Doug Slater
Director, 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: (778) 578-3874
Cell: (778) 214-3842
Fax: (604) 576-7074
Email: doug.slater@fortisbc.com
www.fortisbc.com

March 29, 2019

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) – 2018 Annual Report

Attached please find the Electricity DSM Program 2018 Annual Report for FBC (the Annual Report).

Request for Confidentiality of Certain Information

FBC is filing a full evaluation report which was completed in 2018 for the Commercial Product Rebate (CPR) program provided in Appendix D. FBC requests that the Full Report be filed on a confidential basis pursuant to Section 18 of the British Columbia Utilities Commission's Rules of Practice regarding confidential documents adopted by Order G-15-19. The Full Report must be kept confidential on the basis that the report contains customer-specific information that should not be disclosed to the public. In addition, the methodology and processes used in the report are proprietary to the consultants hired by FBC. The publicly available Executive Summary of the CPR Evaluation Report is provided in Appendix C.

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

Sincerely,

FORTISBC INC.

Original signed:

Doug Slater

Attachment

FortisBC Inc.

Electricity
Demand-Side Management Programs
2018 Annual Report

March 29, 2019

Table of Contents

1. REPORT OVERVIEW 1
1.1 Portfolio Level Results 1
1.2 Meeting Adequacy Requirements of the Demand-Side Measures Regulation 2
1.3 Addressing BCUC Directives 3
1.4 Collaboration & Integration 4
1.5 Portfolio Summary 4
2. RESIDENTIAL PROGRAM AREA 5
2.1 Overview 5
2.2 Residential Programs 5
2.2.1 Home Renovation Rebate 5
2.2.2 Heat Pumps 6
2.2.3 Appliance Program 7
2.2.4 Residential Lighting Program 7
2.2.5 New Home Program 7
2.2.6 Rental Apartment Program 7
2.2.7 Behavioural Programs 8
2.3 Residential Summary 8
3. LOW INCOME PROGRAM AREA 9
3.1 Overview 9
3.2 Energy Savings Kits 9
3.3 Energy Conservation Assistance Program 9
3.4 Non-Profit Custom Program 10
3.5 Low Income Summary 10
4. COMMERCIAL PROGRAM AREA 11
4.1 Overview 11
4.2 Prescriptive programs 12
4.3 Performance programs 12
4.4 Commercial Summary 13
5. INDUSTRIAL PROGRAM AREA 14
5.1 Overview 14

5.2 Industrial Programs 14
5.3 Industrial Summary 15

6. SUPPORTING INITIATIVES 16
6.1 Overview 16
6.2 Conservation Education and Outreach 16
6.3 Community Energy Planning 17
6.4 Education Programs (Elementary and Secondary) 17
6.5 Education Programs (Post-Secondary), Including Trades Training 18
6.6 Codes and Standards 18
6.7 Sector Support 18

7. PLANNING AND EVALUATION 20
7.1 Overview 20
7.2 Program Evaluation Activities 20
7.3 Portfolio Expenditures 21
7.4 Evaluation Reports 22

List of Appendices

Appendix A DSM Programs Cost and Savings Summary Report

Appendix B Historical Summary of DSM Cost and Energy Saving Results

Appendix C Commercial Product Rebate Program Evaluation – Executive Summary

Appendix D Commercial Product Rebate Program Evaluation – Full Report - **CONFIDENTIAL**

Index of Tables

Table 1-1: DSM Portfolio Summary Results for 2018 2
Table 2-1: 2018 Residential Program Area Results Summary 5
Table 2-2: 2018 RAP Installations 8
Table 3-1: 2018 Low Income Program Results Summary 9
Table 4-1: 2018 Commercial Program Results Summary 11
Table 5-1: 2018 Industrial Program Results Summary 14
Table 6-1: 2018 Supporting Initiatives Results Summary 16
Table 7-1: 2018 DSM Program Evaluation and Research Activities 21

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, 2018 and provides a summary of results achieved in 2018. The Report reviews the progress of FBC's DSM programs in meeting the approved 2018 DSM Plan[1] (Plan) by educating and incenting FBC's customers to conserve energy and improve the energy efficiency of their homes, buildings and businesses.

Section 1.1 contains a statement of financial results (Table 1-1), including the Total Resource Cost (TRC) benefit/cost ratio cost-effectiveness test results by Program Area for 2018. Section 1.2 includes summaries of how FBC's DSM programs met the requirements of the British Columbia Demand-Side Measures Regulation (DSM Regulation) enacted under the Utilities Commission Act (UCA). Sections 2 through 7 of the Report provide an overview of DSM program activities in 2018, 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.

An evaluation report was completed in 2018 for the Commercial Product Rebate (CPR) program, the executive summary of which is filed in Appendix C. Additionally, in accordance with Directive 21 of BCUC Order G-186-14, the complete CPR Evaluation Report is provided in CONFIDENTIAL Appendix D.

1.1 PORTFOLIO LEVEL RESULTS

Table 1-1 provides an overview of FBC's 2018 energy savings, expenditures and TRC cost-effectiveness test results for all DSM programs, by Program Area and at the portfolio level. The Company achieved an overall portfolio TRC of 1.6 on DSM expenditures of $7.2 million. Electricity savings totalled 31.4 GWh, a 13 percent increase over 2017 savings. All of FBC's DSM programs passed the TRC test, and therefore results for the modified TRC are not required.

FBC's 2018 DSM expenditures were $7.2 million or 91 percent of Plan. The 2018 DSM energy savings were higher than Plan, with actual savings of 31.4 GWh or 114 percent of Plan. In accordance with past practice, additional detail and results for the TRC, Utility Cost Test (UCT), 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.

[1] 2018 DSM Plan expenditures were accepted by the Commission pursuant to Order G-113-18.

