for advertising, delivering targeted messaging about energy efficiency, and to promote C&amp;EM rebate programs;</li> </ul>
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- funding eligible training that relates to the promotion and sales of high efficiency appliances, appliance safety, installation, best practices, or similar courses related to energy efficient measures that support FEI's current rebate programs.

In 2021, TAN contractors who are members of the Trade Ally Network were responsible for 65% percent of the 2021 Residential Furnace and Boiler Replacement Program rebates. To further support Point of Sale Partners and the commercial DSM programs, work was undertaken in 2021 to build an online search tool on the FEI website that allows commercial customers to find and connect with Point of Sale Partners. The tool is expected to launch in Q1 2022. Due to the regional heat wave and supply-chain disruptions caused by the COVID-19 pandemic, trade allies' participation in co-op advertising programs was limited. FEI continues to develop and offer to the trade allies training focused on the best practices for installing high-efficiency natural gas appliances and education that allows TAN members to maintain competitiveness and flexibility to continue selling energy efficient upgrades in the changing marketplace.

Notes:

- The Quality Assurance process was changed in 2020 to virtually conducting site visits and COVID-19 protocols were established based on restrictions. This has remained the same for 2021. Through the FEI site visit process, approximately 728 site visits were conducted with an average of 95% compliance rate.
- Energy Star Verified Installations continued in 2021; contractors were to follow established COVID-19 safety protocols as well as a mobile app was created based on contractor feedback to reduce in-home install time spent and admin process for contractors for commissioning data.
- FEI continues to support the industry, including FEI's contribution to the Home Performance Stakeholder Council (HPSC). The HPSC is an industry led group comprised of key industry players tasked with addressing the fragmented interests, opportunities and challenges that exist in BC's continuously evolving home performance industry. Funding for the HPSC is supported by FEI, FBC, BC Hydro, and EMLI. Only the FEI contribution is reported here.

Expenditures						
Trade Ally Network	Incentives	Administration	Communication	Evaluation	Labour	TOTAL
2021 Plan	0	416	884	624	421	2,346
2021 Actual	0	308	422	301	307	1,339

## Codes and Standards

<b>Activity Description</b>	<p>Utilities have a unique understanding of energy supply and customer demand cycles, which can be of assistance in the development of codes and standards. The content and timing of code implementation directly affects market transformation in all Program Areas. The Codes and Standards area "supports the development of or compliance with specified standard or a measure respecting energy conservation or the efficient use of energy", as referred to in the definition of "specified demand-side measures" in the DSM Regulation, and supports implementation and adoption of such measures and aims to educate and provide training to the industry.</p> <p>With respect to codes and standards development, FEI continued to evaluate, analyze and review the municipal, provincial and national codes and standards initiatives for energy efficiency and participated in various code amendment processes by way of providing comments.</p> <p>In terms of implementation and adoption of new codes and standards, FEI collaborated with entities, such as BC Hydro, provincial Building Safety and Standards Branch, and various municipalities in a survey to gauge compliance to Energy Codes in BC. FEI is supporting the development of energy</p>
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performance standards such as a CSA standard on Combination Space and Water Heating standard for radiant heating systems.

In the residential sector, FEI continued to provide support for energy compliance and testing of new homes through the provision of incentives for energy advisor services as required by the BC Energy Step Code. Incentives encourage builders to work with an energy advisor to validate the energy performance of their home through energy modelling, on-site airtightness testing, completion of the Step Code compliance reports and receipt of an EnerGuide label. Additional support was provided to encourage early design activities such as mechanical design, building envelope design and integrated design process (IDP). These activities minimize time and risk when building to the upper tiers of the BC Energy Step Code.

With respect to codes and standards education and training, FEI continued to sponsor BC Energy Step Code educational and training sessions throughout the year and delivered initiatives to provide the industry with education and training on a variety of building techniques and products that contribute to high-performance construction with improved energy efficiency. Throughout 2021, the impact of the COVID-19 pandemic continued to have an effect on the delivery of our educational and training sessions. As a result, some sessions were cancelled and others moved to an online / virtual format.

Expenditures						
Codes and Standards	Incentives	Administration	Communication	Evaluation	Labour	TOTAL
2021 Plan	523	1,214	156	192	158	2,244
2021 Actual	1,668	566	692	62	188	3,177

Notes:

- The Codes and Standards expenditure was higher than planned, primarily due to an increase in activity in energy modelling and blower door testing. Financial measures to assist in compliance with building codes via energy modelling and blower door tests for new residential homes was higher in 2021. This activity advances the market to build high performance homes with improved building envelope and enabling compliance with the Air Change per Hour (ACH) metric that was introduced in BC Energy Step Code.

## Reporting Tool & Customer Application Portal

<b>Activity Description</b>	The Demand-side Management Tracking System (DSMS) Project is transitioning FBC and FEI from their legacy DSM tracking systems onto a new, joint system. These tracking systems are used to manage DSM rebates from the application stage through to payment, including application review, reporting, and customer communications. The primary reasons for transitioning both utilities to a new system are: an improved ability to operate joint programs by sharing a platform, the introduction of online application forms for gas customers, improved reporting via integrated dashboards, and a powerful communications management system. In addition, FEI's legacy system vendor has ceased any further development of that system.
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Expenditures						
Reporting Tool & Customer Application Portal	Incentives	Administration	Communication	Evaluation	Labour	TOTAL
2021 Plan	0	416	0	0	147	564
2021 Actual	0	825	0	0	344	1,169

The reporting tool and customer application portal is a joint initiative between FBC and FEI. The tool launched seven residential programs in 2020, five programs launched in 2021, with the remaining programs set to launch in 2022.

The reporting tool offers customers an online portal to apply for rebates and track a rebate's status. The tool also offers FBC and FEI a tracking software to process applications and provide in-depth reporting. The tool is fully integrated to other technologies such as Account Online and SAP. The ongoing evolution of C&EM programs and the highly integrated nature of the tool to support a streamlined customer experience have resulted in a longer project timeline and higher expenditures than anticipated when the Plan values were developed in 2018.

