



Diane Roy
Vice President, Regulatory Affairs

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

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

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

March 29, 2018

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

Attention: Mr. Patrick Wruck, Commission Secretary and Manager, Regulatory Support

Dear Mr. Wruck:

Re: FortisBC Inc. (FBC)
Electricity Demand-Side Management (DSM) – 2017 Annual Report

Attached please find the Electricity DSM Program 2017 Annual Report for FBC (the Annual Report).

Request for Confidentiality of Certain Information

FBC is also filing completed Monitoring and Evaluation Reports (the Evaluation Reports) separately as Confidential Appendix E and Confidential Appendix F of the Annual Report. FBC requests that the Evaluation Reports be filed on a confidential basis pursuant to Section 18 of the Commission's Rules of Practice regarding confidential documents established by Order G-1-16. The Evaluation Reports must be kept confidential on the basis that these reports contain customer-specific information that should not be disclosed to the public. In addition, the methodology and processes used in the reports are proprietary to the consultants hired by FBC. The publicly available Executive Summaries of the Evaluation Reports are provided in Appendices C and D.

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

Sincerely,

FORTISBC INC.

Original signed:

Diane Roy

Attachment



FortisBC Inc.

**Electricity
Demand-Side Management Programs
2017 Annual Report**

March 29, 2018

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1. REPORT OVERVIEW

This Demand-Side Management (DSM) Annual Report (the Report) provides highlights of FortisBC Inc.'s (FBC or the Company) DSM programs for the year ended December 31, 2017 and provides a summary of results achieved in 2017. The Report reviews the progress of FBC's DSM programs in meeting the approved 2017 DSM Plan¹ (Plan) by educating and incenting FBC's customers to conserve energy and improve the energy efficiency of their homes, buildings and businesses.

FBC and FortisBC Energy Inc. (FEI) DSM staff are largely integrated as the Conservation and Energy Management (C&EM) department, with a joint leadership team that combines program managers' responsibilities, wherever possible.

Section 1-3 includes summaries of how FBC's DSM programs met the requirements of the Demand-Side Measures Regulation (DSM Regulation) enacted under the *Utilities Commission Act* (UCA) in 2017. Section 1 contains a statement of financial results (Table 1-1), including Total Resource Cost (TRC) benefit/cost ratio cost-effectiveness test results for 2017. Sections 2 through 7 of the Report provide an overview of DSM program activities in 2017, by program area, including program-level comparisons of actual energy savings and costs to Plan.

Consistent with previous DSM Annual Reports, additional details on program results, cost-effectiveness test results, as well as historical DSM costs and energy savings are included in Appendix A and Appendix B, respectively. Two evaluation reports were completed in 2017; one for the Heat Pump Program and the other for the Custom Business Efficiency Program (the Evaluation Reports), the executive summaries for which are filed in Appendix C and Appendix D respectively. In accordance with Directive 21 of BCUC Order G-186-14, the full versions of the Evaluation Reports are provided in CONFIDENTIAL Appendix E and CONFIDENTIAL Appendix F.

1.1 PORTFOLIO LEVEL RESULTS

Table 1-1 provides an overview of FBC's 2017 energy savings, expenditures and TRC cost-effectiveness test results for all DSM programs, by program area (sector) and at the portfolio level. The Company achieved an overall portfolio TRC of 2.4 on DSM expenditures of \$7.7 million, which were 18 percent higher than in 2016. Electricity savings totalled 27.8 GWh, a 22 percent increase over 2016 savings. As all programs passed the TRC, results for the modified TRC are not required.

FBC's 2017 DSM expenditures were one percent higher than the approved Plan. After accounting for \$400,500 in co-funding received for the Energy Conservation Assistance Program and the Heat Pump Water Heater pilot, the 2017 net expenditure was \$7.3 million or 96 percent of Plan. In accordance with past practise, additional detail and results for the TRC, Utility Cost Test (UCT),

¹ 2017 DSM Plan expenditures were accepted by the Commission pursuant to Order G-9-17.

the Ratepayer Impact Measure (RIM) cost effectiveness tests, and Levelized Costs are provided for the overall portfolio and each Program Area in Appendix A, Table A-1.

Table 1-1: DSM Portfolio Summary Results for 2017

	Annual Electricity Savings (MWh)		Utility Expenditures (\$000s)		
Program Area	2017 Approved Plan	2017 Actual	Total 2017 Actual	2017 Approved Plan	TRC B/C Ratio
Residential Programs	7,755	10,154	1,363	1,557	4.0
Low Income Housing	2,739	693	529	1,161	1.4
Res'l & Low Income Total	10,493	10,847	1,891	2,718	3.6
Commercial Programs	13,666	16,115	4,023	3,131	2.2
Industrial Program	1,556	876	206	309	4.8
Programs Total	25,715	27,838	6,120	6,158	2.7
Portfolio Level Activities					
Planning & Evaluation			994	777	
Supporting Initiatives			595	674	
Total Portfolio	25,715	27,838	7,709	7,610	2.4
Less: Partner Co-funding			(401)		
Total after Co-funding	25,715	27,838	7,309	7,610	2.4

In 2017, FBC met the conditions of the British Columbia *Demand-Side Measures Regulation* (DSM Regulation), achieving a portfolio TRC value of 2.4. The Low Income program achieved a TRC of 1.3, after including the allowed 40 percent adder to benefits. The TRC test result (2.4 overall) was slightly higher than in 2016 (2.3 overall).

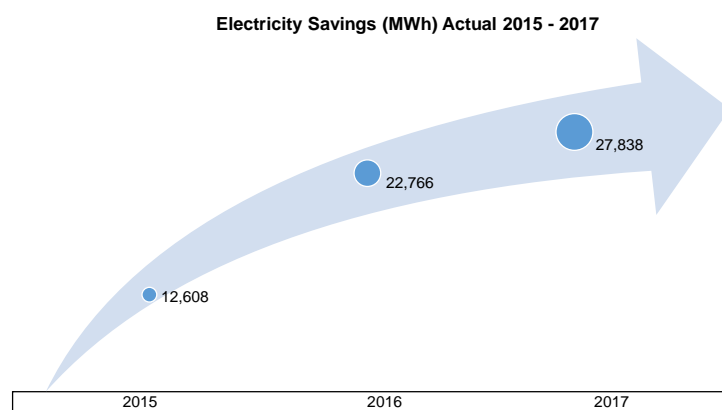
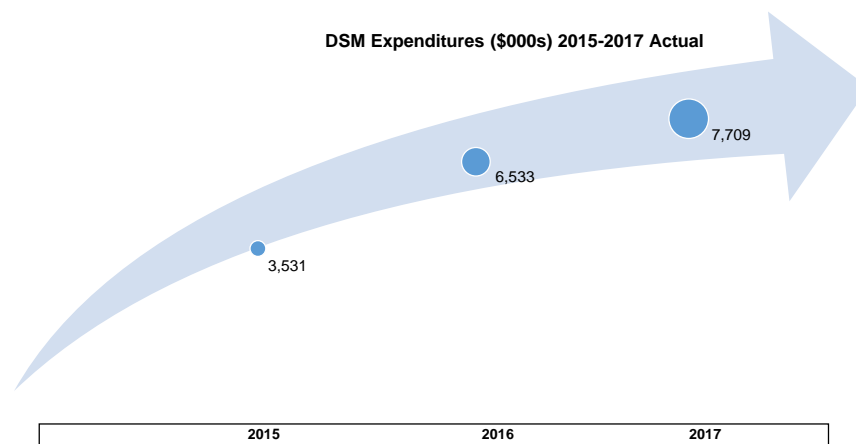
1.2 MEETING APPROVED PLAN EXPENDITURE LEVELS

Actual 2017 DSM expenditures were one percent above the 2017 Plan levels accepted by the Commission as part of FBC's 2017 DSM Expenditure Application (2017 DSM Application). Actual 2017 expenditures of \$7.7 million equal 101 percent of Plan expenditures and actual energy savings of 27.8 GWh equal 108 percent of Plan savings.

Since 2015, the Company has been rebuilding its DSM activities and has increased its results each year. Figure 1-2 shows the actual expenditures and savings for 2015 to 2017.

FBC achieved its 2017 Plan savings and expenditures, as indicated in Table 1-1. In addition, third party co-funding received from the British Columbia Ministry of Energy and Mines (MEM), British Columbia Hydro and Power Authority (BC Hydro) and Natural Resources Canada totalling \$0.4 million reduced overall costs to FBC ratepayers, resulting in a net expenditure of \$7.3 million.

Figure 1-2: FBC Expenditures and Savings (2015-2017)



1.3 MEETING ADEQUACY REQUIREMENTS OF THE DEMAND-SIDE MEASURES REGULATION

The adequacy requirements set out in the DSM Regulation at the time the 2017 DSM Plan was approved were 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 residents of low-income households to reduce their energy consumption;
- b) 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; and
- d) an education program for students enrolled in post-secondary institutions in the public utility's service area.

FBC notes its approved 2017 DSM Plan was in compliance with the adequacy requirements of the DSM Regulation, including BC Reg. 141/2014 amendments (effective July 10, 2014). As detailed in the Report, the Company met all the requirements for adequacy that were in place prior to the March 2017 amendment of the DSM Regulation.

Programs and incentives for low income customers, including Energy Savings Kits (ESK) and Energy Conservation Assistance Program (ECAP), are discussed in Section 3.

With regard to offerings to rental apartment buildings, a number of the Commercial Energy Efficiency programs are intended for use by owners of rental buildings, including the Rental Apartment Efficiency Program (RAP), detailed in Section 4.2.1. Tenants can also access ECAP and ESK offers, and other Residential Energy Efficiency programs are available to qualifying rental properties.

In terms of education programs, the Company funded a variety of initiatives for K-12 students, including BC Lions Energy Champion school assembly presentations, FortisBC Energy Leaders, and Energy is Awesome. The Company also funded post-secondary student engagement initiatives, including a program at Okanagan College and providing training grants (see Section 6.2.3).

1.4 ADDRESSING BCUC DIRECTIVES

There are no outstanding directives to be addressed in the Report; BCUC directives contained in Decision and Order G-186-14 have all been addressed in previous Annual DSM Reports.