Table 1-1: DSM Portfolio Summary Results for 2018

	Annual Electricity Savings (MWh)		Utility Expenditures ($000s)		
Program Area	**2018 Plan**	**2018 Actual**	**2018 Actual**	**2018 Plan**	**TRC B/C Ratio**
Residential Programs	5,903	5,157	935	1,145	2.2
Low Income	1,229	687	396	731	1.0
Labour & Related Expenses	-	-	750	610	
Residential & Low Income Total	**7,132**	**5,844**	**2,082**	**2,486**	**2.1**
Commercial Programs	19,165	23,943	2,602	2,770	
Labour & Related Expenses	-	-	864	822	
Commercial Total	**19,165**	**23,943**	**3,467**	**3,592**	**1.6**
Industrial Programs	1,188	1,615	240	305	
Labour & Related Expenses	-	-	157	72	
Industrial Total	**1,188**	**1,615**	**397**	**377**	**1.5**
Programs Total	**27,486**	**31,402**	**5,945**	**6,455**	**1.7**
Planning & Evaluation	-	-	743	743	
Supporting Initiatives	-	-	537	742	
Portfolio Activities Total	**-**	**-**	**1,280**	**1,485**	
Total	**27,486**	**31,402**	**7,225**	**7,940**	**1.6**

DSM expenditures in 2018 were cost-effective according to the methodology set out in section 4 of the DSM Regulation, achieving a portfolio TRC value of 1.6. The TRC for low income programs includes a 40 percent adder in the benefits[2], increasing the deemed cost effectiveness for the Low Income Program Area. The Low Income Program Area achieved a TRC of 1.0, after including the allowed 40 percent adder to benefits.

1.2 MEETING ADEQUACY REQUIREMENTS OF THE DEMAND-SIDE MEASURES REGULATION

FBC notes the Plan is in compliance with the adequacy requirements of the DSM Regulation, including the most recent amendments that came into effect on March 24, 2017. The DSM Regulation adequacy requirements 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 either (i) assist residents of low-income households to reduce their energy consumption, or (ii) reduce energy consumption in housing owned or operated by a local government, specified societies and associations, or a governing body of a first nation, if the benefits of the reduction primarily accrue to low-income households occupying

[2] In compliance with July 2014 amendments to Section 4(2)(b) of the DSM Regulation

the housing, the prescribed housing providers or the first nation governing body if the households in its housing are primarily low-income;

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;

d) 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; and

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.

FBC provides further details on how its 2018 DSM activities meet the adequacy of the DSM Regulation set out above. Section 3 of the Report discusses programs and incentives for low income customers, including Energy Savings Kits (ESK), Energy Conservation Assistance Program (ECAP) and the Non-Profit Custom Program. With regards to rental apartment buildings, FBC's offers include the Rental Apartment Efficiency Program (RAP), detailed in Section 2.2.6. Tenants can also access ECAP and ESK offers available to qualifying rental properties. In terms of education programs, the Company funded a variety of initiatives for K-12 students, including FortisBC Energy Leaders (Section 6.4), and also funded post-secondary student engagement initiatives (Section 6.5).

FBC provided resources indicated by clause (e) through a combination of Community Energy Planning (Section 6.3) and Codes and Standards (Section 6.6), both of which were underspent despite the Company's efforts to fulfill this requirement through third party funding arrangements. A net expenditure of $46 thousand, of the requisite $80 thousand, was achieved.

The Company supported step code adoption by transitioning its New Home Program (Section 2.2.5) to align with the BC Energy Step Code and providing Community Energy Specialists to local governments (Section 6.3).

1.3 ADDRESSING BCUC DIRECTIVES

There are no directives in the BCUC's Decision and Order G-113-18 to be addressed in the Report.

1.4 COLLABORATION & INTEGRATION

FBC 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.

FBC, FortisBC Energy Inc. (FEI), and BC Hydro and Power Authority (BC Hydro) (collectively, 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 MOU was renewed in 2018 and will continue to August 2022.

The BC Utilities conducted a joint review of incremental cost efficiencies occurring as a direct result of the partnership over the April 1, 2013 to March 31, 2018 time period (based on BC Hydro fiscal years). The review examined the costs incurred for each program and project collaboration that was in place over the time period and determined that the BC Utilities combined benefited from incremental cost efficiencies of approximately $21.5 million as a result of working together.

Other BC Utilities collaboration benefits include streamlined application processes for customers, extended program reach and consistent and unified messaging resulting in improved energy literacy.

In late 2018, British Columbia's Ministry of Energy, Mines and Petroleum Resources (MEMPR) introduced EfficiencyBC, a program including an online portal for homeowners and businesses to access information, incentives and support to reduce energy use and greenhouse gas (GHG) emissions in new and existing homes and buildings. EfficiencyBC is funded by the Province of British Columbia and the Government of Canada under the Low Carbon Economy Leadership Fund.

1.5 PORTFOLIO SUMMARY

The Company's DSM portfolio met the goal of cost effectiveness, with a TRC value of 1.6 in 2018. FBC believes that both energy savings accounted for in the portfolio and the resulting TRC are conservative. In addition to the direct energy benefits accounted for in the TRC, benefits from additional activities, such as Supporting Initiatives, play an important role in supporting the development and delivery of programs, while helping facilitate market transformation in British Columbia.

2. RESIDENTIAL PROGRAM AREA

2.1 OVERVIEW

The Residential Program Area achieved aggregate electricity savings of 5.2 GWh, and an overall TRC of 2.2. Approximately $1.4 million was invested in Residential energy efficiency programs in 2018, and 58 percent of those expenditures were in the form of measure incentives. The energy savings results achieved from Residential programs were 87 percent of Plan.

Residential programs address customers' major end-uses in residential detached dwellings, 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 2018 compared to Plan, including incentive and non-incentive spending, annual and lifetime electric savings.

Table 2-1: 2018 Residential Program Area Results Summary[3]

	Annual Electricity Savings (MWh)		(MWh)	Utility Expenditures ($000s)			
Program Area	2018 Approved Plan	2018 Actual	Lifetime Savings[4]	Incentive Expenditure	Non-Incentive Expenditure	Total 2018 Actual	2018 Approved Plan
Residential							
Home Renovation Rebate	301	225	3,776	120	16	136	140
Heat Pumps	1,297	1,127	17,496	273	85	357	327
Appliance Program	215	303	3,150	203	1	204	159
Residential Lighting	3,337	3,255	22,959	131	9	141	202
New Home Program	169	54	981	32	4	36	76
Rental Apartment Program	306	87	890	9	11	19	53
Behavioural	240	67	188	16	0	16	165
Heat Pump Water Heaters	38	38	260	25	-	25	25
Labour & Related Expenses	-	-	-	-	468	468	610
Residential Subtotal	**5,903**	**5,157**	**49,700**	**809**	**595**	**1,403**	**1,755**

2.2 RESIDENTIAL PROGRAMS

The following sections provide details on the activities FBC carried out in 2018 in each of the residential programs.

2.2.1 Home Renovation Rebate

The following activities were undertaken in the Home Renovation Rebate (HRR) program, which is a collaboration between the BC Utilities and MEMPR:

[3] Lifetime savings adjusted for Net Present Value calculation.