## Conservation Potential Review Program

<b>Activity Description</b>	FEI considers the CPR to be an important tool for use in developing, supporting, and assessing current and future C&EM expenditure applications, as well as for directional input into program development. The purpose of a CPR study is to examine available technologies and determine their conservation potential, which includes the amount of energy savings that can be explored through conservation and energy management programs over the study period. The CPR does this by comparing the economic and market potential of viable measures to a base case scenario.
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### Expenditures

Expenditures						
Conservation Potential Review	Incentives	Administration	Communication	Evaluation	Labour	TOTAL
2021 Plan	0	312	0	0	53	365
2021 Actual	0	276	0	0	26	302

## Customer Research

<b>Activity Description</b>	Research activities undertaken under this budget in 2021 included exploring how to integrate our corporate messaging into our rebate campaigns, surveying customers on energy use during the pandemic, research focused on ethnic communities within our service territory as well as ongoing research to track the impact of general C&EM communications, and communications testing. Overspend in budget was due to an increased need for research to support our 2022 communications objectives.
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### Expenditures

Customer Research	Incentives	Administration	Communication	Evaluation	Labour	TOTAL
2021 Plan	0	156	0	21	0	177
2021 Actual	0	0	147	91	25	264

## Commercial Energy Specialist Program

<b>Activity Description</b>	This program funded Energy Specialist, Energy Analyst and Thermal Energy Manager positions in large commercial organizations. Funding ranged from \$50,000 up to \$80,000 per year based on position and an annual contract. A funded position's key priority is to identify and implement opportunities for their organization to participate in FEI's C&EM programs, while also identifying and implementing non-program specific opportunities to use natural gas more efficiently. There were 41 participants in 2021. This program is funded as an enabling activity but claims natural gas savings for those projects completed by energy specialists, energy analysts and thermal energy managers that are not claimed by another FEI DSM program. Total 2021 verified (non-C&EM program) annual savings were 22,612 GJ. FEI considers this to be an energy management program, and hence a specified demand-side measure, as defined in the DSM Regulation.
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Expenditures						
Commercial Energy Specialist Program	Incentives	Administration	Communication	Evaluation	Labour	TOTAL
2021 Plan	2,400	104	0	68	142	2,714
2021 Actual	1,950	27	0	91	186	2,254

## Notes:

- The Energy Specialist Program continues to experience success as an enabling program. In 2021, organizations with Energy Specialists were responsible for 21 percent of natural gas savings and 36 percent of the incentives paid out by Commercial C&EM programs. This is an addition to the Conservation Education and Outreach, Innovative Technologies, Low Income and Residential programs and incentives that the funded positions promoted and used in 2021.
- Some organizations had funded positions for part of the year only as they were new and added to the program later in the year or their funding agreements concluded and were not renewed.
- The energy savings listed only apply to third party verified natural gas projects completed by funded positions in 2021, which did not receive incentive funding from another C&EM program. These energy savings are only reported and have not been included in the calculations for the benefit/cost tests as the required inputs are not available.

**Community Energy Specialist Program**

Activity Description	This program funded Senior Energy Specialist positions in municipalities and regional districts, up to \$100,000 per year based on an annual contract. In the FEI service territory, C&EM contributes 60% of this funding amount with the other 40% coming from FEI's External Relations department. In the FEI/FBC shared service territory, C&EM contributes 75% of this funding (split 50/50 between C&EM FEI and FBC) with the other 25% coming from FEI's External Relations department. Senior Energy Specialists lead policy development and implementation as communities develop or refresh their sustainability and energy plans including BC Energy Step Code support where applicable and raise awareness of and participate in FEI's C&EM programs. There were nine participants in 2020. FEI considers this to be an energy management program, and hence a specified demand-side measure, as defined in the DSM Regulation.
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Expenditures						
Community Energy Specialist Program	Incentives	Administration	Communication	Evaluation	Labour	TOTAL
2021 Plan	750	10	0	36	26	823
2021 Actual	509	1	0	29	155	695

## Notes:

- Actual participation was under forecast since some communities had Community Energy Specialist for part of the year only related to hiring delays.

### 11.3 SUMMARY

Enabling Activities are critical initiatives that support and supplement DSM program development and delivery. The Trade Ally Network provides FEI the opportunity to quickly and effectively communicate new programs or revisions to existing programs. FEI continued to work with industry partners, including FBC, BC Hydro, and EMLI to support the industry and the Home Performance Stakeholder Council - an industry led group tasked with addressing the fragmented interests, opportunities and challenges that exist in BC's home performance industry.

FEI's involvement in codes and standards work in 2021 continued to encompass various activities including monitoring, reviewing and responding to existing and proposed regulatory changes and direct participation in working groups, committees and sub-committees that explore the development of future targets, codes and standards. In collaboration with the provincial Building Safety and Standards Branch, FEI and FBC provided support to educate builders and energy advisors and encourage the building of high performance homes in BC.

The continued development work in 2021 to implement the new DSM management system has further improved customer experience and service delivery for DSM programs. Once fully implemented, this new system will replace the legacy tool and provide improved features and reports to help FEI manage its expanding portfolio of DSM activities and enable new online functions for FEI's customers. Finally, customer research initiatives and the Energy Specialist programs continue to help improve the delivery of programs and energy efficiency awareness and behaviour in BC.

## 12. EVALUATION

In alignment with the Company's Evaluation, Measurement and Verification (EM&V) Framework and industry standard practice, program evaluation activities are assessed at different stages of each program's lifecycle<sup>13</sup>. Based on this ongoing assessment, all programs are evaluated when appropriate. The 2021 evaluation activities presented here reflect the number of programs in market, and the type of evaluation activities required to provide program feedback.

### 12.1 2021 PROGRAM EVALUATION AND EVALUATION RESEARCH ACTIVITIES

In 2021, FEI's various evaluation activities included quantifying energy savings, assessing participant awareness and satisfaction, identifying barriers to participation, assessing customer usability, engaging with various FEI DSM outreach activities, conducting industry research, and conducting quality assurance site visits. Measurement and Verification (M&V) activities focused on identifying and verifying project and measure level savings assumptions and understanding any issues associated with equipment installation in the field.

Table 12-1 provides a summary of all program evaluation and evaluation research related activities undertaken in 2021. Expenditures for these activities have been accounted for within the applicable program or Program Area non-incentive costs included in previous sections but are also reported here in order to provide a concise, easy-to-view summary of evaluation activities. Included in the table are: a list of all the 2021 evaluation activities; the Program Area each activity occurred in; the general type of evaluation activity undertaken; the Company's actual 2021 evaluation expenditures; and a status update on each activity. The total expenditure for program evaluation and research activities in 2021 was approximately \$1.9 million.