1.5 COLLABORATION & INTEGRATION

The Company continues to collaborate and integrate energy efficiency programming with both FEI and BC Hydro, as well as with other entities such as governments and industry associations.

1 The Company recognizes that collaboration among utilities maximizes program efficacy and
2 effectiveness. Collaborative activity is reported in the individual Program Area sections and
3 program descriptions.

4 FBC, FEI and BC Hydro (the BC Utilities) also continue to experience additional benefits from
5 collaboration efforts, including cost savings, streamlined application processes for customers,
6 extended program reach and consistent and unified messaging, resulting in improved energy
7 literacy among each utility's customers.

8 **1.6 PORTFOLIO SUMMARY**

9 The Company's DSM portfolio met the goal of cost effectiveness, with a TRC value of 2.4 in 2017.
10 FBC is of the view that both energy savings accounted for in the portfolio and the resulting TRC
11 are conservative. In addition to the direct energy benefits accounted for in the TRC, benefits from
12 additional activities, such as Supporting Initiatives, play an important role in supporting the
13 development and delivery of programs, while helping facilitate market transformation in British
14 Columbia.

2. RESIDENTIAL PROGRAM AREA

2.1 OVERVIEW

The Residential Program Area achieved aggregate electricity savings of 10.2 GWh, and an overall TRC of 4.0. Approximately \$1.4 million was invested in Residential energy efficiency measures in 2017, and 69 percent of these expenditures were in the form of incentives. The energy savings results from Residential programs were 131 percent of Plan, with the Lighting program contributing 80 percent of total Residential savings.

Residential programs address customers' major end-uses in residential detached dwellings, row-townhomes or mobile homes, and include retrofit and new home applications. Residential programs, in combination with education and outreach activities, play an important role in driving the culture of conservation in British Columbia.

Table 2-1 summarizes the actual expenditures for the Residential Program Area in 2017 compared to Plan, including incentive and non-incentive spending, annual and lifetime electric savings, as well as TRC cost-effectiveness test results.

Table 2-1: 2017 Residential Program Area Results Summary

Program Area	Annual Electricity Savings (MWh)		Lifetime Savings	Utility Expenditures (\$000s)			
	2017 Approved Plan	2017 Actual		Incentive Expenditure	Non-Incentive Expenditure	Total 2017 Actual	2017 Approved Plan
Residential							
Home Renovation Rebate	364	187	6,082	66	129	196	348
Behavioural	3,097	20	56	4	1	5	200
Rental	508	295	4,091	42	35	77	206
Heat Pump Water Heaters	17	12	139	0	0	1	30
Appliances	126	494	7,727	240	98	337	133
Lighting	2,735	8,125	74,701	326	53	380	190
Heat Pumps	781	976	23,656	235	72	307	298
New Home Program	126	45	1,570	22	39	61	151
Residential Subtotal	7,755	10,154	118,020	936	427	1,363	1,557

2.2 RESIDENTIAL PROGRAMS

The highlights of the Residential programs are outlined below:

2.2.1 Home Renovation Rebate and Heat Pump Programs

The following activities were undertaken in the Home Renovation and Heat Pump programs in 2017:

- The Home Renovation Rebate (HRR), formerly called the Home Improvement Program, is a province wide program delivered and marketed in collaboration with BC Hydro and FEI, continued to gain momentum. By focusing on the most cost-effective retrofit

measures and using a “menu” approach, the program provides incentives to customers for insulation and draft-proofing, bathroom fans, and space and water heating;

- A fall retail point of sale program was implemented in partnership with FEI and BC Hydro with RONA, Canadian Tire, and Home Depot. Instant rebates were offered on smart products, bathroom fans and thermostats. Bathroom fans were moved from HRR to the fall retail program to see if the uptake would be higher in a retail environment, and the results were positive;
- In partnership with FEI, BC Hydro and the MEM, funding was provided to support a Home Performance Stakeholder Council; and
- Heat pump rebates were offered through two channels: ductless heat pumps through the HRR program and central heat pump systems through a stand-alone program. A lower interest rate was introduced to the Company’s long-standing air source heat pump loan offer for electrically-heated homes in 2016 and maintained throughout 2017. In addition, the heat pump tune up program attracted over 300 participants.

2.2.2 Appliance Program

The Appliance Retail Program continues to grow, encouraging retailers to carry top tier efficiency models for clothes washers, clothes dryers and refrigerators. By engaging retailers more consistently, the appliance program grew substantially with a 104 percent increase in kWh savings in 2017, and over 3,300 appliance rebates processed.

2.2.3 Residential Lighting Program

The Residential Lighting program offered point-of-sale rebates for ENERGY STAR labelled lighting products. Offered in collaboration with BC Hydro to provide a BC-wide offer to customers through lighting retailers across the BC market, the campaign ran for two months in the spring and one month in the fall in major retail stores.

The Residential Lighting program exceeded Plan savings by nearly 200 percent due to successful retail campaigns. Residential Lighting program costs were commensurate with savings at double the Plan amount. A number of changes in the rebate offering were implemented in 2017: a shorter offer period, the removal of A19 bulbs from the list of qualifying products, and switching to a percentage rather than a fixed rebate. These factors, as well as other market factors, led to savings from the 2017 Lighting program of 8.1 GWh, a six percent reduction from 2016 results.

2.2.4 New Home Program

The New Home program offers incentives for homes built to the ENERGY STAR New Home standard. 2017 saw a small increase in program participation, although the challenges central to 2016 remained. ENERGY STAR has high brand recognition, but stringent performance and prescriptive requirements have resulted in modest program participation by builders. The second

tier of FBC's Residential Conservation Rate (RCR) is also a deterrent to builders/home owners choosing electric heat.

An internal review of this program is underway in order to identify improvements to increase participation, with plans to implement changes that align with the BC Energy Step Code.

2.2.5 Rental Apartment Program

There are three components to the Rental Apartment Program (RAP):

1. To provide direct install in-suite energy efficiency measures for occupants (renters) in multi-family rental properties;
2. To provide rental building owners and/or property/management companies with energy assessments recommending building level energy efficiency upgrades, such as common area lighting upgrades; and
3. To provide support in implementing the recommended upgrades and applying for rebates.

The program is offered jointly by FEI and FBC in the shared service territory (SST)² and by FEI outside the SST. A total of 44 buildings received in-suite installations in 2017 in the SST, with 3,557 individual measures installed, as shown in Table 2-2.

Table 2-2: 2017 RAP Installations

Installed Measure Type	# Units
CFL PAR 38, 23 W bulb	194
LED 16W bulb	77
LED 9.5 W bulb	3,286
Total measures intalled	3,557

2.2.6 Behavioural Programs

In 2017, FBC undertook a behavioural program to provide high usage customers with in-home displays. As an incentive for high usage customers who completed a survey of electricity use, 50 in-home displays were received for their homes. The program achieved measured savings, estimated at 20 MWh for these units.

In Q4 of 2017, FBC conducted a Request for Information process for the Customer Engagement Tool (CET), in preparation for a 2018 Request for Proposal to begin CET development.

² The Shared Service Territory is the overlapping service territories of FBC and FEI where both natural gas and electricity are supplied.

2.3 RESIDENTIAL SUMMARY

The Residential Program Area, including the Low Income program discussed in further detail in Section 3, realized 10.8 GWh of energy savings at an expenditure of \$1.9 million, and achieved a TRC of 3.6. In 2017, Lighting remained the core Residential measure, delivering 75 percent of the overall Residential Program Area energy savings. With a TRC of 6.7, it was the most cost-effective program of the Residential portfolio.

3. LOW INCOME PROGRAM AREA

3.1 OVERVIEW

FBC worked collaboratively with FEI to deliver Low Income programs to customers in the SST.

Table 3-1 summarizes the planned and actual expenditures for the Low Income Program Area. In accordance with July 2014 amendments to Section 4(2)(b) of the DSM Regulation, the TRC of 1.3 for low income programs includes a 40 percent adder in the benefits, increasing the deemed cost effectiveness.

Table 3-1: 2016 Low Income Program Results Summary

Program Area	Annual Electricity Savings (MWh)		Lifetime Savings	Utility Expenditures (\$000s)			
	2017 Approved Plan	2017 Actual		Incentive Expenditure	Non-Incentive Expenditure	Total 2017 Actual	2017 Approved Plan
Low Income Housing	2,739	693	7,171	409	119	529	1,161

Savings were 693 MWh for Low Income programs. Over 800 ECAP direct installations were completed in 2017, resulting in 440 MWh of energy savings. Additionally, 819 Energy Savings Kits (ESKs) were distributed, contributing savings of 253 MWh.

The following sections provide detail on the two Low Income programs delivered in 2017.

3.2 ENERGY SAVINGS KITS

ESKs were promoted and distributed at local food banks and other community events in the pre-heating season, as well as direct mailed to on-line applicants and Contact Centre referrals. In addition, the Company worked with FEI and BC Hydro to deliver a direct mail brochure through the British Columbia Ministry of Social Development's cheque run, and promoted the program through in-bill stuffers. In 2017, participation was in line with prior year results, although slightly lower than participation results in 2016.

3.3 ENERGY CONSERVATION ASSISTANCE PROGRAM

The Company delivered ECAP in the SST for eligible low income single and multi-family dwellings. The program's "basic" service level provided energy evaluations, consumer education, and the direct installation of energy efficiency measures including LED lighting, low-flow showerheads, faucet aerators and hot water pipe insulation at no cost. For homes that met the eligibility criteria for the "advanced" program level, ENERGY STAR refrigerators, high-efficiency furnaces, draft-proofing and insulation were also provided.

The ECAP program was promoted primarily through community-based social service organizations. Participation in 2017 was 24 percent lower than in 2016 due to 2016 results including installations for applications that were received beginning in November 2015, but not installed until the program was fully operational in February 2016.

1 **3.4 LOW INCOME SUMMARY**

- 2 The Low Income program area achieved savings of 693 MWh from \$530,000 in expenditures.
- 3 The overall TRC, including a 40 percent adder for benefits, was 1.3, up from 0.9 in 2016.