- MEMPR EfficiencyBC rebates were integrated into the BC Utilities administered HRR program as of September 28, 2018. The updated offer included the addition of new rebates, updated Bonus Offers, and increased incentive levels:

- FBC introduced and funded window and door rebates for electrically heated homes, while EfficiencyBC funded them for gas heated homes across the province. The draftproofing offer was removed.

- Bonus Offers are designed to promote multi-measure upgrades. The $750 Bonus Offer was restructured into two new Bonus Offers: An EnerGuide performance-based offer and a $300 Two Upgrade Bonus for completing two eligible measures.

- Insulation incentives were increased in alignment with BC Hydro to provide consistent provincial offers for customers.

- Bathroom fan rebates, captured under the HRR program, were offered through the spring and fall retail campaigns.

A total of 150 rebates were issued in the HRR program in 2018 which represents a 5 percent increase in participation over 2017.

Industry support includes FBC's application support fees to Energy Advisors and 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 the BC Utilities and MEMPR.

Administration expenditures include FBC rebate processing fees, and the enhancement of the existing online application hosted by BC Hydro. This custom form includes all program rebates from FBC, FEI, BC Hydro and MEMPR, allowing for centralized, province-wide rebate access and faster rebate processing.

2.2.2 Heat Pumps

Although reported separately in Table 2-1, heat pump rebates were consolidated under the HRR program in Q4, further streamlining the customer application process. An improved and tiered rebate structure was implemented to reward customers who install more efficient equipment. The Company's long-standing air source heat pump loan offer for electrically-heated homes was maintained throughout 2018.

Over 290 customers received heat pump rebates in 2018, an increase of 34 percent over 2017. The heat pump tune-up program attracted over 360 participants, 60 more than the prior year.

Heat Pump Water Heater activity levels met Plan, with 25 participants installing such units.

FBC lead an ASHP Installation Practices study, with co-funding from BC Hydro and MEMPR[4]. The study included site visits to 74 air source heat pump retrofits in homes in five regions of BC along with interviews of homeowners and contractors. The report provides a set of recommendations on best practices to install air source heat pumps. The report findings will be incorporated into contractor training workshops to be held in 2019.

2.2.3 Appliance Program

The Appliance Program continues to be a popular program encouraging retailers and customers to keep top-tier efficiency models for clothes washers, clothes dryers and refrigerators top of mind during the purchasing cycle. In 2018 the appliance program processed over 3,100 rebates and exceeded planned savings by 41 percent.

2.2.4 Residential Lighting Program

As LED lights are moving towards market maturation it becomes increasingly difficult to maintain historical program participation levels. As a result of low participation in the spring campaign a number of changes in the rebate offering were implemented in the fall campaign; increased rebates for bulbs, tiered rebates for fixtures based on the quantity in each package, and expanding the rebates to a wider range of bulbs and fixtures. Customer response was positive with over 200 percent more lighting products purchased, and a 175 percent increase in savings, compared to the spring campaign.

2.2.5 New Home Program

The New Home Program was redesigned in 2018 to align with the performance-based BC Energy Step Code. By broadening rebates and adding tiers, FBC is able to encourage and capture additional savings from homes built to the Step Code metrics.

The New Home Program saw a small increase in participation in 2018 as FBC transitioned from its prior ENERGY STAR for New Homes offer and introduced a more streamlined application process.

2.2.6 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

[4] The co-funders paid approximately one half of the total cost of the study, and only FBC's net cost is reflected in the Report.

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)[5] and by FEI outside the SST. A total of seven buildings received in-suite installations in 2018 in the SST, with 1,354 individual measures installed, as shown in Table 2-2.

Table 2-2: 2018 RAP Installations

Installed Measure Type	# Units
LED 16W bulb	456
LED 9.5 W bulb	898
Total measures intalled	1,354

2.2.7 Behavioural Programs

In 2018 FBC and FEI completed a Request for Proposal (RFP) process for the Customer Engagement Tool (CET), resulting in a CET vendor being selected. The CET will include both an online portal and home energy reports. Development has commenced with an expectation to launch by the end of 2019.

2.3 RESIDENTIAL SUMMARY

The Residential Program Area realized 5.2 GWh of energy savings with actual expenditures of $1.4 million, and achieved a TRC of 2.2. In 2018, Lighting remained the core residential measure, delivering 46 percent of the overall Residential Program Area energy savings. With a TRC of 4.9, it was the most cost-effective program of the Residential portfolio.

FBC's Residential programs enabled customers to upgrade lighting and appliances, and to capture ongoing energy savings. These programs enabled FBC to continue building on relationships with the trades for education and program awareness. The combination of financial incentives, policy support, contractor outreach, and effective marketing is instrumental to the ongoing success of these programs in generating energy savings and fostering market transformation in the residential sector.

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

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 Plan and actual expenditures for the Low Income Program Area.

Table 3-1: 2018 Low Income Program Results Summary

	Annual Electricity Savings (MWh)			Utility Expenditures ($000s)			
Program Area	2018 Approved Plan	2018 Actual	Lifetime Savings[4]	Incentive Expenditure	Non-Incentive Expenditure	Total 2018 Actual	2018 Approved Plan
Low Income	1,229	687	4,774	383	13	396	731
Labour & Related Expenses	-	-	-	-	282	282	-
Low Income Total	**1,229**	**687**	**4,774**	**383**	**295**	**678**	**731**

The following sections provide detail on the three Low Income programs delivered in 2018.

3.2 ENERGY SAVINGS KITS

The Energy Saving Kit (ESK) offer is a Low Income program whereby income-qualified participants receive a box of energy saving measures in the mail along with an instruction booklet and links to "how to" videos. All measures are easy-to-install measures that participants install themselves. The ESK offer is a partnership program with FEI.

The ESK offer was promoted and distributed at local food banks and other community events, through digital promotions, bill inserts and Contact Centre referrals. The Company also continued it's partnership with the Ministry of Social Development and Social Innovation to promote the ESK program to their clientele.

A total of 1,125 customers participated in the ESK program in 2018, an increase in participation of more than 35 percent over 2017.

3.3 ENERGY CONSERVATION ASSISTANCE PROGRAM

The Energy Conservation Assistance Program (ECAP) is a Low Income program whereby income-qualified participants receive an in-home visit from a program contractor to install basic measures (e.g. LED lighting, high efficiency showerheads, etc.) and provide customized energy efficiency coaching. Additionally some qualified participants also receive more robust measures such as fridges and insulation. The ECAP is a partnership program with FEI and BC Hydro.