<sup>13</sup> Types of evaluation activities include: Communications evaluations, which focus on advertising and media outreach, and focus groups; Evaluation studies, where quality assurance is conducted to gain more insight on the incited measure, and literature reviews conducted to better understand the incited measure; Market studies, research and interviews with industry stakeholder to assess market penetration; Process evaluations, where surveys and interviews are used to assess customer satisfaction and program success; Impact evaluations, to measure the achieved energy savings attributable from the program; Market Analysis, to characterized the industry and the program's effect on market penetration and, Measurement & Verification, to monitor real time energy savings associated with energy conservation measures and validation of energy savings through energy study and energy model reviews.



1 **Table 12-1: Inventory of DSM Program Evaluation and Evaluation Research Activities Conducted in 2021<sup>14</sup>**

Evaluation Name	Program Area	Type of Evaluation	Evaluation Partners	Actual Evaluation Expenditure (000's)	Evaluation Status
<b>CUSTOMER RESEARCH</b>					
FortisBC Communication Tracking: Energy Efficiency Conservation	Enabling Activities	Communications	none	\$35	Customer engagement and awareness of C&EM activities. <b>Completed in March, June and October 2021 by Sentis Research</b>
MyVoice Panel Software	Enabling Activities	Communications	none	\$39	Various online testing projects: • Home Renovation Rebate & Free Ridership Research <b>Ongoing by FortisBC Energy Inc.</b> • Income Qualified DSM Programs Research <b>Completed November 2021 by FortisBC Energy Inc.</b>
HER & DDSM Service Quality Research	Enabling Activities	Communications	none	\$17	Customer experience and satisfaction with the Home Energy Report and Dynamic Demand Side Management service products. <b>To be completed Q2 2022</b>
<b>COMMERCIAL ENERGY SPECIALIST PROGRAM</b>					
Energy Audit 2020 Update	Enabling Activities	Process & Impact	FortisBC Energy Inc. & FortisBC Inc.	\$30	The study is an update to an energy savings audit to verify energy savings from projects completed in 2021. <b>Completed June 2021 by Prism Engineering. Preliminary results provided in 2020 AR.</b>
Energy Specialist Program Evaluation 2021	Enabling Activities	Process & Impact	FortisBC Energy Inc. & FortisBC Inc.	\$61	The evaluation study includes program and industry stakeholder surveys and an energy savings audit on a subset of completed 2021 projects. <b>To be completed Q2 2022</b>
<b>COMMUNITY ENERGY SPECIALIST PROGRAM</b>					
Community Energy Specialist Program Evaluation 2021	Enabling Activities	Process	FortisBC Energy Inc. & FortisBC Inc.	\$29	Program evaluation consisting of a process evaluation and interviews with internal and external stakeholders in order to gather feedback for future program design. <b>To be completed Q2 2022</b>

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<sup>14</sup> Table 12-1 does not include Prefeasibility Studies. Please refer to the Innovative Technologies section (Section 8) for details.



1 **Table 12-1: Inventory of DSM Program Evaluation and Evaluation Research Activities Conducted in 2021 (continued)**

TRADE ALLIED NETWORK QUALITY ASSURANCE					
Insulation & Program Compliance Site Visits	Enabling Activities	Evaluation Study	none	\$100	Ongoing site visit of homes with insulation and draft proofing measures with a focus on quality assurance and program compliance in order to provide contractor feedback and promote future contractor education and training.
Furnace Quality Assurance & Program Compliance Site Visits	Enabling Activities	Evaluation Study	none	\$165	Ongoing site visit of homes with furnace or boiler upgrades with a focus of quality assurance and program compliance in order to provide contractor feedback and promote future contractor education and training.
Furnace Quality Installation Field Study	Enabling Activities	Evaluation Study	none	\$35	In-person site assessments for furnace upgrades with a focus on capturing the pre-change out data to assess the baseline for the furnaces replaced. <b>To be completed Q2 2022</b>
CODES & STANDARDS					
Energy Code Compliance Studies	Enabling Activities	Process	none	\$60	Online survey of industry professionals and building officials regarding compliance with the BC Energy Step Code energy performance requirements for new buildings including residential and commercial. <b>Completed December 2021 by RDH Building Science</b>
Gas Fired ASHP - Calculation Tool	Enabling Activities	Market Study	none	\$0	Calculation tool development to assist Energy Modelers to calculate savings and evaluate gas fired heat pumps as part of the energy code compliance. <b>Completed September 2021 by E3 Eco Group Inc.</b>
Evaluation Industry Standard Practices Seminar	Enabling Activities	Communications	none	\$3	Seminar on advanced DSM impact evaluation techniques with emphasis placed on the methods, statistics and data preparation. <b>Completed November 2021 by Sampson Research</b>
HOME RENOVATION PROGRAM					
Fireplace Industry Research	Residential	Market Study	none	\$5	Interviews with manufacturers and retailers were conducted to assess satisfaction, rebate levels and delivery of the program. <b>Completed May 2021 by DAN SIR Energy Solutions</b>
Water Heater Evaluation	Residential	Process & Impact	none	\$75	Program evaluation consisting of participant and contractor interviews and an impact analysis for domestic gas hot water heaters. <b>Completed August 2021 by Econoler</b>

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1 **Table 12-1: Inventory of DSM Program Evaluation and Evaluation Research Activities Conducted in 2021 (continued)**