4. COMMERCIAL PROGRAM AREA

4.1 OVERVIEW

Commercial DSM programs encourage commercial customers (including institutions, government etc.) to reduce overall consumption of electricity and associated energy costs. The Commercial programs produced aggregate electricity savings of 16.1 GWh and achieved an overall TRC of 2.2 in 2017. Actual Commercial program expenditures totaled \$4.0 million, 69 percent of which was in the form of incentives.

Table 4-1 summarizes Plan and actual expenditures for the Commercial programs, including incentive and non-incentive spending, annual and lifetime savings, and the TRC cost-effectiveness test results.

Table 4-1: 2017 Commercial Program Results Summary

Program Area	Annual Electricity Savings (MWh)		Lifetime Savings	Utility Expenditures (\$000s)			
	2017 Approved Plan	2017 Actual		Incentive Expenditure	Non-Incentive Expenditure	Total 2017 Actual	2017 Approved Plan
Commercial							
Lighting	10,592	12,580	224,139	2,222	527	2,749	2,322
Sm Business Direct Install	0	2,634	56,547	430	432	862	-
Building Improvement	2,931	605	10,242	104	267	371	784
Irrigation	144	59	1,170	10	3	12	25
MURB New Construction	0	237	3,723	25	3	29	
Commercial Total	13,666	16,115	295,822	2,791	1,232	4,023	3,131

The Commercial sector recorded savings of 16.1 GWh, or 118 percent of Plan. Approximately 94 percent of these savings were realized through the commercial lighting programs, including Commercial Product Rebate (CPR) program, Business Direct Install (BDI) program and custom lighting projects incented through the Custom Business Efficiency program (CBEP) rebates. An example of a commercial lighting project was the replacement of high-pressure sodium exterior lighting with LEDs at the Kelowna International Airport, which contributed 127 MWh of energy savings.

Building and Process Improvement (BIP) energy savings were 0.6 GWh or 21 percent of Plan. An example of a BIP project was the installation of a high-efficiency refrigeration system at a local grocery store, which contributed 138 MWh of energy savings.

Commercial sector costs in 2017 amounted to \$4.0 million or 128 percent of Plan; a 72 percent increase over 2016. The largest cost component of Commercial programs was the Lighting program paid through CPR, BDI and CBEP.

The following sections provide detail on the key Commercial DSM programs offered in 2017.

4.2 *COMMERCIAL PRODUCT REBATE AND BUSINESS DIRECT INSTALLATION*

- The CPR program offers prescribed rebates for commercial lighting, HVAC, refrigeration, commercial kitchen appliances, irrigation and other electric energy efficiency measures. The program was offered through point-of-sale rebates at lighting wholesalers and directly to customers. A third party study was conducted to expand CPR offers and several new lighting, HVAC, kitchen and refrigeration measures were added. The new offers will be launched in early 2018.
- The BDI program was launched in April 2016 and provides point-of-sale rebates for the direct installation of lighting, HVAC, refrigeration, plug load and other end use measures to small and medium businesses. The BDI implementer contract term ended in December 2017. BDI rebates will be incorporated in the CPR program and the electrical contractor benefits will be transitioned to the FortisBC Trade Ally Network (TAN) in 2018;
- In partnership with FEI, FBC offers the Rental Apartment Efficiency Program (RAP) that specifically addresses the rental market by providing direct in-suite installations of hot water and LED lighting measures, energy assessments and implementation support for deeper energy efficiency retrofits at the building-wide level (see Section 2.2.5); and
- To support customers in MURBs, FBC developed the MURB New Construction program jointly with FEI to encourage building energy efficiency above code. The MURB New Construction program provides prescribed rebates for energy efficient lighting, controls, electric HVAC, natural gas HVAC, natural gas hot water and natural gas fireplace measures.

4.3 *CUSTOM BUSINESS EFFICIENCY PROGRAM (CBEP)*

- CBEP provides custom rebates for larger, more complex energy efficiency retrofits and new construction projects in both the Commercial and Industrial sectors;
- FBC and FEI offer a joint new construction program to encourage energy efficient electric and natural gas measures to be installed in large new construction projects. The program allows new building projects over 85,000 square feet to access subsidized energy modelling and provide custom rebates for both electric and natural gas energy conservation measures; and
- FBC and FEI have a joint retrofit program to encourage energy efficient electric and natural gas retrofits in existing buildings. The energy efficiency electric measures are primarily focussed on deeper building and process retrofit energy conservation measures. The program allows existing buildings to access a subsidized energy assessment and then provide custom rebates for both electric and natural gas energy conservation measures.

1 **4.4 COMMERCIAL SUMMARY**

- 2 The Commercial program area activity in 2017 achieved 16.1 GWh of annual electricity savings,
3 almost doubling 2016 results, and achieved a TRC of 2.2, an increase from the 2016 TRC of 1.5.
4 The program is experiencing the rapid adoption of LED lighting, supported by the downward cost
5 curve in LED lighting products.

5. INDUSTRIAL PROGRAM AREA

5.1 OVERVIEW

The Industrial DSM programs continued to encourage industrial customers to consume electricity more efficiently in 2017. The Industrial programs achieved an overall TRC of 4.8, with electricity savings of 0.9 GWh. Actual Industrial expenditures in 2017 totalled \$0.2 million, of which 70 percent was incentive spending.

Table 5-1 summarizes the plan and actual expenditures for the Industrial Program Area in 2017, including incentive and non-incentive spending, annual and lifetime electricity savings, and TRC cost-effectiveness test results.

Table 5-1: 2017 Industrial Program Results Summary

Program Area	Annual Electricity Savings (MWh)		Lifetime Savings	Utility Expenditures (\$000s)			
	2017 Approved Plan	2017 Actual		Incentive Expenditure	Non-Incentive Expenditure	Total 2017 Actual	2017 Approved Plan
Industrial							
Industrial Efficiency	1,556	876	13,980	145	61	206	309
Industrial Total	1,556	876	13,980	145	61	206	309

The Industrial Efficiency program achieved savings of 0.9 GWh, or 56 percent of the 1.6 GWh Plan for 2017 and a decrease over 2016 savings of 2.1 GWh.

The Industrial sector is characterized by large “lumpy” projects that generally occur less frequently and take much longer to complete, so the realization of energy savings can shift to a following year. In 2017, delays were associated with two medium sized industrial energy efficiency projects and the cancellation of a sawmill modernization energy efficiency project.

Industrial sector costs incurred totaled \$0.2 million for 2017, or 67 percent of Plan. An example of an industrial energy efficiency project was a compressed air upgrade for a large winery that contributed to 138 MWh of energy savings.

5.2 INDUSTRIAL PROGRAMS

- The Custom Business Efficiency program (CBEP) provides custom rebates for larger, more complex energy efficiency retrofits, including, but not limited to, lighting, compressed air, hydraulics, industrial controls, fans and pumps;
- The Industrial Optimization Program (IOP) provides industrial customers with electricity usage in excess of 3 GWh electricity per year two different energy assessment offers
 - The Plant Wide Audit: a high level, whole facility audit to identify energy efficiency and both electric and natural gas conservation measures;

- The Feasibility Study: a detailed engineering study of a specific process or system to fully investigate opportunities to use electricity and natural gas more efficiently. In 2017, the first IOP studies was completed at a local wood pellet mill.

5.3 INDUSTRIAL SUMMARY

In 2017, the Industrial energy savings and program costs were below Plan at 876 MWh and \$206 thousand due to project delays and a cancellation. Overall, the Industrial program area achieved a 4.8 TRC for 2017.

6. SUPPORTING INITIATIVES

6.1 OVERVIEW

Supporting initiatives support the goals of conservation and energy management in a variety of ways, from funding and supporting educational opportunities in schools, to promoting energy conservation at community events.

To maximize internal efficiencies and minimize duplicate messaging, FBC worked collaboratively with FEI for all initiatives except for a limited number of electricity-only outreach events. Budgets and other resources were coordinated to provide school and community outreach, retail campaigns, communications pieces and various event materials. The Company also supported various training seminars and educational workshops in collaboration with the Canadian Home Builders' Association and other industry associations.

The Community Energy Planning program, described in further detail in section 6.2, was fully subscribed and will result in community or institutional strategic energy plans that will promote energy efficiency into the future.

Supporting Initiative activities are not incentive-based programs, therefore the Company has not attributed any direct savings to them. Supporting Initiatives costs are included at the portfolio level and incorporated into the overall portfolio cost-effectiveness results.

Plan expenditures for 2017 were \$0.7 million and actual spending was \$0.6 million. Expenditures on Supporting Initiatives were 12 percent below Plan because a First Nation energy plan was delayed, and a post-secondary behavioural campaign was cancelled by the participant due to internal restructuring.

Table 6-1 summarizes the Plan and actual expenditures for Supporting Initiatives in 2017.

Table 6-1: 2017 Supporting Initiatives Results Summary

Program Area	Utility Expenditures (\$000s)			2017 Approved Plan
	Incentive Expenditure	Non- Incentive Expenditure	Total 2017 Actual	
Supporting Initiatives	10	585	595	674

The following sections provide detail on FBC's Supporting Initiatives activity in 2017.

6.2 COMMUNITY ENERGY PLANNING

The Company continues to offer strategic Community Energy Planning financial assistance to local governments, including First Nations, and publically-funded institutions (up to 50 percent of project costs to a maximum of \$20 thousand per participant) to facilitate future energy efficiency activities. Only one local government applied to access the funds in 2017.

6.3 EDUCATION PROGRAMS (ELEMENTARY AND SECONDARY)

The focus for 2017 was the development and launch of the elementary school curriculum-based Energy Leaders program, which started its pilot phase in late 2016. The program, accessed through an on-line portal, was fully launched in the fall of 2017.

The following programs were continued:

- Energy is Awesome, an interactive presentation focused on energy conservation and safety; and
- BC Lions Energy Champions program.