The ECAP was promoted to social housing providers through one-on-one outreach efforts from dedicated program contractors. The ECAP was also promoted to individual low income customers through outreach at food banks, referrals from the Contact Centre and through direct mail to past participants of the ESK program.

A total of 702 customers participated in the ECAP in 2018 which is slightly lower than participation in 2017. The reduction was due to a transition in program contractors, however, contractual changes made in 2018 have resulted in increased program delivery capacity for 2019 and beyond.

3.4 NON-PROFIT CUSTOM PROGRAM

In 2018, the Non-Profit Custom Program was introduced to the market in mid-February and fully launched at the end of June. The Non-Profit Custom Program offer meets the needs of low income rental buildings. This has resulted in low income apartment buildings that would have participated in RAP participating in the Non-Profit Custom Program instead.

The Non-Profit Custom Program is designed to encourage social housing apartment buildings to replace inefficient equipment and systems with high-efficiency solutions. The program is built around three components:

- Energy study: Up to $5,000 is available for an energy study conducted by a professional engineer to identify energy savings potential in their multi-unit residential building.
- Implementation support: Up to $7,000 is available for engineering support to install and commission energy efficiency measures.
- Measure Incentives: Approximately 90 gas and electric energy efficiency measures are eligible for an incentive rebate.

Retrofit projects in this program require a longer timeline for completion (between one and two years) depending on whether an energy study is being conducted. For this reason, costs in the Non-Profit Custom Program were low in 2018.

The Non-Profit Custom Program was launched in partnership with FEI and BC Hydro and then later incorporated BC Housing and MEMPR as part of the EfficiencyBC initiative.

3.5 LOW INCOME SUMMARY

In total, over 1,800 customers participated in FBC's Low Income programs in 2018 achieving savings of 687 MWh. 2018 also laid a solid foundation for further growth in Low Income program participation in 2019 by implementing a strong contractor team to deliver the ECAP and engaging several prospects in the Non-Profit Custom program.

4. COMMERCIAL PROGRAM AREA

4.1 OVERVIEW

Commercial DSM programs encourage commercial customers (including institutions and government) to reduce overall consumption of electricity and associated energy costs. The Commercial programs produced aggregate electricity savings of 23.9 GWh and achieved an overall TRC of 1.6 in 2018. Actual Commercial program expenditures totaled $3.5 million, 72 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.

Table 4-1: 2018 Commercial Program Results Summary

	Annual Electricity Savings (MWh)		(MWh)	Utility Expenditures ($000s)			
Program Area	2018 Approved Plan	2018 Actual	Lifetime Savings[4]	Incentive Expenditure	Non-Incentive Expenditure	Total 2018 Actual	2018 Approved Plan
Commercial							
Lighting	13,620	17,635	75,693	1,746	5	1,751	1,750
Sm Business Direct Install	-	3,224	34,034	383	-1	382	-
Building Improvement	5,290	1,763	7,364	153	95	247	988
Irrigation	255	249	1,385	180	-	180	-
MURB New Construction	-	1,073	6,200	42	-	42	32
Labour & Related Expenses	-	-	-	-	864	864	822
Commercial Total	**19,165**	**23,943**	**124,676**	**2,503**	**963**	**3,467**	**3,592**

The Commercial sector recorded savings of 23.9 GWh, or 125 percent of Plan. Almost 90 percent of these savings were realized through the commercial lighting programs. An example of a commercial lighting project was the replacement of high-pressure sodium street lighting with light-emitting diode (LED) street lighting in Kelowna, which contributed 2.2 GWh of energy savings.

The remaining Commercial savings came from retrofit Building Improvements, MURB New Construction and Irrigation energy savings. An example of a non-lighting project was the installation of an earth tube passive geo-exchange at an office and warehouse complex in Okanagan Falls, which contributed 128 MWh of energy savings. An example of an Irrigation project was the installation of a variable speed drive on an existing irrigation pump motor for an irrigation district in Grand Forks, which contributed 34 MWh of energy savings.

Commercial Program Area costs in 2018 amounted to $3.5 million or 97 percent of Plan. The largest cost component of Commercial programs was the Lighting program, where the largest energy savings were also achieved.

The Program Areas, listed in Table 4-1 are delivered through two primary program channels: Prescriptive (product) and Performance (custom) as described in the following two sections. Additionally there was some residual activity in the Business Direct Install (BDI) program.

4.2 PRESCRIPTIVE PROGRAMS

- The Commercial Product Rebates (CPR) program offers prescribed retrofit and new construction rebates for commercial lighting, HVAC6, refrigeration, commercial kitchen appliances, irrigation and other electric energy efficiency measures. The program also offers point-of-sale rebates through participating lighting, kitchen, refrigeration and other electric product wholesalers directly to customers.

- The Business Direct Install (BDI) program provided point-of-sale rebates for the installation of lighting and other end use measures to small and medium businesses. The BDI implementer contract term ended in December 2017 and final rebates were paid out in 2018. The BDI rebates were incorporated into the existing CPR program and the electrical contractor benefits were transitioned to the FortisBC Trade Ally Network (TAN) in 2018;

- In partnership with FEI, FBC offers RAP providing direct in-suite installations of water and LED lighting measures. Additionally, FBC and FEI (together, FortisBC) offers common area energy assessments, and implementation support, for deeper energy efficiency retrofits at the building-wide level (see Section 2.2.6); and

- To support customers in multi-unit residential buildings (MURBs), FBC offers the MURB New Construction program jointly with FEI to encourage building energy efficiency above code. The MURB New Construction program packages FBC electric rebates in the CPR program with natural gas HVAC, natural gas hot water and natural gas fireplace measures in FEI's prescriptive programs.

4.3 PERFORMANCE PROGRAMS

- The Customer Business Efficiency Program (CBEP) provides custom rebates for larger, more complex energy efficiency retrofits and new construction projects in both the Commercial and Industrial Program Areas;

- 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 to access rebates for both electric and natural gas whole-building energy conservation measures.

The new construction program has been recently amended and simplified to align with Part 3 the British Columbia Energy Step Code, with a pathway for non-Energy Step Code subject buildings.

- 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

[6] HVAC – an industry abbreviation for the Heating Ventilation and Air Conditioning system in a building

program allows existing buildings to access a subsidized energy assessment and then provide custom rebates for both electric and natural gas energy conservation measures.