Evaluation Name	Program Area	Type of Evaluation	Evaluation Partners	Actual Evaluation Expenditure (000's)	Evaluation Status
<b>HOME RENOVATION PROGRAM</b>					
Double Rebates Offer Evaluation	Residential	Process	none	\$59	Customer and contractor surveys to assess the impacts of the Double Rebates Offer. <b>Completed November 2021 by Sampson Research</b>
Insulation Measures Characterization Analysis	Residential	Market Study	FortisBC Energy Inc., FortisBC Inc. & BC Hydro	\$3	Characterization analysis of insulation measures incented as part of the Home Renovation Rebate Program. <b>Completed December 2021 by Dunskey</b>
Furnace Quality Installation Field Analysis	Residential	Evaluation Study	none	\$5	Data analysis component of the Furnace Quality Installation Field Study project. <b>To be completed Q2 2022.</b>
Space Heating Incremental Cost Research	Residential	Market Study	none	\$7	Industry research on incremental costs associated with furnaces and boilers that are installed as part of the FortisBC Residential and Low Income incentive programs. <b>To be completed Q2 2022</b>
<b>NEW HOME PROGRAM</b>					
New Home Program Evaluation	Residential	Process & Impact	FortisBC Energy Inc. & FortisBC Inc.	\$100	Program evaluation of the New Home rebate program consisting of contractor and customer surveys, impact analysis, and an analysis on customer usage with hybrid models. <b>To be completed Q2 2022</b>
<b>RENTAL APARTMENT EFFICIENCY PROGRAM</b>					
Participant and Building Owner Surveys	Residential / Commercial	Process	FortisBC Energy Inc. & FortisBC Inc.	\$3	Surveys conducted with building owners and tenants to assess customer satisfaction, program awareness, and gather feedback for future program design. <b>2020 results: Completed April 2021 by Cohesium Research</b> <b>2021 results: To be completed Q2 2022</b>
<b>DIRECT INSTALL PROGRAM</b>					
Direct Install Quality Assurance	Low Income	Evaluation Study	FortisBC Energy Inc., FortisBC Inc. & BC Hydro	\$179	Ongoing quality assurance to ensure direct install measures are installed according to program policies and procedures.
Ongoing Customer Feedback Surveys	Low Income	Process	FortisBC Energy Inc., FortisBC Inc. & BC Hydro	\$25	Ongoing surveys with Direct Install program participants to gather feedback on their customer experience, satisfaction with the program and the program representatives. <b>Completed February and March 2021 by Sentsi Market Research</b>

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1 **Table 12-1: Inventory of DSM Program Evaluation and Evaluation Research Activities Conducted in 2021 (continued)<sup>15</sup>**

Evaluation Name	Program Area	Type of Evaluation	Evaluation Partners	Actual Evaluation Expenditure (000's)	Evaluation Status
<b>COMMERCIAL PERFORMANCE PROGRAM</b>					
Third Party Energy Study Reviews	Commercial	Measurement & Verification	none	\$133	Ongoing reviews conducted by third party consultants to review and verify the savings as noted in the project energy study reports. Energy study reviews may include engineering calculations for specific energy conservation measures, plant wide reviews, document reviews, and feasibility study reviews.
Third Party Measurement & Verification	Commercial	Measurement & Verification	none	\$15	Ongoing third party M&V conducted as part of the program evaluation. The M&V activities include the completion of an M&V plan, commissioning validation site visits, and M&V reports. M&V activities align with the International Performance Measurement and Verification Protocol (IPMVP).
<b>COMMERCIAL NEW CONSTRUCTION PROGRAM</b>					
Third Party Energy Model Reviews	Commercial	Measurement & Verification	none	\$120	Ongoing BC Energy Step Code and Non-BC Energy Step Code energy model validations conducted by a third party consultant as part of the program administration and evaluation.
<b>INNOVATIVE TECHNOLOGIES</b>					
Carbon Capture Pilot	Innovative Technologies	Measurement & Verification	none	\$19	Measurement of energy savings, installation and technology performance associated with the carbon capture system. <b>To be completed Q3 2023</b>
Gas Absorption Heat Pump Pilot	Innovative Technologies	Measurement & Verification	none	\$36	Measurement of energy savings, installation and customer acceptance of the gas-fired absorption heat pump technology for commercial DHW applications. <b>Phase 1 &amp; 2: Completed October 2020 by Building Energy Solutions Ltd. Results reported in the 2020 Annual Report.</b> <b>Phase 3 &amp; 4: Completed September 2021 by Building Energy Solutions Ltd.</b>
Thermal Compression Heat Pump Pilot	Innovative Technologies	Measurement & Verification	none	\$80	Measurement of energy savings, installation and customer acceptance of the thermal compression heat pump technology for residential space heat and DHW applications. <b>To be completed Q3 2023</b>

2 <sup>15</sup> Measurement & Verification studies require time to conduct activities which include, but are not limited to, project commissioning, installing and removal of monitoring equipment, data collection, and data analysis and reporting. M&V activities align with the International Performance Measurement and Verification Protocol (IPMVP) Concepts and Options for Determining Energy and Water Savings. Prepared by the Efficiency Valuation Organization: [www.evo-world.org](http://www.evo-world.org). January 2012.

1 **Table 12-1: Inventory of DSM Program Evaluation and Evaluation Research Activities Conducted in 2021 (continued)**

Evaluation Name	Program Area	Type of Evaluation	Evaluation Partners	Actual Evaluation Expenditure (000's)	Evaluation Status
<b>INNOVATIVE TECHNOLOGIES</b>					
Residential Gas Absorption Heat Pump Pilot	Innovative Technologies	Measurement & Verification	none	\$189	Measurement of energy savings, installation and customer acceptance of the gas-fired absorption heat pump technology for residential space and water heating applications. <b>To be completed Q3 2023</b>
Deep Energy Retrofit Pilot	Innovative Technologies	Measurement & Verification	none	\$49	Measurement of energy savings, installation and customer acceptance of building envelope and energy system upgrades for residential and commercial buildings. <b>To be completed Q4 2025</b>
<b>INDUSTRIAL PERFORMANCE PROGRAM</b>					
Third Party Energy Study Reviews	Industrial	Measurement & Verification	none	\$70	Ongoing reviews conducted by third party consultants to review and verify the savings as noted in the project energy study reports. Energy study reviews may include engineering calculations for specific energy conservation measures, plant wide reviews, document reviews, and feasibility study reviews.
Third Party Measurement & Verification	Industrial	Measurement & Verification	none	\$42	Ongoing third party M&V conducted as part of the program evaluation. The M&V activities include the completion of an M&V plan, commissioning validation site visits, and M&V reports. M&V activities align with the International Performance Measurement and Verification Protocol (IPMVP).
<b>CONSERVATION EDUCATION AND OUTREACH</b>					
Customer Engagement Tool Evaluation	CEO	Impact	FortisBC Energy Inc. & FortisBC Inc.	\$49	Evaluation of the overall program, validation of the treatment and control group selection, and net savings attributed to the distribution of the Home Energy Reports. <b>To be completed Q2 2022</b>
<b>PORTFOLIO</b>					
Partnership Program Evaluation Study	Portfolio	Market Study	FortisBC Energy Inc. & FortisBC Inc.	\$6	Research study to gather feedback from industry experts, documentation review of guidelines and best practices for Partnership programs. <b>Completed May 2021 by Tetra Tech Inc.</b>
Incentives Project Study	Portfolio	Market Study	none	\$15	Sponsorship towards a collaborative exploration of incentive strategies for energy efficiency programs. Project led by ICF and E Source. <b>Completed September 2021 by ICF</b>
Comprehensive Energy Savings Project	Portfolio	Market Study	none	\$47	A comprehensive review to better understand the tracking of total energy savings and emission reductions that are being employed by other utilities and organizations. <b>To be completed Q2 2022</b>