6.4 EDUCATION PROGRAMS (POST-SECONDARY), INCLUDING TRADES TRAINING

The Company partnered with and supported several university and college trade training programs that provided real life/living lab learning opportunities, as well as support for post-college upgrade training. These included:

- Support for Okanagan College for curriculum enhancement to include more efficiency construction techniques and the purchase of blower door equipment to better illustrate air-tightness;
- Support for the University of British Columbia Okanagan (UBCO) and Okanagan College Wilden Living Lab project, which saw two identically designed homes constructed side-by-side, one built to the current building code and the other to an EnerGuide rating of 47 GJ – less than half the energy usage of a typical new home. The homes will be monitored and analysed by UBCO for energy use over the next three years;
- Sponsorship of Illumination Engineering Society Fundamentals of Lighting course, and grants for electricians and local contractors to participate; and
- Grant support for Certified Energy Manager (CEM) training.

6.5 COMMUNITY OUTREACH

Opportunities to communicate directly with customers in less formal, community focused venues are important. In 2017, the Company engaged in the following outreach activities:

- Junior hockey game sponsorship: promotion of conservation in public venues;
- A new initiative, in collaboration with FEI, was successfully piloted with small businesses in the SST. The focus was face-to-face efficiency education, and through this pilot 371 small businesses were visited in 2017. This will become an ongoing offering in 2018;

- To support residential conservation and energy literacy, FortisBC's Street Team and Ambassadors attended 93 community events in the SST last year, including educational seminars, home shows and community events, such as the Rock Creek Fall Fair;
- Attendance and seminar presentations were undertaken at residential home shows, retail building supply and hardware stores; and commercial trade shows; and
- FortisBC's electronic newsletter, Energy Moment (previously known as the Conserver Club).

The Company, in collaboration with FEI, partnered with selected local governments to provide direct community engagement and marketing to residents and energy rebate program education for government officials and community organizations (i.e., Chambers of Commerce, community social service organizations).

6.6 *SECTOR SUPPORT*

To help promote energy efficiency and rebate programs, the Company supported several large institutions and harder to reach communities and stakeholders with resources and educational opportunities. This included:

- The Company co-sponsored two Energy Specialist positions (City of Kelowna and Interior Health Authority), in partnership with FEI, to promote both natural gas and electricity energy efficiency projects. Energy Specialists serve as an in-house customer resource that supports the development and execution of energy efficiency projects to increase participation in energy efficiency programs;
- The Company provided funds to the Regional District of Central Kootenay and the City of Kelowna for a Community Senior Energy Advisor to promote residential energy efficiency and the C&EM rebate programs at the community level; and
- FBC supported and provided education to trade allies (e.g. contractors) to promote energy efficiency products and C&EM rebate programs to their customers.

7. PLANNING AND EVALUATION

7.1 OVERVIEW

The BC Utilities (including Pacific Northern Gas) dual-fuel Conservation Potential Review (BC CPR) undertook additional scope services during 2017 that built on the base services Technical/Economic potential study. The additional work included three components: Market, Demand Response and Fuel-Switching (Electrification) potential. The latter will include an estimate of electric vehicle (EV) potential. These will be completed in 2018.

Members of the DSM Advisory Committee (DSMAC) were invited to a joint Energy Efficiency and Conservation Advisory Group (EECAG) meeting in late November 2017 to provide feedback on FortisBC's multi-year DSM expenditure plan filings anticipated in 2018.

FBC continued to operate its Monitoring and Evaluation (M&E) activities in 2017 in accordance with the DSM Monitoring and Evaluation Plan 2013-15³, as amended and extended for 2017⁴. Evaluation activities are undertaken at different stages of the programs' lifecycles, when appropriate. The evaluation activities undertaken in 2017 and presented in Table 7-1 reflect the characteristics of the individual programs in the market and the level of studies required to provide program feedback.

7.2 PROGRAM EVALUATION ACTIVITIES

Primary types of Evaluation, Measurement and Verification (EM&V) activities include the following:

- Process evaluations, where surveys and interviews of participants and trade allies are used to assess customer satisfaction and program success;
- Impact evaluations, to measure the achieved energy savings attributable from the program, including free-ridership and spillover⁵ impacts; and
- Measurement & Verification (M&V) activities, to confirm project specific energy savings associated with energy conservation measures. Secondary evaluation findings of market effects may be revealed through interviews of market players, such as trade allies.

FBC's evaluation activities for 2017 continued to focus on identifying energy savings, assessing participant awareness and satisfaction, barriers to participation, the effectiveness of education initiatives and conducting industry research regarding best practices. EM&V activities were focused on identifying and verifying project and measure level savings assumptions and

³ FBC Application for 2014-2018 Performance Based Ratemaking Plan, Appendix H3.

⁴ FBC Application for Demand Side Management (DSM) Expenditures for 2017, s.6.1 and Appendix A5.

⁵ Free-ridership refers to participants who would have participated in the absence of the program and spillover refers to additional reductions in energy consumption or demand that are due to program influences that are not directly associated with program participation. Reference: National Renewable Energy Laboratory, <https://www.nrel.gov/docs/fy17osti/68578.pdf>

- 1 understanding any issues associated with equipment installation in the field. M&V activities
- 2 associated with specific projects, conducted by third party engineering consultants to verify
- 3 installed measures and savings thereof, are included in the project costs and not in the portfolio
- 4 level EM&V costs.

1

Table 7-1: 2017 DSM Program Planning, Evaluation and Research Activities

Evaluation Name	Program Area	Type of Evaluation	Evaluation Partnership	Evaluation Status
Heat Pump Program	Residential	Process & Impact	None	Participant and contractor surveys for free-ridership and spillover. Process review. Review of other utilities' programs. Completed March 2018 by Research Into Action
Energy Conservation Assistance Program (ECAP) - Ongoing Feedback Survey	Low Income	Process	FEI & BC Hydro	Ongoing survey with program participants to gather frequent and ongoing feedback on customer experience, satisfaction with the program and its program evaluators.
Energy Conservation Assistance Program (ECAP)	Low Income	Evaluation Study	FEI & BC Hydro	Ongoing Quality Assurance to ensure products are installed according to program policies and procedures.
Energy Conservation Assistance Program (ECAP) - Overall Program Evaluation 2017	Low Income	Process & Impact	FEI	Participant survey and monthly consumption usage conducted for the program. Expected completion by Q2 2018
Rental Apartment Efficiency Program (RAP) - Evaluation 2016	Residential	Process	FEI	Building owner and Tenant survey for program evaluation with 2015 and 2016 program participants. Completed December 2016 by Cohesium Research.
Rental Apartment Efficiency Program (RAP) - Evaluation 2017	Residential	Process	FEI	Building owner and Tenant survey for program evaluation with 2017 program participants. Expected completion by Q1 2018
Commercial Custom Program	Commercial	Process & Impact	None	Participant and contractor surveys. On-site visits to ten participant sites. Completed March 2018 by Evergreen Economics
Smart Learning Thermostat Pilot	Innovative Technologies	Measurement & Verification	FEI	Gauging customer acceptance and energy savings associated with smart learning thermostats. Expected completion Q3 2019
Review of Net-to-Gross Assumptions (FEI & FBC Energy Efficiency Programs)	C&EM Portfolio	Evaluation Study	FEI	Review of net-to-gross (NTG) methods, data sources, and assumption used by FortisBC to ensure alignment with the industry best practices. Completed Decmber 2017 by Sampson Research
Contractor Research Survey	Residential	Process	FEI	Survey with program participants and non-participants within the Contractor community. Completed May 2017 by Participant Research and Sentis Research Inc.
Energy Specialist Program - Evaluation 2017	Commercial	Process & Impact	FEI	The evaluation study includes program and industry stakeholder surveys and an energy savings audit on a subset of completed 2017 projects. Expected completion by Q2 2018.

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7.3 *PORTFOLIO EXPENDITURES*

Formerly known as Planning & Evaluation (P&E), the actual Portfolio expenditures for 2017 were \$1.0 million, or 128 percent of Plan. However, after accounting for the \$208 thousand in co-funding received, from MEM, BC Hydro and Natural Resources Canada for the Heat Pump Water Heater Pilot project, net Portfolio expenditures were \$0.8 million or 101 percent of Plan. Costs comprise largely of staffing costs and consultants' fees for the two comprehensive evaluation studies undertaken. Non-program area specific costs, such as telephone and tracking system upgrades, are also reported herein.

7.4 *EVALUATION REPORTS*

Two evaluation studies were largely completed in 2017, one for Residential Heat Pumps and the other for Custom Commercial projects. These had been scheduled for 2016, but were delayed due to increased due-diligence of vendors for privacy policy and technical security compliance.

FBC requests that the Evaluation Reports be filed on a confidential basis pursuant to Section 18 of the Commission's Rules of Practice regarding confidential documents established by Order G-1-16. The Evaluation Reports must be kept confidential on the basis that these reports contain customer-specific information that should not be disclosed to the public. In addition, the methodology and processes used in the reports are proprietary to the consultants hired by FBC.

The executive summary of the evaluation study conducted on the Residential Heat Pump Program by a third-party research company, Research Into Action, is included in Appendix C. The full report⁶ is provided separately in Confidential Appendix E.

The Heat Pump study's high level findings were an energy savings realization rate of 102 percent and an overall program-level weighted net-to-gross ratio (NTGR) of 84 percent. Loan participants had a significantly lower free-ridership rate of 15 percent, compared to rebate participants at 44 percent.

The executive summary of the evaluation study conducted on the Custom Business Efficiency Program by Evergreen Economics, is included in Appendix D. The full report is provided separately in Confidential Appendix F.

The CBEP study's high level findings were an energy savings realization rate of 100 percent, a program-level weighted NTGR of 69 percent, a measure-level NTGR of 59 percent for lighting and 76 percent for non-lighting measures.