4.4 COMMERCIAL SUMMARY

The Commercial Program Area activity in 2018 achieved 23.9 GWh of annual electricity savings, a 48 percent increase over 2017 results, and achieved a TRC of 1.6. The Commercial Program Area is experiencing sustained adoption of LED lighting, supported by the continued downward cost curve in LED lighting products. The Commercial Program Area is also seeing a modest growth of non-lighting and whole-building energy efficiency projects, with a near three-fold increase in BIP and irrigation energy savings.

5. INDUSTRIAL PROGRAM AREA

5.1 OVERVIEW

The Industrial DSM programs continued to encourage industrial customers to consume electricity more efficiently in 2018. The Industrial programs achieved an overall TRC of 1.5, with electricity savings of 1.6 GWh. Actual Industrial expenditures in 2018 totalled $0.4 million, of which 60 percent was incentive spending.

Table 5-1 summarizes the plan and actual expenditures for the Industrial Program Area in 2018, including incentive and non-incentive spending, annual and lifetime electricity savings.

Table 5-1: 2018 Industrial Program Results Summary

	Annual Electricity Savings (MWh)		(MWh)	Utility Expenditures ($000s)			
Program Area	2018 Approved Plan	2018 Actual	Lifetime Savings[4]	Incentive Expenditure	Non-Incentive Expenditure	Total 2018 Actual	2018 Approved Plan
Industrial							
Industrial Efficiency	1,188	1,615	721	239	1	240	305
Labour & Related Expenses	-	-	-	-	157	157	72
Industrial Total	**1,188**	**1,615**	**721**	**239**	**157**	**397**	**377**

The Industrial Efficiency program achieved savings of 1.6 GWh, or 136 percent of the 1.2 GWh Plan for 2018 and an increase of 0.9 GWh over 2017 savings .

The Industrial Program Area is characterized by large intermittent 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 2018, much of the program activity concerned investigating and encouraging efficient industrial electric usage in new cannabis production facilities.

Industrial Program Area costs totaled $0.4 million for 2018, or 105 percent of Plan. An example of an industrial energy efficiency project was the installation of light-emitting diode (LED) lighting at a large cannabis production facility in Kelowna that contributed 1.2 GWh of energy savings.

5.2 INDUSTRIAL PROGRAMS

- The Commercial Product Rebates (CPR) program offers prescribed retrofit and new construction rebates for industrial lighting, refrigeration, variable speed drives, compressed air, and other electric energy efficiency measures. The program also offers point-of-sale rebates through participating lighting, refrigeration and other electric product wholesalers directly to customers.

- The Custom Business Efficiency program (CBEP) provides custom rebates for larger, more complex energy efficiency retrofits, including, but not limited to, LED agricultural lighting, compressed air, hydraulics, industrial controls, fans and pumps.

- The Industrial Optimization Program (IOP) provides qualified industrial customers, with electricity usage in excess of 0.5 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.

5.3 INDUSTRIAL SUMMARY

In 2018, the Industrial energy savings and program costs were above Plan at 1.6 MWh and $0.4 million, supported by large cannabis LED lighting projects. Overall, the Industrial Program Area achieved a 1.5 TRC benefit/cost ratio in 2018.

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.

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 2018 were $0.7 million and actual spending was $0.5 million. Expenditures on Supporting Initiatives were 28 percent below Plan partly due to timing of Community Energy Specialist funding, the mid-year launch of The Trade Ally Network (TAN) electric co-op program, and unallocated Codes & Standards support.

Table 6-1 summarizes the Plan and actual expenditures for Supporting Initiatives in 2018.

Table 6-1: 2018 Supporting Initiatives Results Summary

	Utility Expenditures ($000s)		
Program Area	**Non-Incentive Expenditure**	**Total 2018 Actual**	**2018 Approved Plan**
Conservation Education & Outreach	278	278	200
Community Energy Planning	46	46	75
Trade Allies	58	58	100
Education Programs	68	68	150
Codes & Standards	-	-	80
Non-program specific expenses	87	87	137
Supporting Initiatives Total	**537**	**537**	**742**

The following sections provide detail on FBC's Supporting Initiatives activity in 2018.

6.2 CONSERVATION EDUCATION AND OUTREACH

The community outreach 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 2018, providing new information about behaviour change and customer attitudes on efficiency. Educating all types of customers including residential and commercial remains a strong priority, and FBC is continuing to ensure steps are taken to make the information relevant and timely for these customers.

In late 2017, FortisBC launched it's "We've got rebates" marketing campaign which united DSM program messaging for the gas and electric utilities. In 2018, "We've got rebates" continued to have one sustained message in market, with the overarching objective to increase customer awareness that FortisBC has DSM program rebates.

Continued collaboration elsewhere with FEI was ongoing in 2018 to maximize efficiencies across both utilities. Costs continue to be shared on school, residential and commercial outreach as applicable. The fifth annual Efficiency in Action awards were held recognizing commercial organizations that have most effectively utilized C&EM programs and achieved electric savings. In collaboration with FEI and BC Hydro, four tangible commercial behaviour change tool kits for medium to large customers were created to utilize for employee engagement.

Community outreach continued to provide information to customers and the public on electric conservation and energy literacy and sought out new opportunities to reach customers. There were 137 events that FortisBC's street team attended in SST, up from 121 in the prior year. Also in collaboration with FEI, a municipal landing page was created to support municipalities in their efforts to promote FortisBC incentives and behaviour change.

As these are not incentive-based programs, FBC has not attributed direct savings to them in 2018. Community outreach costs are included at the Portfolio level and incorporated into the overall DSM Portfolio cost-effectiveness results. Although there were no energy savings attributed to the community outreach in 2018, FBC continues to focus on behavioural change opportunities that lead to potential energy savings.

6.3 COMMUNITY ENERGY PLANNING

The Community Energy Planning program supports community or institutional strategic energy plans, including policy development, that will promote energy efficiency into the future. The Company, in collaboration with FEI, offers financial assistance to local governments, including First Nations, and publically-funded institutions to facilitate energy efficiency planning activities. Two local governments accessed the offer in 2018.

Additionally, the Company, in partnership with FEI, supports Senior Energy Specialist (SES) positions. The role's responsibilities include the development of energy efficiency policy for residential and commercial Program Areas, including support for the BC Energy Step Code. Support and promotion of energy efficiency initiatives and activities within the community was also a criteria.