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**Table 12-2: Summary of Key Findings and Methodology for 2021 Completed DSM Program Evaluation Studies and Pilot Program Reports**

Evaluation Name	Program Area	Type of Evaluation	Methodology	Outcome from Key Findings
<b>CUSTOMER RESEARCH</b>				
FortisBC Communication Tracking: Energy Efficiency Conservation	Enabling Activities	Communications	Three waves of online interviews conducted with approximately 800 per wave of British Columbia adults living within the FortisBC service territory. The waves were conducted in March, June and October 2021.	<p><b>Results:</b> The percentage of participants that were aware of at least one of the three main energy efficiency activities undertaken by FortisBC remained unchanged compared to the previous three years (79% in 2021, 81% in 2018 and 80% in both 2019 and 2020).</p> <p>Overall, eight-in-ten participants were at least moderately engaged, an increase of 5 percentage points from 2020. The percentage of respondents that were extremely or highly engaged rose significantly compared to the prior year (43% vs. 35% in 2019).</p> <p><b>Outcome of Key Findings:</b> Continue to emphasize the overarching energy efficiency activities rather than individual programs to build awareness.</p>
MyVoice Panel Software	Enabling Activities	Communications	FortisBC MyVoice online community panel.	<p>• <b>Home Renovation Rebate &amp; Free Ridership Research:</b>  <b>Results</b> - Fifty-six percent of program participants who completed the rebate application form online found it easy or very easy to complete.  <b>Outcome of Key Findings:</b> Continue to explore ways to make the application form less onerous and easy to complete.</p> <p>• <b>Income Qualified DSM Programs Research:</b>  <b>Results</b> - Thirty-eight percent of survey respondents were not aware that FortisBC had energy efficiency and conservation programs specifically designed for income qualified customers.  <b>Outcome of Key Findings:</b> Increase marketing and awareness of income qualified energy efficiency and conservation programs.</p>
<b>COMMERCIAL ENERGY SPECIALIST PROGRAM</b>				
Energy Specialist Program Evaluation 2021	Enabling Activities	Process & Impact	<p>The evaluation comprised of three phases; a preliminary review of the program design and delivery methods, interviews with 35 program stakeholders, including Energy Managers, Key Account Managers and Energy Specialist program roles to assess the effectiveness and delivery of the program, and an energy savings audit for 14 projects completed in 2021.</p> <p>The energy savings audit consisted of gas savings projects without FortisBC Incentive program participation.</p>	<p><b>Results:</b> Projects from six organizations were reviewed which included; universities, school districts, health authorities, and municipalities. 14 completed projects from these organizations were reviewed to represent savings for 2021. The results indicated a total verified savings of 22,612 GJ/year.</p> <p><b>Outcome of Key Findings:</b> Results were taken under consideration for future program design.</p>

**Table 12-2: Summary of Key Findings and Methodology for 2021 Completed DSM Program Evaluation Studies and Pilot Program Reports (continued)**

Evaluation Name	Program Area	Type of Evaluation	Methodology	Outcome from Key Findings
<b>CODES &amp; STANDARDS</b>				
Energy Code Compliance Studies	Enabling Activities	Process	Online surveys were conducted for 2 groups of building industry practitioners and building officials with experience meeting or assessing energy code compliance for residential and commercial buildings. The survey for the Part 3 buildings was conducted from October to December 2020 with 175 completions. The survey for the Part 9 buildings was conducted from December 2020 to February 2021 with 101 completions.	<p><b>Results:</b> Part 3 buildings – The average As-Built Energy Code Compliance Rates declined in comparison to the previous years. (68% on the individual level and 56% for the industry-wide impressions vs 79% and 61% in 2015). Part 9 buildings – The average As-Built Energy Code Compliance Rate for BC Step Code was 74% (Individual/self-impressions) at the high end, and at the low end (Industry-wide impressions) 61%. Overall, code compliance (or confidence in achievement) drops as step code levels are increased (Step 1 to Step 5).</p> <p><b>Outcome of Key Findings:</b> Results were reviewed with appropriate stakeholders via focus groups. Results and recommendations were taken into consideration for future planning.</p>
Gas Fired ASHP - Calculation Tool	Enabling Activities	Market Study	An initial assessment of the calculation tool was conducted via literature review and technical data from manufacturer contacts and webinars. This information was used to calibrate inputs to the simulation models and tested in a comparative analysis using the simulation results for a current project that is in its design stage.	<p><b>Results:</b> The results of this comparative analysis showed that the Internal Combustion Engine Heat Pump used less total energy than the electric base models, with less electricity and more natural gas use. Although the total energy use is lower the Greenhouse Gas Emission Intensity results vary with local utility emissions factors.</p> <p><b>Outcome of Key Findings:</b> Results were reviewed with appropriate stakeholders. Findings were taken under consideration for future projects.</p>
<b>HOME RENOVATION REBATE PROGRAM</b>				
Retail Program Evaluation	Residential	Process & Impact	A combination of engineering analysis, literature review, and telephone survey with 196 program participants from the 2017 to 2019 program years were conducted to gather feedback about the program.	<p><b>Results:</b> Overall, participant satisfaction is high with over 90 percent of respondents being satisfied with the overall program. Net-to-gross ratios estimated for the appliance program are consistent with similar programs and align with the program targets.</p> <p><b>Outcome of Key Findings:</b> Results were taken under consideration for future program design and evaluation planning.</p>
Fireplace Industry Research	Residential	Market Study	Twenty-two (22) manufacturers who are members of the Hearth Patio and Barbecue Association of Canada (HPBAC) were identified and contacted to participate in a telephone survey. Interview questions focused on gathering feedback to better improve the program design and delivery.	<p><b>Results:</b> Overall, the manufacturers who were interviewed (12 completions out of 22) were supportive and generally satisfied with the FortisBC fireplace program and incentive levels. The double rebate offer was well received for the increased incentive value and positive market influence however, manufacturers had difficulty keeping up with the demand due to supply chain and labor shortages.</p> <p><b>Outcome of Key Findings:</b> Results were taken under consideration for future program design and evaluation planning.</p>
Water Heater Evaluation	Residential	Process & Impact	A combination of phone interviews, literature and program documentation reviews were conducted to assess the effectiveness of the program delivery, the quality of the installation and equipment performance, free ridership and spillover attributed to the program. Telephone surveys with 200 program participants from the 2018 to 2020 program years were completed from April to May 2021, and 32 water heater contractors were surveyed between April to June 2021.	<p><b>Results:</b> The overall program satisfaction is very high with participants indicating an average score of 8.7 or higher, and contractors indicating an 8.0 out of a 10-point scale. New unitary savings were realized for the three types of program eligible water heaters; conventional storage tank, condensing tankless and condensing storage tank.</p> <p><b>Outcome of Key Findings:</b> Results were reviewed and new savings estimates were used to update the program cost effectiveness calculations as part of the 2021 program updates.</p>