⁶ Order G-186-14, Directive 21

Appendix A

DSM PROGRAMS COST AND SAVINGS SUMMARY REPORT

1 **Table A-1: FBC DSM Report for Year Ended December 31, 2017**

Program Area	Annual Electricity Savings (MWh)		(MWh)	Utility Expenditures (\$000s)				Cost Effectiveness Results			
	2017 Approved Plan	2017 Actual	Lifetime Savings	Incentive Expenditure	Non-Incentive Expenditure	Total 2017 Actual	2017 Approved Plan	TRC B/C Ratio	Calc UTC	Calc RIM	Levelized cost (¢/kWh)
Residential											
Home Renovation Rebate	364	187	6,082	66	129	196	348	1.8	1.7	0.6	7.6
Behavioural	3,097	20	56	4	1	5	200	1.1	1.1	0.5	0.0
Rental	508	295	4,091	42	35	77	206	6.7	5.4	0.9	0.1
Heat Pump Water Heaters	17	12	139	0	0	1	30	1.2	42.1	1.5	17.1
Appliances	126	494	7,727	240	98	337	133	2.2	2.9	1.0	9.8
Lighting	2,735	8,125	74,701	326	53	380	190	6.0	23.5	0.8	59.5
Heat Pumps	781	976	23,656	235	72	307	298	1.9	4.8	0.8	7.2
New Home Program	126	45	1,570	22	39	61	151	2.1	1.4	0.6	6.5
Residential Subtotal	7,755	10,154	118,020	936	427	1,363	1,557	4.0	9.0	0.8	2.5
Low Income Housing	2,739	693	7,171	409	119	529	1,161	1.4	1.3	0.5	927.2
Res'l & Low Income Total	10,493	10,847	125,191	1,345	546	1,891	2,718	3.6	6.8	0.8	2.9
Commercial											
Lighting	10,592	12,580	224,139	2,222	527	2,749	2,322	2.2	5.1	0.8	468.9
Sm Business Direct Install	0	2,634	56,547	430	432	862	-	3.3	3.7	0.7	25.3
Building Improvement	2,931	605	10,242	104	267	371	784	1.3	1.6	0.6	2.1
Irrigation	144	59	1,170	10	3	12	25	7.6	12.8	1.4	0.6
MURB New Construction	0	237	3,723	25	3	29		2.3	10.2	0.8	0.1
Commercial Total	13,666	16,115	295,822	2,791	1,232	4,023	3,131	2.2	4.5	0.8	6.4
Industrial											
Industrial Efficiency	1,556	876	13,980	145	61	206	309	4.8	5.2	0.8	2.6
Industrial Total	1,556	876	13,980	145	61	206	309	4.8	5.2	0.8	2.6
Programs Total	25,715	27,838	434,993	4,281	1,839	6,120	6,158	2.7	5.3	0.8	4.6
Portfolio Level Activities											
Planning & Evaluation					994	994	777				
Supporting Initiatives				10	585	595	674				
Total Portfolio	25,715	27,838	434,993	4,292	3,418	7,709	7,610	2.4	4.2	0.8	4.6
Less: Partner Co-funding				(193)	(208)	(401)					
Total after Co-funding	25,715	27,838	434,993	4,099	3,210	7,309	7,610	2.4	4.4	0.8	5.1

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Appendix B

HISTORICAL SUMMARY OF DSM COST AND ENERGY SAVINGS RESULTS

1

Table B-1: Historical FBC DSM Costs and Energy Savings 2012-2017

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	2012 (Actual)							2013 (Actual)						
	Spend (\$000s)			Energy Savings (MWh)			TRC	Spend (\$000s)			Energy Savings (MWh)			TRC
	Planned	Actual	Variance	Planned	Actual	Variance	(B/C)	Planned	Actual	Variance	Planned	Actual	Variance	(B/C)
1 Residential														
2 Home Improvements	1,719	637	1,082	7,620	4,656	(2,964)	1.7	1,961	725	1,236	8,680	5,222	(3,458)	1.7
3 Building Envelope ¹														
4 Heat Pumps	703	636	67	3,397	2,161	(1,236)	1.0	698	532	166	3,397	2,100	(1,297)	1.3
5 Residential Lighting	328	337	(9)	2,530	2,599	69	1.8	313	473	(160)	2,467	3,300	833	1.4
6 New Home Program	43	314	(271)	90	1,040	950	1.4	45	782	(737)	93	3,000	2,907	1.9
7 Appliances ¹	247	332	(85)	690	1,248	558		267	241	26	739	578	(161)	
8 Electronics ¹														
9 Water Heating ¹														
10 Low Income	677	308	369	1,774	1,054	(720)	1.3	660	415	245	1,570	2,000	(430)	1.6
11 Behavioural ¹														
12 <i>Residential Total</i>	3,717	2,564	1,153	16,101	12,758	(3,343)	1.5	3,944	3,168	776	16,946	16,200	(1,606)	1.6
13 Commercial														
14 Lighting	1,157	2,152	(995)	7,390	14,256	6,866	2.2	1,170	1,235	(65)	7,140	7,600	460	2.0
15 Building and Process Improvements	659	612	47	3,410	1,959	(1,451)	1.3	738	594	144	3,730	2,600	(1,130)	1.6
16 Computers														
17 Municipal (Water Handling)	383	255	128	2,580	1,677	(903)	2.6	177	80	97	1,110	700	(410)	1.4
18 Irrigation ²														
19 <i>Commercial Total</i>	2,199	3,019	(820)	13,380	17,892	4,512	2.0	2,085	1,909	176	11,980	10,900	(1,080)	1.8
20 Industrial														
21 Compressed Air														
23 EMIS	27	10	17	190	-	(190)	2.0	41	17	24	290	-	(290)	-
22 Industrial Efficiencies	323	163	160	2,290	937	(1,353)	-	323	307	16	2,290	2,500	210	1.0
24 <i>Industrial Total</i>	350	173	177	2,480	937	(1,543)	1.9	364	324	40	2,580	2,500	(80)	1.0
25 Programs Total	6,266	5,756	510	31,961	31,587	(374)	1.8	6,393	5,401	992	31,506	29,600	(2,766)	1.9
26 Supporting Initiatives	725	816	(91)	-	-	-	-	725	706	19	-	-	-	-
27 Planning & Evaluation	740	728	12	-	-	-	-	760	748	12	-	-	-	-
28 Total	7,731	7,300	431	31,961	31,587	(374)	1.6	7,878	6,855	1,023	31,506	29,600	(2,766)	1.6
¹ These programs were included in Home Improvements program														
² Irrigation was included in Municipal (Water Handling)														
³ Benefits calculated using RS3808 applicable at the time														

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Table B-2: Historical FBC DSM Costs and Energy Savings 2012-2016 (cont'd)

	1	2	3	4	5	6	7	8						
	2014 (Actual)							2015 (Actual)						
	Spend (\$000s)			Energy Savings (MWh)			TRC	Spend (\$000s)			Energy Savings (MWh)			TRC
	Planned	Actual	Variance	Planned	Actual	Variance	(B/C)	Planned	Actual	Variance	Planned	Actual	Variance	(B/C)
1 Residential														
2 Home Improvements	295	391	(96)	1,881	1,299	582	1.5	884	199	685	3,106	231	2,875	1.7
3 Heat Pumps	158	252	(94)	553	865	(312)	1.6	302	182	120	1,618	569	1,049	1.5
4 Residential Lighting	176	291	(115)	2,136	3,411	(1,275)	1.5	193	198	(5)	1,569	4,144	(2,575)	5.3
5 New Home Program	67	254	(187)	98	733	(635)	2.7	390	111	279	1,179	356	823	1.1
6 Appliances ¹	-	-	-	-	-	-	-	96	71	25	288	52	236	1.2
7 Water Heating	99	3	96	425	92	333	-	387	2	385	850	5	845	1.5
8 Low Income	242	502	(260)	707	2,286	(1,579)	1.9	824	287	537	2,598	282	2,316	1.3
9 Behavioural ¹			-			-	-	85	-	85	888	-	888	0.0
10 Residential Total	1,037	1,694	(657)	5,800	8,686	(2,886)	1.7	3,160	1,050	2,110	12,096	5,639	6,457	2.9
11 Commercial														
12 Lighting	510	646	(136)	3,359	3,353	6	2.0	1,485	735	750	7,445	4,089	3,356	2.0
13 Building and Process Improvements	592	533	59	2,641	1,926	715	1.4	897	543	354	3,832	1,606	2,226	1.6
14 Municipal (Water Handling)	-	5	(5)	-	-	-	-	79	36	43	759	187	572	2.3
15 Irrigation	32	-	32	200	-	200	0.0	69	9	60	490	-	490	0.0
16 Commercial Total	1,134	1,184	(50)	6,200	5,279	921	1.6	2,530	1,324	1,206	12,526	5,882	6,644	1.8
17 Industrial														
18 Compressed Air ²														
19 Industrial Efficiencies	148	188	(40)	800	614	1,121	1.2	202	226	(24)	1,537	1,087	450	2.0
20 Industrial Total	148	188	(40)	800	614	2,041	1.2	202	226	(24)	1,537	1,087	450	2.0
21 Programs Total							2.0							2.2
22 Supporting Initiatives	190	207	(17)					675	346	329				0.0
23 Planning & Evaluation	492	579	(87)					725	585	140				0.0
24 Recoveries from 2013		(378)	378							-				
25 Total	3,001	3,473	(472)	12,800	14,580	75	1.6	7,292	3,531	3,761	26,159	12,608	13,551	2.0
¹ In 2014, these programs were included in Home Improvements program.														
² In 2014, Compressed Air was included in Industrial Efficiencies.														
³ In 2015, Computers was added to Process Improvements and had no Spending or Savings.														