FBC contracted two local governments (one regional district, one city) for SES funding in 2018, also a 3rd SES position was verbally accepted by a FN association, but that contract wasn't executed. Due to these timing issues only $46 of the $75 thousand CEP budget was expended.

6.4 EDUCATION PROGRAMS (ELEMENTARY AND SECONDARY)

"Energy Leaders", the online, curriculum-connected resource program for BC elementary and secondary school teachers moved to its second year in market and expanded to include Grade 10 lessons.

Additionally the following school programs were continued:

- Energy is Awesome, an interactive presentation focused on energy conservation and safety; and

- BC Lions Energy Champions program.

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

Support for the University of British Columbia Okanagan (UBCO) and Okanagan College Wilden Living Lab project continued. The homes will be monitored and analyzed, by UBCO students, for their energy use over the next three years.

Sponsorship and grants for electricians and local contractors to participate, and grant support for Certified Energy Manager (CEM) training continue.

6.6 CODES AND STANDARDS

In past years FBC has supported relevant codes and standards work, e.g. Heat Pump efficiency testing, and installation standards. Despite discussions with the Canadian Standards Association (CSA), no such funding arrangements were completed in 2018 and no expenditures were made.

A supporting field study conducted in 2018, of Heat Pump installations (see s.2.2.2), that the Company led and co-funded, is however, expected to provide valuable inputs to the next edition of the CSA Heat Pump installation standard.

FBC intends to meet the 2019 planned expenditures for codes and standards by supporting education and awareness of the BC Energy Step Code, participating in CSA projects, and providing funding to Provincial codes and standards initiatives.

6.7 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 Manager positions (City of Kelowna and University of British Columbia Okanagan), in partnership with FEI, to promote both natural gas and electricity energy efficiency projects. These positions 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 Community Senior Energy Specialists that in addition to policy development, promote residential energy efficiency and the C&EM rebate programs at the communities;

- The TAN program continues to work at growing our Trade Ally Network members, and to provide guidance on how to take advantage of the new co-op advertising funding available to them; and

- Additionally 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 additional scope services phase of the BC Utilities dual-fuel Conservation Potential Review (BC CPR) was largely completed in 2018 and the final component, FBC's Market potential report, was submitted as part of FBC's 2019-2022 DSM Expenditure Plan filing.

The Energy Efficiency and Conservation Advisory Group (EECAG) provides insight and feedback on FBC's Portfolio of DSM activities and related issues. This includes DSM program and Portfolio performance, development and design, funding transfers, policy and regulations that may impact DSM activities, and other issues and activities as they arise. EECAG members supported both of FortisBC's 2019-2022 DSM Plan expenditure filings.

In alignment with the Company's Monitoring and Evaluation (M&E) Framework and industry practice, program evaluation activities are in accordance with the approved 2018 DSM Expenditure Plan[7]. Evaluation activities are undertaken at different stages of the programs' lifecycles, when appropriate. The evaluation activities undertaken in 2018 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 spillover[8] 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 2018 continued to focus on verifying energy savings, assessing participant awareness and satisfaction, drivers and barriers to participation, the effectiveness of education initiatives and conducting industry research regarding best practices. 2018 EM&V activities (listed in Table 7-1) were focused on identifying and verifying project and measure level

[7] FBC Application for Demand Side Management (DSM) Expenditures for 2018, s.5.1 and Appendix A6.1.

[8] 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 influence. Reference: National Renewable Energy Laboratory, https://www.nrel.gov/docs/fy17osti/68578.pdf

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

Table 7-1: 2018 DSM Program Evaluation and Research Activities

Evaluation Name	Program Area	Type of Evaluation	Evaluation Partnership	Evaluation Status
Commercial Product Rebate Program	Commercial	Process & Impact	None	The purpose of this study was to conduct a process and impact evaluation of the Commercial Products Rebate Program for the period 2016 through May 2018. **Expected completion Q1 2019.**
Home Renovation Rebate Program - Insulation & Program Compliance Site Visits	Residential / Commercial	Evaluation Study	FEI	Ongoing site visit of homes with insulation and draft proofing measures, with a focus on quality assurance and program compliance.
Rental Apartment Efficiency Program (RAP) - Evaluation 2017	Residential / Commercial	Process	FEI	Building owner and tenant surveys for program evaluation with 2017 program participants. **Completed December 2017 by Cohesium Research. Results reported in 2017 Annual Report.**
Rental Apartment Efficiency Program (RAP) - Evaluation 2018	Residential / Commercial	Process	FEI	Building owner and tenant surveys for program evaluation with 2018 program participants. **Expected completion by Q1 2019**
Energy Conservation Assistance Program (ECAP)	Low Income	Evaluation Study	FEI & BCH	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 & BCH	Participant survey and monthly consumption usage conducted for the program. **Completed August 2018 by Sampson Research**
Energy Conservation Assistance Program (ECAP) - Ongoing Feedback Survey	Low Income	Process	FEI & BCH	Ongoing survey with program participants to gather frequent and ongoing feedback on customer experience, satisfaction with the program and its program evaluators. **Expected completion by Q1 2019**
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. **Completed August 2018 by Prism Engineering**
Smart Learning Thermostat Pilot	Innovative Technologies	Measurement & Verification	FEI	Gauging customer acceptance and energy savings associated with smart learning thermostats. **Expected completion Q3 2019**
Energy Leaders Grade 10 Lesson Reviews	CEO	Process	FEI	Assessment with teachers to assess the usability of the lesson plans and corresponding materials. **Completed December 2018 by Kidnetic Education Inc.**

7.3 PORTFOLIO EXPENDITURES

Formerly known as Planning & Evaluation (P&E), the actual Portfolio expenditures for 2018 were $0.8 million, or 100 percent of Plan. Portfolio costs comprise largely of staffing costs and

consultant fees for the EM&V studies undertaken. Non-Program Area specific costs, such as telephone and tracking system upgrades, are also reported herein.

7.4 EVALUATION REPORTS

One comprehensive evaluation study was substantially completed in 2018, for the Commercial Products Rebate Program. The Commercial Products Rebate program was designed to assist FBC's small and medium-sized commercial customers in identifying and pursuing energy efficient energy improvements to reduce their electricity consumption in existing facilities. The majority of the CPR incentives are provided as point of sale rebates at electrical wholesalers, thereby enabling high customer participation while minimizing administrative burden.