**Table 12-2: Summary of Key Findings and Methodology for 2021 Completed DSM Program Evaluation Studies and Pilot Program Reports (continued)**

Evaluation Name	Program Area	Type of Evaluation	Methodology	Outcome from Key Findings
<b>HOME RENOVATION REBATE PROGRAM</b>				
Double Rebates Offer Evaluation	Residential	Process	An online survey of program participants who installed a furnace, boiler or combination boiler under the 2020 to 2021 Double Rebate offer was conducted in August 2021. Interviews with large HVAC contractors, and analyses of the program application form data was also conducted to assess the impact of the double rebate offer customer satisfaction, and the timing of the participant's decision to replace their existing furnace or boiler.	<p><b>Results:</b> A total of 1,197 surveys were completed from a sample of 4,392 participants (27% response rate). Overall, 93% of participants are satisfied with the Double Rebate offer, significantly higher than the 88% satisfaction for participants from the 2016-18 program years. Compared to the 2016-18 program year, 2020-21 program with its higher rebates incented a significantly larger proportion of customers to replace their furnaces sooner than they would have without the program.</p> <p><b>Outcome of Key Findings:</b> Results were reviewed and updates were made to the program cost effectiveness calculations as part of the 2021 program inputs.</p>
Insulation Measure Characterization Analysis	Residential	Market Study	Savings were estimated using an algorithmic approach and calculated for each measure based on data specific to the Home Renovation Rebate program.	<p><b>Results:</b> New average savings assumption by insulation measures were realized as part of the study.</p> <p><b>Outcome of Key Findings:</b> As a result of the findings and recommendations, updates were made, where appropriate for the 2021 program inputs.</p>
<b>RENTAL APARTMENT EFFICIENCY PROGRAM</b>				
Participant and Building Owner Surveys	Residential/ Commercial	Process	This study is an ongoing evaluation conducted annually for the program. In-person installations were temporarily put on hold starting March 2020 therefore a telephone survey with building owners/managers was not conducted. The online survey continued to be active with 31 tenants completing the survey.	<p><b>Results:</b> The survey results continue to show positive feedback with 80% of the tenants surveyed indicating "very" or "somewhat satisfied" with the overall program (76% in 2019). The favorable areas include; the application process, the level of program communications, installation of the fixtures were good, and the professionalism and friendliness of the installer.</p> <p><b>Outcome of Key Findings:</b> Continue to conduct ongoing tenant and building owner surveys to provide feedback to program design.</p>
<b>DIRECT INSTALL PROGRAM</b>				
Ongoing Customer Feedback Surveys	Low Income	Process	<p>Two separate surveys were conducted to evaluate the Direct Install Program.</p> <p>The first survey, is a paper survey with an option to be completed online. A total of 506 program participants completed the survey between January 2020 to January 2021. The survey assess customer satisfaction with the program application process, the measures installed and the experience with the installation contractors.</p> <p>A subgroup of participants from the first survey who were eligible for additional draft-proofing, insulation and/or a natural gas furnace upgrades were contacted to participate in a second survey (online and telephone). A total of 40 participants completed the survey between September and December 2020. The purpose of this survey was to assess program satisfaction and contractor experience relating to the additional measures.</p>	<p><b>Results:</b> First survey - Overall satisfaction has trended up for a second consecutive year where 83% are very satisfied with the program (vs. 80% in 2019 and 75% in 2018). There is some indication that satisfaction increases with the number of products installed. On average participants had three products installed with the most common being the energy-saving light bulbs, exterior door weather stripping, and kitchen and bathroom faucet aerators</p> <p><b>Results:</b> Second survey - Satisfaction is somewhat higher for the subgroup of participants who were eligible for additional measures than those who didn't (88% vs 83%, respectively). The primary reason customers participate in the program is consistent with previous years in that the top motivator is to save money on utility bills. For the subgroup who were eligible for the additional measures; bathroom fan, and insulation represented 98% and 78% of the products installed. Satisfaction with the contractor's professionalism remains consistently high, garnering 93% very satisfied ratings overall for the year.</p> <p><b>Outcome of Key Findings:</b> Continue to conduct the participant surveys to assess the program's development and contractor experience.</p>

**Table 12-2: Summary of Key Findings and Methodology for 2021 Completed DSM Program Evaluation Studies and Pilot Program Reports (continued)<sup>16</sup>**