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Table B-3: Historical FBC DSM Costs and Energy Savings 2012-2016 (cont'd)

		2016 Actual						
		Spend (\$000s)			Energy Savings (MWh)			TRC
		Planned	Actual	Variance	Planned	Actual	Variance	(B/C)
1	Residential							
2	Home Improvement Program	884	225	659	3,106	243	2,863	1.6
3	Behavioural	106	79	27	1,048	587	461	4.1
4	Rental	-	137	(137)	576	840	(264)	4.5
5	Watersavers	430	72	358	948	21	927	2.3
6	Appliances	96	245	(149)	288	242	45	1.6
7	Lighting	189	360	(171)	1,547	8,607	(7,059)	10.7
8	Heat Pumps	302	249	53	1,618	753	865	1.6
9	New Home Program	390	39	351	1,179	31	1,148	1.4
10	Low Income Housing	952	1,111	(159)	2,598	1,214	1,385	0.9
11	<i>Residential Total</i>	3,348	2,518	830	12,908	12,538	370	4.0
12	Commercial			-			-	
13	Lighting	1,519	1,192	327	7,616	5,694	1,922	1.6
14	Sm Business Direct Install	-	556	(556)	-	1,139	(1,139)	1.6
15	Building Improvement	842	574	268	3,452	1,234	2,218	1.0
16	Computers	55	-	55	378	-	378	
17	Municipal (WWTP)	79	4	75	759	-	759	0.0
18	Irrigation	69	13	56	490	61	429	2.1
19	<i>Commercial Total</i>	2,564	2,339	225	12,695	8,128	4,566	1.5
20	Industrial			-			-	
21	Industrial Efficiency	209	300	(91)	1,585	2,099	(514)	6.9
22	<i>Industrial Total</i>	209	300	(91)	1,585	2,099	(514)	6.9
23	Programs Total	6,122	5,158	964	27,188	22,766	4,422	2.6
24	Portfolio Level Activities			-			-	
25	P&E, M&E, Dev	735	718	17			-	
26	Supporting Initiatives	675	657.3	17.68			0	
27	Total	7,532	6,533	998	27,188	22,766	4,422	2.3

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Appendix C

**RESIDENTIAL HEAT PUMPS PROGRAM
EXECUTIVE SUMMARY**

Final Report

Evaluation of the FortisBC Residential Heat Pump Program

March 27, 2018

Funded By:



Prepared By:

research > into > action^{inc}

Mersiha McClaren

Ryan Bliss

Nathaniel Albers

Jennifer Loomis

Anne Weaver

&

sbw

ENERGY • WATER • EFFICIENCY

Bob Tingleff

Executive Summary

FortisBC commissioned this study to gain a deeper understanding of the effectiveness of its residential heat pump offerings in driving uptake of heat pumps and shifting the market from electric resistance heating to heat pump technologies.¹ Presently, FortisBC offers a \$1,200 rebate for a central air source heat pump (ASHP), \$800 rebate for a ductless ASHP, or a loan of up to \$6,500 at a 1.9% interest rate for either central or ductless ASHP. We refer to these residential heat pump offerings collectively as the “Heat Pump Program.”

Research Into Action and SBW, the evaluation team, conducted several tasks as part of this evaluation:

- › Assessed savings for the two measures (central and ductless ASHP)
- › Estimated free-ridership (FR) and spillover (SO) and net-to-gross (NTG) ratio
- › Reviewed program tracking data and documentation
- › Interviewed program staff about goals, program processes, and program delivery challenges
- › Surveyed trade allies and participants on program influence and processes

The team estimated savings for the two heat pump measures using residential energy simulation software. Results derived with this software have been calibrated to utility bills in the U.S. Pacific Northwest (PNW) region. The calibration adjustments were applied to the results found for the FortisBC Heat Pump Program.

Note inputs to the savings simulations were based on data collected as part of the program implementation, data gathered in a phone survey of program participants, and data provided by FortisBC personnel. These data included parameters such as home size, type of home, efficiency of installed heat pumps, and prevalence of Heating Ventilation and Air Conditioning (HVAC) system types in homes in FortisBC territory. Where inputs specific to FortisBC program participants were not available, values used by programs in the PNW were used.

We also estimated FR and SO based on data from the participant and trade ally surveys and calculated NTG ratio with the formula $NTG = 1 - FR + SO$. We calculated both FR and SO values for central and ductless ASHP and for the program as a whole. We weighted the measure-level mean values by the proportion of participants who received rebates versus loans, and we weighted the program-level mean values by the proportion of program savings that central and ductless ASHP generated.

SO estimates included estimations of both participant and nonparticipant SO. We estimated the participant SO from the participant survey and nonparticipant SO from the trade ally survey data.

¹ Excluding heat pump water heater offerings.

We surveyed 77 participants and 15 trade allies. The 15 trade allies represented 53% of all installations completed in 2016-2017. Below we present a summary of the key findings, conclusions, and recommendations from this study.

Key Findings, Conclusions, and Recommendations

Conclusion 1: This study's estimate of the ductless ASHP savings value was higher than the savings value used by the program in 2017 (Table ES-1). Compared to the savings values used by the program in 2017, the study's estimate of the ductless ASHP savings value was higher while the estimate of the central ASHP savings value was lower. Since a large majority (74%) of the installed units in 2016 and 2017 were ductless ASHPs, the overall realization rate (the study-estimated savings as a percentage of the program claimed savings) was 102%.

Table ES-1: Calibrated Simulation Estimation of Savings Compared to Program Savings Values

Measure	kWh Savings per Year per Ton		Realization Rate	
	Estimated and Calibrated Savings	FortisBC 2017 Program Energy Savings ^a	Percentage of Participants (by Measure)	Program (Weighted by Participation %)
Central ASHP	1309	1700	26%	102%
Ductless ASHP	2406	2200	74%	

^a Reported by FortisBC staff. Savings are 4,400 per Ductless ASHP, with an average of 2 tons per unit.

The savings calibration adjustment based on comparison of simulation output to utility bills had a large impact on the per-ton savings estimate shown in Table ES-1. The calibration study conducted in the PNW found that occupant behavior reduced actual energy use significantly compared with that predicted by the simulation software, especially in poorly insulated homes where energy consumption would be the highest. Occupant behavior may differ in FortisBC territory. To improve on the estimates of savings found here, we **recommend** a study that measures actual energy consumption.

The program-level FR was 0.36, participant SO was 0.02, and nonparticipant SO was .18. Thus, the NTG ratio was $1 - .36 + .02 + .18 = .84$.

Conclusion 2: Generating more loan than rebate applications will help lower FR at the program level. FR is substantially lower for loan than rebate participants (Table ES-2). The program-level FR is 0.361.²

² The program-level free-ridership is the savings weighted mean of the measure-level free-ridership scores.

Table ES-2: FR Scores by Participant Type

Measure	Count	Mean FR Score	Confidence/ Precision
Loan	20	0.150	85/12
Rebate	57	0.442	90/10

To generate more loan applications, we offer two **recommendations**:

1. Reach out to contractors to encourage them to promote FortisBC loans since very few contractors reported discussing FortisBC loan offers with their customers. However, since contractors often do not like to deal with loan paperwork, provide them with the information on loan offers but do not ask them to help customers with that paperwork.
2. Increase the focus on the loan options in program marketing campaigns. The loan participants most commonly noted hearing about the loans from their family, friends, or other acquaintances (45% of all responses). A smaller proportion reported hearing about the loans from channels FortisBC uses to promote the heat pump incentives: website (15%), bill inserts (5%), and contractors (20%).

Conclusion 3: Program is influencing trade allies to sell qualifying equipment outside of the program.

We asked trade allies to report on program-qualifying and program-influenced heat pump measures sold for which no incentives or program financing were provided. From this data, we were able to estimate the nonparticipant SO. The prior evaluation assessed participant SO only. Our findings show a much higher nonparticipant than participant SO (Table ES-3).

Table ES-3: Spillover

Type	Data Source	SO
Participant SO	Participant Survey	0.02
Nonparticipant SO	Trade Ally Survey	0.18

We **recommend** FortisBC measures the nonparticipant SO in future evaluations.

Conclusion 4: Saving money should not be the sole message conveyed when promoting heat pumps and program incentives. Surveyed participants were less satisfied with bill savings than with heat pump reliability, comfort from it, and ease of operation. Additionally, the nonparticipant survey conducted by Illumina Research Partners³ revealed that high-usage customers were skeptical that the ASHP will save them money if they installed one. We **recommend** program staff include and/or highlight messages around comfort, ease of operation, and reliability of ASHPs in program and/or marketing collateral. The vast majority (90% or more) of customers were highly satisfied with these non-energy benefits.

³ FortisBC Heat Pump Potential: Pumping Up Potential for Electricity Conservation. Prepared for FortisBC by Illumina Research Partners, June 2, 2017. FortisBC proprietary research document.

Conclusion 5: Current rebates, although reasonable, could be further optimized. While current participants indicated that rebate levels were adequate – and even suggested they might have bought heat pumps at lower rebate levels, feedback from surveyed contractors and nonparticipants⁴ suggests that current incentive levels may not be sufficient to drive a large increase in participation.⁵ Since staff are considering restructuring rebate offers, we **recommend** exploring tiered rebates that depend upon factors such as efficiency level or whether the heat pump is certified to operate in very cold climates. Tiered rebates would reward (i.e., be higher for) customers who installed more efficient equipment and are the most common type of rebates offered by many heat pump programs we reviewed during this evaluation.

Conclusion 6: Promotion of program offerings via multiple channels generates confusion among customers. FortisBC customers receive rebates for ductless ASHPs through the Home Renovation Rebate Program, while central ASHPs are incented through another program. Loan and ductless ASHP rebate applications are submitted via mail, while central ASHP rebate applications are submitted online. Ductless ASHP rebate submissions are processed by a third-party, while central ASHP loan submissions and rebates are processed internally. This complexity appears to generate confusion among customers: staff noted customers who mistakenly apply for ductless ASHP rebates online are confused when their application is rejected. Ductless ASHP rebate must be submitted via mail to a third-party implementer. However, whether this potential confusion and requirement to resubmit reduces the number of applications is unclear. We **recommend** FortisBC investigate this impact by tracking the number of such customers who resubmit to assess the relative frequency with which such customers drop out of the application process. Further, since FortisBC staff must spend time explaining the process and helping such customers resubmit applications through the correct channel, we recommend that FortisBC consider streamlining these processes to reduce administrative costs.

⁴ Ibid.

⁵ The nonparticipant study reported that the current central ASHP rebate is sufficient for “only” 35% of customers and the current ductless rebate is sufficient for “only” 30%. Note that these percentages translate to around 50,000 customers, which is many multiples of the total number of rebates provided to date.