The Commercial Products Rebate study's high level findings were evaluated by a third-party research company, Mazzi Consulting. The study found net energy savings of 29,118 MWh and evaluated net demand savings of 3.9 MW. The program's free rider and spill-over estimates were calculated resulting in a net to gross ratio of 1.16.

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 may 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 Commercial Products Rebate Program is included in Appendix C. The detailed report[9] is provided separately in Confidential Appendix D.

[9] Order G-186-14, Directive 21

Appendix A

DSM PROGRAMS COST AND SAVINGS SUMMARY REPORT

Table A-1: FBC DSM Summary Report for Year Ended December 31, 2018

	Annual Electricity Savings (MWh)		(MWh)	Utility Expenditures ($000s)				Cost Effectiveness Results			
Program Area	**2018 Approved Plan**	**2018 Actual**	**NPV Lifetime Savings**	**Incentive Expenditure**	**Non-Incentive Expenditure**	**Total 2018 Actual**	**2018 Approved Plan**	**TRC B/C Ratio**	**UCT**	**RIM**	**Levelized cost (¢/kWh)**
Residential											
Home Renovation Rebate	301	225	3,776	120	16	136	140	1.3	1.1	0.5	9.3
Behavioural	240	67	188	16	0	16	165	1.3	1.3	0.5	7.8
Rental	306	87	890	9	11	19	53	4.2	4.3	0.8	3.1
Heat Pump Water Heaters	38	38	260	25	0	25	25	1.3	1.9	0.8	15.6
Appliances	215	303	3,150	203	1	204	159	1.8	3.3	1.4	17.4
Lighting	3,337	3,255	22,959	131	9	141	202	4.9	18.9	0.8	2.2
Heat Pumps	1,297	1,127	17,496	273	85	357	327	1.2	1.5	0.6	9.7
New Home Program	169	54	981	32	4	36	76	1.5	1.1	0.5	8.1
Labour & Related Expenses					468	468	610				
Residential Subtotal	**5,903**	**5,157**	**49,700**	**809**	**595**	**1,403**	**1,755**	**2.2**	**2.1**	**0.6**	**6.2**
Low Income Housing	1,229	687	4,774	383	13	396	731	1.0	0.4	0.3	15.4
Labour & Related Expenses					282	282					
Low Income Subtotal	**1,229**	**687**	**4,774**	**383**	**295**	**679**	**731**				
Res'l & Low Income Total	**7,132**	**5,844**	**54,474**	**1,192**	**890**	**2,082**	**2,486**	**2.1**	**2.1**	**0.6**	**6.2**
Commercial											
Lighting	13,620	17,635	75,693	1,746	5	1,751	1,750	1.0		0.5	1.5
Sm Business Direct Install	0	3,224	34,034	383	-1	382		3.8	4.1	0.7	2.8
Building Improvement	5,290	1,763	7,364	153	95	247	988	2.2	0.9	0.4	14.8
Irrigation	255	249	1,385	42	0	180		0.6	0.6	0.4	25.0
MURB New Construction		1,073	6,200	180	0	42	32	2.0	3.3	0.6	5.1
Labour & Related Expenses				0	864	864	822				
Commercial Total	**19,165**	**23,943**	**124,676**	**2,503**	**964**	**3,467**	**3,592**	**1.6**	**2.1**	**0.7**	**8.9**
Industrial											
Industrial Efficiency	1,188	1,615	721	239	1	240	305	1.5		0.7	8.9
					157	157	72				
Industrial Total	**1,188**	**1,615**	**721**	**239**	**158**	**397**	**377**	**1.5**	**0.0**	**0.7**	**8.9**
Programs Total	**27,486**	**31,402**	**179,872**	**3,935**	**2,011**	**5,945**	**6,455**	**1.7**	**3.1**	**0.8**	**9.3**
Portfolio Level Activities											
Planning & Evaluation					743	743	743				
Supporting Initiatives				0	537	537	742				
Total Portfolio	**27,486**	**31,402**	**179,872**	**3,935**	**3,291**	**7,225**	**7,940**	**1.6**	**2.2**	**0.7**	**8.6**

Appendix B

HISTORICAL SUMMARY OF DSM COST AND ENERGY SAVING RESULTS

Table 1: Historical FBC DSM Costs and Energy Savings 2013-2017

	2013						
	Spend ($000s)			Energy Savings (MWh)			TRC
	Plan	Actual	Variance	Plan	Actual	Variance	(B/C)
Residential							
Home Improvements	1,961	725	(1,236)	8,680	5,222	(3,458)	1.7
Building Envelope[1]			-			-	
Heat Pumps	698	532	(166)	3,397	2,100	(1,297)	1.3
Residential Lighting	313	473	160	2,467	3,300	833	1.4
New Home Program	45	782	737	93	3,000	2,907	1.9
Appliances[1]	267	241	(26)	739	578	(161)	
Electronics[1]			-			-	
Water Heating[1]			-			-	
Low Income	660	415	(245)	1,570	2,000	430	1.6
Behavioural[1]						-	
Residential Total	**3,944**	**3,168**	**(776)**	**16,946**	**16,200**	**(746)**	**1.6**
Commercial							
Lighting	1,170	1,235	65	7,140	7,600	460	2.0
Building and Process Improvements	738	594	(144)	3,730	2,600	(1,130)	1.6
Computers			-			-	
Municipal (Water Handling)	177	80	(97)	1,110	700	(410)	1.4
Irrigation[2]			-				
Commercial Total	**2,085**	**1,909**	**(176)**	**11,980**	**10,900**	**(1,080)**	**1.8**
Industrial							
Compressed Air							
EMIS	41	17	(24)	290	-	(290)	-
Industrial Efficiencies	323	307	(16)	2,290	2,500	210	1.0
Industrial Total	**364**	**324**	**(40)**	**2,580**	**2,500**	**(80)**	**1.0**
Programs Total	**6,393**	**5,401**	**(992)**	**31,506**	**29,600**	**(1,906)**	**1.9**
Supporting Initiatives	725	706	(19)	-	-	-	-
Planning & Evaluation	760	748	(12)	-	-	-	-
Total	**7,878**	**6,855**	**(1,023)**	**31,506**	**29,600**	**(1,906)**	**1.6**

[1] These programs were included in the Home Improvements program

[2] Irrigation was included in Municipal (Water Handling)