Evaluation Name	Program Area	Type of Evaluation	Methodology	Outcome from Key Findings
<b>COMMERCIAL PRODUCT REBATE PROGRAM</b>				
Virtual Site Assessment Evaluation Study	Commercial	Process	A combination of stakeholder and participant surveys (online and telephone) and documentation reviews were completed to assess the uptake and satisfaction with conducting virtual site assessment amidst the pandemic.	<p><b>Results:</b> Overall, program participants are satisfied with the virtual site assessment process (mean rating of 4.7 out of 5.0). Satisfaction with the virtual assessment process is consistent when compared to the 4.8 rating for in-person assessments. Recommendations to improve the communication and expectations for the virtual site assessments include; increasing the level of detail and clarity on the templates with guidelines for undertaking the virtual assessment, and providing more detail on how to capture relevant installation pictures.</p> <p><b>Outcome of Key Findings:</b> Results and recommendations were reviewed and taken under consideration for future program design.</p>
<b>INNOVATIVE TECHNOLOGIES</b>				
Gas Absorption Heat Pump Pilot	Innovative Technologies	Measurement & Verification	<b>M&amp;V Plan:</b> Complies with the International Performance Measurement & Verification Protocol. The selected IPMVP option and measurement boundary was Option A Retrofit Isolation Key Parameter Measurement.	<p><b>Pilot Objective:</b> Stemming from the results of the DHW heating trial which completed in 2020, FortisBC further investigated two existing participant sites to identify GAHP DHW system efficiency improvements (adding modulating condensing boiler) as well as GAHP performance for space heating applications.</p> <p><b>Outcome of key findings:</b></p> <p>The DHW system efficiency improvement trial realized 35.2% energy savings which is a significant increase from the original 21% that was evaluated from original field trials. Savings were attributed to replacing the existing aged mid-efficient boiler with two new condensing modulating tankless units and adding more sophisticated controls to control switchover points.</p> <p>The Space heating trial identified greater potential to increase overall system efficiencies of the heating system by taking one of the GAHP units to tie into the space heating loop while the other GAHP unit satisfied the DHW heating loop. This space heating and DHW heating (hybrid) realized 27.9% energy savings which is significant increase from the original 15.7% savings that was evaluated from the original field trials.</p> <p>As a result of the pilot studies, FortisBC will be implementing the gas absorption heat pump measure for multiple end uses under the commercial prescriptive program area in 2022.</p>

<sup>16</sup> IPMVP Option A - Measurement of key parameters governing energy use to assess consumption. [www.evo-world.org](http://www.evo-world.org)



**Table 12-2: Summary of Key Findings and Methodology for 2021 Completed DSM Program Evaluation Studies and Pilot Program Reports (continued)**

Evaluation Name	Program Area	Type of Evaluation	Methodology	Outcome from Key Findings
<b>CONSERVATION EDUCATION AND OUTREACH</b>				
Customer Engagement Tool Evaluation	CEO	Impact	The evaluation consisted of program documentation reviews, and a validation of the treatment and control groups based on analysis of the energy consumption data, household characteristics and geographical locations. The evaluation would assist in determining the Year 1 net natural gas savings and provide recommendations on how to improve the accuracy of the savings calculations in preparation for next year's evaluation.	<p><b>Results:</b> A validation of the treatment and control groups from both the gas (85,384 treatment and 34,354 control) and electricity (12,285 treatment and 3,060 control) customers indicated that the selection of households were comparable, followed similar and relatively steady usage patterns in the two years leading up to their inclusion in the program. The program's Year 1 gas savings from December 2020 to November 2021 yield a 0.91 percentage of savings. Given the later program launch for the electricity participants, program electric savings will be evaluated as part of the second phase of this evaluation along with the program Year 2 savings.</p> <p><b>Outcome of Key Findings:</b> Results were reviewed and preliminary gas savings estimates were used to update the program cost effectiveness calculations as part of the 2021 program updates. Further evaluations will be conducted for the Year 2 program including a verification of gas and electric savings.</p>
<b>Portfolio</b>				
Partnership Program Evaluation Study	Portfolio	Market Study	Phone interviews with 13 utility program staff, 11 industry experts and consultants across Canada and the U.S. were conducted to gather insights on industry best practices and guidelines for attribution of savings and greenhouse gas emission reductions, and protocol for reporting these savings and associated reductions. Program documentation and literature reviews were also conducted to meet the research objectives.	<p><b>Results:</b> Overall, the research found that how savings and GHG emission reductions are attributed to co-funding entities is situation-specific. The findings provided a guideline that allows for flexibility while taking into account the industry practices gathered from the research study.</p> <p><b>Outcome of Key Findings:</b> Results and recommendations were taken under consideration for future guidance.</p>
Incentives Project Study	Portfolio	Market Study	An online experience module conjoint survey with 459 customers and phone interviews with a sub-group of 25 customers from 7 utilities across Canada and the U.S. was conducted to gather insight on the customer experience and their journey with utility rebate programs.	<p><b>Results:</b> The findings include looking at the customer's shopping experience, purchasing decision and the impacts of the utility rebates. Contractors play a central role in the customer's shopping experience. Most people either already had a contractor they knew, searched for one online, or asked friends and family. Customers gather information from manufacturer websites and independent user reviews of products to guide their purchase decision. Those who are proactive tend to be more satisfied with their purchase. 74% of customers learned about the rebates through their contractors, and 84% of customers reviewed the rebate amounts before selecting the equipment.</p> <p><b>Outcome of Key Findings:</b> Results and recommendations were taken under consideration for future program guidance.</p>

## 12.2 EVALUATION COLLABORATION

In 2021, FEI continued to seek opportunities to increase collaboration activities with FBC, BC Hydro, and other entities to conduct program evaluation for DSM programs. The number of collaboration activities depends on the timing of the activity, program participants, legal and privacy concerns, and available budget to conduct the study. Tables 12-1 and 12-2 provide information on program evaluation activities conducted in partnership with other organizations. FEI, FBC and BC Hydro continue to collaborate in the evaluation projects for the Low Income Direct Install Program – Ongoing Customer Feedback Survey, and Direct Install Quality Assurance study.

In keeping with the MOU on collaboration discussed in Section 2.4, FEI, FBC and BC Hydro continue to hold update project meetings and explore opportunities for future collaboration on program evaluations.

## 13. DATA GATHERING, REPORTING AND INTERNAL CONTROLS PROCESSES

### 13.1 OVERVIEW

The following section outlines FEI's business practices to ensure DSM activities and associated expenditures are in compliance with the Company's internal control processes and with BCUC Decision and Order G-36-09, which directed the Company to include a discussion in the DSM Annual Report of the Company's internal data gathering, monitoring and reporting control practices.

### 13.2 ROBUST BUSINESS CASE PROCESS APPLIED TO ALL PROGRAMS

Before a new DSM pilot or program can be implemented, a business case must first be developed. FEI is committed to putting each pilot or program through the appropriate level of internal scrutiny before moving ahead and believes doing so ensures an increased chance of pilot or program effectiveness.