Appendix D

CUSTOM BUSINESS EFFICIENCY PROGRAM EXECUTIVE SUMMARY



Evaluation of the FortisBC Custom Business Efficiency Program (CBEP)

Submitted by Evergreen Economics

Executive Summary

March 28, 2018

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I Executive Summary

I.1 Introduction

This report presents the impact and process evaluation results for the FortisBC Custom Business Efficiency Program (CBEP) covering participants that completed projects from November 2014 through July 2017.

This program provides custom rebates for larger, more complex energy efficiency retrofits and new construction projects for medium to large customers in both the Commercial and Industrial sectors. Completed projects include lighting upgrades, industrial compressed air upgrades and municipal water projects. Other qualifying projects include measures such as HVAC upgrades, hydraulics, industrial controls, fans and pumps. Energy savings are calculated with the assistance of Technical Advisors on an individual project basis based on the eligible measures. For CBEP projects where the estimated rebate amount is greater than \$10,000, the rebate is paid in two installments. The first payment is equal to one-half of the total estimated rebate amount, as determined at the time the project is completed. The second payment is paid after the project savings have been verified and is equal to the total rebate amount associated with the verified savings, minus the first installment payment.

The Evergreen Economics evaluation team that conducted the research consists of the following firms:

- Evergreen Economics (prime contractor)
- Michaels Energy
- Phil Willems / PWP
- Sentis Research

The evaluation relied on several analysis methods to derive gross and net impacts:

- **Engineering analysis.** The Evergreen team completed both desk reviews (n=37) and site visits (n=9) for participating CBEP customers. Reviews focused on the appropriateness of assumptions and savings algorithms that were used in calculating energy savings, along with a verification that measures were installed in participants' facilities.
- **Participant phone surveys.** A phone survey was conducted on a sample of program participants (n=20). These surveys were used primarily to collect feedback on the program experience as part of the process evaluation and estimate self-reported free ridership.

- **Net-to-gross analysis.** The evaluation team estimated net impact savings for CBEP using the battery of questions in the phone survey focused on what equipment would have been installed if the FortisBC CBEP had not been available. A program net-to-gross ratio was calculated based on the evaluation team's free ridership scoring system.
- **Trade ally interviews.** Interviews were conducted with contacts provided by FortisBC (n=3) to evaluate the effectiveness of the program's design and delivery and better understand contractors' experience with the program.
- **FortisBC staff interviews.** Interviews were conducted with key FortisBC staff members (n=3) to identify the overall processes and effectiveness of CBEP and inform the other research tasks.

I.2 Impact Evaluation Results

The impact evaluation portion of the FortisBC CBEP evaluation consisted of three main research tasks:

- **Desk reviews of project documentation.** The evaluation team's engineers reviewed the project documentation for 37 CBEP projects to help determine the appropriateness of assumptions and savings algorithms that were used in calculating energy savings.
- **Project site visits.** Site visits were conducted on available participants to understand the equipment installed through the program, determine installation rates and help aid the savings claim validation.
- **Self-reported participant free ridership.** Results from the participant phone survey were used to estimate participant free ridership and the subsequent weighted net-to-gross ratios to determine program net impacts.

I.2.1 Engineering Review of Savings Values – Desk Reviews

The evaluation team carefully examined the complete set of documentation for each project during desk reviews. During project file reviews, we verified all key characteristics of the sampled projects, including:

1. **Engineering Equations.** Savings were calculated using engineering models that must be consistent with sound engineering fundamentals. The evaluation team scrutinized each equation to verify that it was fundamentally consistent and arithmetically accurate.
2. **Technical Assumptions.** An engineering equation can be correct, but the result still inappropriate if the inputs into equations are not reasonable. We traced the sources of assumptions through calculation files and supporting documentation such as

invoices, equipment specifications, data trends, codes and standards, and written project descriptions.

3. **Baseline Used.** Proper baselines are an essential part of any program impact evaluation. We reviewed the project documentation to determine if the selected baseline was appropriate for the technology and application.
4. **Holistic Results.** The overall savings were given a final review to confirm that measure savings as a portion of total building consumption were reasonable. Were the savings proportional to what was expected for the measure? If facility usage histories were available, were the project savings relative to facility usage reasonable?

Desk reviews were completed for 37 projects, which represented 4,099,239 kWh in energy savings and 1,060.5 kW in demand savings. The desk reviews included a review of the project documentation in addition to determining the appropriateness of assumptions and savings algorithms that were used to calculate energy savings.

A review of the project documentation and savings analyses showed that key operating parameters and equipment quantities used in the savings analyses were consistent with the information provided in the project documentation.

No adjustments were made to the claimed savings based on the desk reviews. The savings for the projects evaluated through a desk review are shown below in Table 1. The projects in the desk review sample accounted for approximately 36 percent of the overall program kWh savings (11,430,613).

Table 1: Summary of Savings - Desk Reviews

	kW	kWh
Claimed	1,060.5	4,099,239
<i>Ex Post</i>	1,060.5	4,099,239
Realization Rate	100.0%	100.0%

1.2.2 Engineering Review of Savings Values – Site Visits

Once desk reviews were completed, the evaluation team selected another nine projects for follow-up site visits. The selected projects constituted the largest projects in the sample. The site visits focused on verifying the following information with customers:

- **Equipment Installation:** During the site visit, the evaluation team verified any new equipment that had been installed. Additionally, relevant existing equipment was also verified to be consistent with the energy calculations. Equipment specifications,

make and model numbers, and physical descriptions were also verified as appropriate.

- **Equipment Operation:** The customer was interviewed regarding the operation of pertinent equipment. If data were collected by the customer, they were reviewed during the site visit. Operational information was compared to what FortisBC staff used in the *ex ante* calculations.
- **Baseline Conditions:** The customer was also interviewed about the baseline equipment or conditions for the project. This could include what equipment was removed, changes to equipment operation, or facility conditions that were adjusted.

The evaluation team completed site visits in order to gain a better understanding of the equipment installed through the program. The information gathered during site visits was used to determine installation rates and to aid in validating the savings claims for a sample of the projects that were completed over the study period (November 2014 – July 2017). Site visits were completed at four facilities to verify the completion of nine projects. These projects accounted for 487.1 kW in demand savings and 3,301,098 kWh in energy savings, representing 47 percent of the overall sample savings and 29 percent of the overall population savings. The evaluated measures included air compressor upgrades, variable speed drives, and LED light fixtures.

All of the equipment was found to be installed and operating as expected. The realization rates for each of the projects are shown in Table 2.

Table 2: Summary of Savings - Site Visits

Project Number	Claimed Savings		Evaluated Savings		Realization Rates	
	kW	kWh	kW	kWh	kW	kWh
ME3 - c	169.00	1,277,858	169.00	1,277,858	100%	100%
ME3 - d	89.30	782,648	89.30	782,648	100%	100%
ME3 - a	81.70	392,591	81.70	392,591	100%	100%
ME4	24.92	213,446	24.92	213,446	100%	100%
ME1	27.64	192,125	27.64	192,125	100%	100%
ME2	21.25	187,194	21.25	187,194	100%	100%
ME3 - b	31.80	132,261	31.80	132,261	100%	100%
ME3 - e	33.80	77,099	33.80	77,099	100%	100%
ME4	7.60	45,876	7.60	45,876	100%	100%
Total	487.01	3,301,098	487.01	3,301,098	100%	100%

The desk reviews and site visits showed that the project-specific inputs were appropriate and representative of equipment operation for each project. The evaluation estimated 1,547.5 kW in demand savings and 7,400,337 in energy savings, resulting in realization rates of 100 percent for both demand and energy savings.

1.2.3 Net Impact Analysis

In addition to the gross impact analysis, a separate net impact analysis was completed as part of the CBEP evaluation. The net impact analysis consisted of using a phone survey to estimate a free ridership rate that reflects the portion of gross savings that likely would have occurred even if the program were not available.

The net impact analysis relied on a self-report method that is based on a series of participant phone survey responses. In general, the self-report method uses responses to a series of carefully constructed survey questions to learn what participants would have done in the absence of the utility's program. The goal is to ask enough questions to paint an adequate picture of the influence of the program activities (rebates and other program assistance) within the confines of what can reasonably be asked during a phone survey.

With the self-report approach, specific researchable questions that were explored included the following:

- What were the circumstances under which the customer decided to implement the project (i.e., new construction, retrofit/early replacement, replace-on-burnout)?
- To what extent did the program accelerate installation of high efficiency measures?
- What were the primary influences on the customer's decision to purchase and install the high efficiency equipment?
- How important was the program rebate on the decision to choose high efficiency equipment?
- How would the project have changed if the rebate had not been available (e.g., would less efficient equipment have been installed, would the project have been delayed, etc.)?
- Were there other program or utility interactions that affected the decision to choose high efficiency equipment (e.g., was there an energy audit done, has the customer participated before, is there an established relationship with a utility account rep, was the installation contractor trained by the program)?

The method for estimating free ridership (and ultimately the net-to-gross ratio) is based on the 2017 Illinois Statewide Technical Reference Manual (TRM).¹ The general framework is presented here and was applied to the participant survey results for the FortisBC CBEP.

The net-to-gross method divides free ridership into several primary components:

- A ***Program Component*** series of questions that asks about the influence of specific program activities (rebate, customer account rep, contractor recommendations, other assistance offered) on the decision to install energy efficient equipment;
- A ***Program Influence*** question, where the respondent is asked directly to provide a rating of how influential the overall program was on their decision to install high efficiency equipment, and;
- A ***No-Program*** component, based on the participant's intention to carry out the energy-efficient project without program funds or due to influences outside of the program.

Each component is assessed using survey responses that rate the influence of various factors on the respondent's equipment choice. Since opposing biases potentially affect the main components, the *No-Program* component typically indicates higher free ridership than the *Program Component/Influence* questions. Therefore, combining these opposing influences helps mitigate the potential biases. This framework also relies on multiple questions that are crosschecked with other questions for consistency. This prevents any single survey question from having an excessive influence on the overall free ridership score.

Once the self-report algorithm is used to calculate free ridership, the total net-to-gross ratio (NTGR) is calculated using the following formula:

$$\text{NTGR} = (1 - \text{Free Ridership Rate})$$

The NTGR was calculated at the program level, and (if possible) at the measure level (lighting versus non-lighting) for larger measure groups if there was an adequate amount of data available. Finally, we also conducted sensitivity analyses using alternative weighting and scoring schemes to test the stability of the estimated NTGR.

Using the mean value across all three free ridership input scores, the evaluation team estimated individual free ridership scores for all participants. As shown in Table 3, these individual scores were then averaged across the participants to estimate measure-level (lighting versus non-lighting) and program-level free ridership values. The resulting net-

¹ The full Illinois TRM can be found at http://www.ilsag.info/il_trm_version_6.html

to-gross values were then weighted based on project savings for a program total of 0.69. The non-lighting net-to-gross value was estimated to be 0.76 compared to the lighting net-to-gross value of 0.59, indicating a higher level of free ridership among participants that completed lighting projects.

Table 3: Free Ridership and Net-to-Gross Ratio

Measure Type	Unweighted Free Ridership Score	Unweighted Net-to-Gross Ratio	Weighted Net-to-Gross Ratio
Lighting (n=11)	0.34	0.66	0.59
Non-lighting (n=9)	0.20	0.80	0.76
Total (n=20)	0.28	0.72	0.69

The participant phone survey did include questions about any additional projects the participants had completed since participating in CBEP, which potentially could provide evidence of program spillover. Results from the phone survey were very limited, however, as only two participants provided information on additional efficiency upgrades, with little context on how these were influenced by the program. Given the very small sample and limited information, we did not attempt to quantify participant spillover from these results.

1.2.4 Combined Impact Evaluation Results

Savings for CBEP were calculated using each of the analysis components discussed above and are summarized in Table 4 for both energy (kWh) and demand (kW). The gross realization rate is based solely on the engineering adjustments as applied to the current participant population. The weighted net-to-gross ratio is the result of applying the sample net-to-gross ratios outlined previously to the participant population. To calculate the final savings for the program, the *ex ante* savings were multiplied by the gross realization rate to determine gross annual savings. This value was then multiplied by the weighted net-to-gross ratio determined from the phone survey data to obtain net annual savings. The final realization rate was obtained by dividing the net annual savings value by the original *ex ante* savings total.

Table 4: Summary of Gross and Net Realized Savings²

	Ex Ante Electrical kWh Savings	Gross Realization Rate (%)	Gross Annual Savings (kWh)	Net-to- Gross Ratio (Weighted)	Net Annual Savings (kWh)	Final Realization Rate
Energy (kWh)	11,430,613	100%	11,430,613	0.69	7,887,123	69.0%
Demand (kW)	1,656	100%	1,656	0.69	1,143	69.0%

1.3 Process Evaluation

To supplement the impact analysis, the evaluation team also conducted a process evaluation of the FortisBC CBEP. The process evaluation included three primary analysis components:

- **In-depth Interviews with program staff (n=3).** Three key CBEP program staff were interviewed over the phone to provide insight on the program scope and processes and to guide the remaining analysis components.
- **In-depth interviews with contractors and trade allies (n=3).** Interviews with participating contractors and trade allies focused on evaluating their experience with CBEP and identifying ways to improve the program moving forward.
- **Participant phone survey (n=20).** A phone survey was conducted with a representative sample of the participant sample that completed projects between 2014 and 2017.

1.3.1 Summary of Staff Interview Findings and Recommendations

Overall, the staff interviews indicate that the program is effectively reaching out to commercial and some industrial customers. While there are known challenges, program managers have taken or are planning to take steps to address concerns regarding the predominance of lighting projects, bottlenecks in application and rebate processing, and the two-stage rebate process that increases uncertainty for customers and limits the program's ability to influence equipment selection decision. Concerns remain, however, regarding CBEP's outreach to trade allies and the difficulty program staff have working with the system used to track applications.

A more detailed summary of the staff interview findings is presented in Section 4.2 of this report.

² Savings based on project database provided by FortisBC with 67 completed and verified projects.

I.3.2 Summary of Trade Ally Findings and Recommendations

The results of our limited interviews indicate a surprisingly low level of involvement with and awareness of CBEP among 17 companies identified as trade allies by FortisBC. Even though we reached out to the specific contact provided by FortisBC or spoke with individuals we were referred to by that contact, only a few trade allies were aware of any involvement with projects completed through CBEP. While trade allies who had completed applications for the program generally considered the paperwork and other administrative requirements to be reasonable, those who were aware of the program but had not participated perceived it to be complicated and cumbersome, and they were not certain of what kinds or sizes of projects would be eligible for the program.

For most trade allies, the Business Direct Install (BDI) program was one with which they had more experience and found much easier to use and sell to their customers. The Commercial Products Program is seen as less generous in the level of rebates provided but easier to participate in than CBEP.

Both these results and specific suggestions from some respondents indicate that better communication with trade allies is needed to explain the details of CBEP, including eligibility requirements and the participation process. In addition, several trade allies pointed out that customers are relatively uninformed regarding energy efficiency generally and FortisBC programs in particular. A more focused outreach program to address these concerns should be manageable for the limited number of trade allies involved.

A more detailed summary of the staff interview findings is presented in Section 4.3 of this report.

I.3.3 Summary of Participant Survey Findings and Recommendations

The participant survey was designed to probe more in-depth on participants' experiences with CBEP and included questions on the following topics:

- Participant demographics
- Program awareness and participation process
- Program rebates
- Program satisfaction
- Project decision making
- Participant attitudes towards energy efficiency

Key findings across each of these categories include:

- Overall, CBEP participants covered a wide range of business types including schools (n=2), food retailers (n=2), municipal office buildings (n=2), and manufacturing facilities (n=2). Other businesses included aircraft engine facilities, low income apartments, an electrical utility, and a sawmill.
- Participants noted they learned about CBEP from a variety of sources. The most common sources included FortisBC technical advisors (25%), distributors (15%), word of mouth (15%), and from co-workers with previous experience with FortisBC programs (15%). All five of the participants who first learned of the program through a FortisBC technical advisor indicated the process went well and the technical advisor did a good job of explaining the program and the necessary participation steps.
- Approximately 60 percent of participants said the Technical Advisors were very or extremely influential in their decision. Additionally, 45 percent of participants noted their contractors were very or extremely influential while 60 percent of participants added that outside consultants were not at all or not very influential in their decision.
- Satisfaction was relatively high across all program aspects, with over 50 percent of participants indicating they were somewhat or completely satisfied with all parts of the program. Participants noted especially high levels of satisfaction with the application requirements for the program and communications with FortisBC and the overall service provided by FortisBC, with over 65 percent of participants saying they were completely satisfied with each of those aspects (71%, 67% and 65%, respectively).

1.4 Conclusions and Recommendations

Based on the key findings from the research tasks outlined above, the evaluation team identified the following recommendations for CBEP.

Recommendation 1: Calculate demand savings during peak demand periods given that peak demand savings were claimed inconsistently based on a review of the savings analysis. There can be significant differences between demand reduction and demand savings during peak periods due to variable equipment operation. For example, lighting projects simply claim the demand reduction due to installing efficient LED light fixtures while several other projects claim peak demand savings as the peak power reading based on metered data. If the lights or other equipment are off during the peak demand periods, no peak demand savings should be claimed.

Recommendation 2: HVAC interactive effects should be considered when lighting projects are completed in conditioned spaces. Currently, lighting projects do not take into account the location of the installations and the potential effects the projects may have on other pieces of equipment such as the HVAC requirements. HVAC interactive effects

account for the reduced cooling load required to be provided by the air conditioning equipment.

Recommendation 3: Continue to monitor the implications that shifting lighting projects to the Commercial Products Program has on custom projects that include non-lighting measures as well. Given the large percentage of lighting projects in CBEP (66%), the decision to move lighting projects to the Commercial Products Program will significantly reduce potential program savings for CBEP. While this shift will allow CBEP to devote more time and resources to other custom projects, it may also impact large-scale custom projects that involve lighting and non-lighting measures as the rapid payback from lighting projects plays a significant role in justifying the return on investment (ROI). If potential participants elect not to pursue these custom projects because of the difficulty pursuing incentives through two distinct programs, the CBEP program may experience a loss in potential savings from non-lighting measures.

Recommendation 4: Consider an adjustment to the two-stage (50-50) rebate payment process such as a 75-25 split or an increase to the threshold for two-stage payment projects.³ Both staff and participants acknowledged that the evenly split two-stage payment process typically means only the initial part of the payment can be used to offset the costs of the project. This lesser payment can also influence the purchase decision and may dissuade potential customers from pursuing additional energy efficient solutions. Only 47 percent of survey participants noted they were completely satisfied with the length of time it took to receive their rebate.

Recommendation 5: Increase engagement with both existing and potential trade allies. The evaluation found that there is relatively limited interaction between program staff and trade allies despite the amount of customer engagement the contractors and other trade allies have with participants. For example, of the provided trade ally contact list used for interview recruitment, over 50 percent of contacts were relatively unaware of CBEP and had little knowledge of any past involvement with the program. Increasing communication can help drive program participation – from both a trade ally and commercial customer perspective – and ensure trade allies are aware of program updates, administrative requirements of the program and project statuses for existing projects through the program.

Recommendation 6: Continue to leverage relationships with Technical Advisors, and provide additional resources – such as more allocated time and marketing efforts – for them to help drive participation. Approximately 25 percent of survey participants indicated they learned about CBEP from their Technical Advisor, which was the most

³ Based on staff interview feedback, both of these solutions have been discussed internally already by FortisBC but were not implemented at the time of the interviews and evaluation

common source mentioned. Additionally, 60 percent of survey participants noted that the Technical Advisor was very or extremely influential in their decisions to install high efficiency equipment through CBEP. Given their level of expertise and knowledge of the program, Technical Advisors can remain a primary driver in raising customer awareness of CBEP and encouraging large-scale custom projects.

Appendix E
EVALUATION STUDY
RESIDENTIAL HEAT PUMPS PROGRAM

FILED CONFIDENTIALLY

Appendix F

**EVALUATION STUDY
CUSTOM BUSINESS EFFICIENCY PROGRAM**

FILED CONFIDENTIALLY