Business cases include information about program rationale and purpose, as well as a description of the target audience, assumptions, cost-benefit tests and proposed evaluation methods. Cost effectiveness analysis is performed using the California Standard Tests (CST) as outlined in the California Standard Practice Manual. FEI uses an in-house cost-benefit modeling tool developed in partnership with expert industry consultants to apply the program costs and benefits in each of the four standard cost-effectiveness tests based on the California Standard Practice Manual (Rate Impact Measure [RIM], Utility, Participant, and TRC) and the MTRC in accordance with DSM Regulation. The results from this modelling are used as inputs for the business cases, which are approved in accordance with FEI's policy on financial authorization levels.

In addition to the internal business case process, FEI is required to submit a detailed plan for new programs to the BCUC for approval prior to the expenditure of any funds. No new programs, beyond those approved as part of the 2019-2022 DSM Plan and the Application for Updated DSM Expenditures for 2021 and 2022<sup>17</sup>, were submitted to the BCUC for approval in 2021.

### 13.3 INCENTIVE APPLICATIONS VETTED FOR COMPLIANCE WITH PROGRAM REQUIREMENTS

Ensuring that all customer applications are compliant with program eligibility requirements as laid out in program terms and conditions is also part of the internal control process. The Company has a number of mechanisms in place to ensure DSM incentive funding applications are in compliance with program requirements. The verification process is specific to each program and is dependent on the type of program, its complexity, the financial value of the incentive and other parameters. The general principles applied are as follows:

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<sup>17</sup> Filed on March 19, 2021 and approved by BCUC Order G-135-21.

- Each application is reviewed for completeness and accuracy;
  - Applications must meet the criteria outlined in the terms and conditions of the program put forward through the approval process;
  - Once approved, incentives are distributed to participants; and
- Copies of applications and supporting documents are filed and retained.

### 13.4 INTERNAL AUDIT SERVICES

On an approximately biannual basis, FEI engages its own Internal Audit Services (IAS) group to review the internal controls associated with the DSM activities. Such an audit was performed in 2021 assessing the effectiveness of controls that were in place the prior year. That audit (see Appendix A) concluded that key controls are in place and operating effectively to mitigate risk around program development, program administration including rebate payments, and program reporting and evaluation to an appropriately low level.

### 13.5 SUMMARY

FEI is committed to strong internal controls in all aspects of its DSM activity. As demonstrated in this section, the Company's business practices related to program development, application processing and ongoing monitoring are all sound and subject to continuous improvement.

## 14. 2021 DSM PROGRAMS ANNUAL REPORT SUMMARY

In 2021, FEI achieved close to 100 percent of its total approved DSM expenditures and estimated annual energy savings for the year, based on its 2019-2022 DSM Plan, including approved amendments. Annual energy savings again exceeded 1.0 million GJ or 1 PJ. Incentive expenditures at year-end were more than four times that of non-incentive expenditures, making up 80 percent of the overall portfolio expenditures. The resulting total lifetime energy savings for 2020 DSM activity is estimated at 12.3 million GJ and corresponding lifetime GHG emissions reductions of 735,700 tonnes CO<sub>2</sub>e.

The Report details how FEI cost-effectively delivered these programs as set out in the 2019-2022 DSM Plan. A small negative carryover of expenditures from 2020, as approved by BCUC Order G-345-21, was balanced in 2021 with a small carryover amount available for spending in 2022. FEI was able to grow energy savings while maintaining strong COVID-19 pandemic safety protocols in accordance with Provincial Health directives. FEI continues to offer a robust portfolio of DSM programming accessible to all customer groups and locations, meeting the adequacy requirements of the DSM Regulation and operating according to the Company's DSM Guiding Principles.

## **Appendix A**

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# **FEI INTERNAL AUDIT REPORT CONSERVATION AND ENERGY MANAGEMENT INTERNAL CONTROL AND PROCESS REVIEW**

**Date:** July 5, 2021

**To:** **Diane Roy**, VP, Regulatory Affairs

**CC:** **Danielle Wensink**, Director, Conservation and Energy Management

**From:** **Katrina Craig**, Director, Internal Audit & Risk

**Re:** Conservation and Energy Management – Internal Control and Process Review

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## **INTRODUCTION**

The Conservation and Energy Management Program (“the Program”) is designed to provide customers with tools and incentives to manage their natural gas consumption, reduce their energy costs, and lower their greenhouse gas emissions.

The British Columbia Utilities Commission (“BCUC”) granted approval for a Program expenditure of \$72.6 million for 2020 in order G-10-19. The Program includes rebates and incentives on a number of energy efficient appliances, equipment and systems as well as education and outreach initiatives to increase awareness of energy efficiency and conservation.

## **SCOPE AND OBJECTIVES**

The objective of the review was to evaluate the design and operating effectiveness of the key internal controls over the 2020 Program, namely around development, administration including rebate payments, and reporting and evaluation. In addition, this year’s audit included an assessment that IT general controls over the Dynamic Demand Side Management (DDSM) system (currently being implemented) are operating effectively and in compliance with Corporate Information Security policies.

This was accomplished by:

- Inspecting that a cost/benefit analysis is developed for each new business case by Integrated Resource Planning (IRP);
- Understanding, documenting and obtaining evidence that controls are in place that help ensure program criteria are met for each application;
- Verifying the effectiveness of system-based application controls;
- Ensuring that program metrics and reports are produced and reviewed, on a regular basis, by Management for program monitoring and evaluation purposes; and
- Developing recommendations to address any control deficiencies or opportunities for improvement as identified.

## **OBSERVATIONS & CONCLUSION**

Based on procedures performed, Internal Audit found that key controls are in place and operating effectively to mitigate risk to an appropriately low level for Program development, administration including rebate payments, and reporting and evaluation. In particular, Internal Audit notes the increased level of maturity in the control environment related to reconciliation and reporting between the Program system and FortisBC's financial system, SAP, which were findings noted in prior year audits, and previously addressed by Management.

The DDSM application controls also enhance the Program control environment. Internal Audit has identified opportunities to strengthen the current design of certain controls of the DDSM system, as value-add solutions for the remainder of the DDSM implementation project, which is expected to be completed this year. The findings and recommendation were discussed with Management and provided in the Management Report. Management has acknowledged and agreed that the remediation for these findings will be addressed through the completion of the DDSM project. Internal Audit will follow up in normal course.