	2014						
	Spend ($000s)			Energy Savings (MWh)			TRC
	Plan	Actual	Variance	Plan	Actual	Variance	(B/C)
Residential							
Home Improvements	295	391	96	1,881	1,299	(582)	1.5
Heat Pumps	158	252	94	553	865	312	1.6
Residential Lighting	176	291	115	2,136	3,411	1,275	1.5
New Home Program	67	254	187	98	733	635	2.7
Appliances[1]	-	-	-	-	-	-	
Water Heating	99	3	(96)	425	92	(333)	
Low Income	242	502	260	707	2,286	1,579	1.9
Behavioural[1]			-			-	
Residential Total	**1,037**	**1,694**	**657**	**5,800**	**8,686**	**2,886**	**1.7**
Commercial							
Lighting	510	646	136	3,359	3,353	(6)	2.0
Building and Process Improvements	592	533	(59)	2,641	1,926	(715)	1.4
Municipal (Water Handling)	-	5	5	-	-	-	
Irrigation	32	-	(32)	200	-	(200)	0.0
Commercial Total	**1,134**	**1,184**	**50**	**6,200**	**5,279**	**(921)**	**1.6**
Industrial							
Compressed Air[2]			-				
Industrial Efficiencies	148	188	40	800	614	(186)	1.2
Industrial Total	**148**	**188**	**40**	**800**	**614**	**(186)**	**1.2**
Programs Total							
Supporting Initiatives	190	207	17				
Planning & Evaluation	492	579	87				
Recoveries from 2013		(378)	(378)				
Total	**3,001**	**3,473**	**472**	**12,800**	**14,580**	**1,780**	**1.6**

[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.

	2015						
	Spend ($000s)			Energy Savings (MWh)			TRC
	Plan	Actual	Variance	Plan	Actual	Variance	(B/C)
Residential							
Home Improvements	884	199	(685)	3,106	231	(2,875)	1.7
Heat Pumps	302	182	(120)	1,618	569	(1,049)	1.5
Residential Lighting	193	198	5	1,569	4,144	2,575	5.3
New Home Program	390	111	(279)	1,179	356	(823)	1.1
Appliances[1]	96	71	(25)	288	52	(236)	1.2
Water Heating	387	2	(385)	850	5	(845)	1.5
Low Income	824	287	(537)	2,598	282	(2,316)	1.3
Behavioural[1]	85	-	(85)	888	-	(888)	0.0
Residential Total	**3,160**	**1,050**	**(2,110)**	**12,096**	**5,639**	**(6,457)**	**2.9**
Commercial						-	
Lighting	1,485	735	(750)	7,445	4,089	(3,356)	2.0
Building and Process Improvements	897	543	(354)	3,832	1,606	(2,226)	1.6
Municipal (Water Handling)	79	36	(43)	759	187	(572)	2.3
Irrigation	69	9	(60)	490	-	(490)	0.0
Commercial Total	**2,530**	**1,324**	**(1,206)**	**12,526**	**5,882**	**(6,644)**	**1.8**
Industrial							
Compressed Air[2]							
Industrial Efficiencies	202	226	24	1,537	1,087	(450)	2.0
Industrial Total	**202**	**226**	**24**	**1,537**	**1,087**	**(450)**	**2.0**
Programs Total							**2.2**
Supporting Initiatives	675	346	(329)				0.0
Planning & Evaluation	725	585	(140)				0.0
Recoveries from 2013			-				
Total	**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.

	2016						
	Spend ($000s)			Energy Savings (MWh)			TRC
Residential	Plan	Actual	Variance	Plan	Actual	Variance	(B/C)
Home Improvement Program	884	225	(659)	3,106	243	(2,863)	1.6
Behavioural	106	79	(27)	1,048	587	(461)	4.1
Rental	-	137	137	576	840	264	4.5
Watersavers	430	72	(358)	948	21	(927)	2.3
Appliances	96	245	149	288	242	(45)	1.6
Lighting	189	360	171	1,547	8,607	7,059	10.7
Heat Pumps	302	249	(53)	1,618	753	(865)	1.6
New Home Program	390	39	(351)	1,179	31	(1,148)	1.4
Low Income Housing	952	1,111	159	2,598	1,214	(1,385)	0.9
Residential Total	**3,348**	**2,518**	**(830)**	**12,908**	**12,538**	**(370)**	**4.0**
Commercial							
Lighting	1,519	1,192	(327)	7,616	5,694	(1,922)	1.6
Sm Business Direct Install	-	556	556	-	1,139	1,139	1.6
Building Improvement	842	574	(268)	3,452	1,234	(2,218)	1.0
Computers	55	-	(55)	378	-	(378)	
Municipal (WWTP)	79	4	(75)	759	-	(759)	0.0
Irrigation	69	13	(56)	490	61	(429)	2.1
Commercial Total	**2,564**	**2,339**	**(225)**	**12,695**	**8,128**	**(4,566)**	**1.5**
Industrial			-			-	
Industrial Efficiency	209	300	91	1,585	2,099	514	6.9
Industrial Total	**209**	**300**	**91**	**1,585**	**2,099**	**514**	6.9
Programs Total	**6,122**	**5,158**	**(964)**	**27,188**	**22,766**	**(4,422)**	**2.6**
Portfolio Level Activities			-			-	
P&E, M&E, Dev	735	718	(17)			-	
Supporting Initiatives	675	657	(18)			0	
Total	**7,532**	**6,533**	**(998)**	**27,188**	**22,766**	**(4,422)**	**2.3**

	2017						
	Spend ($000s)			Energy Savings (MWh)			TRC
Residential	Plan	Actual	Variance	Plan	Actual	Variance	(B/C)
Home Improvement Program	348	196	(152)	364	187	(177)	1.8
Behavioural	200	5	(195)	3,097	20	(3,077)	1.1
Rental	206	77	(129)	508	295	(213)	6.7
Watersavers	30	1	(30)	17	12	(6)	1.2
Appliances	133	337	204	126	494	368	2.2
Lighting	190	380	190	2,735	8,125	5,390	6.0
Heat Pumps	298	307	8	781	976	195	1.9
New Home Program	151	61	(91)	126	45	(81)	2.1
Low Income Housing	1,161	529	(632)	2,739	693	(2,046)	1.4
Residential Total	**2,718**	**1,891**	**(827)**	**10,493**	**10,847**	**354**	**3.6**
Commercial							
Lighting	2,322	2,749	427	10,592	12,580	1,989	2.2
Sm Business Direct Install	-	862	862	-	2,634	2,634	3.3
Building Improvement	784	371	(413)	2,931	605	(2,326)	1.3
Computers	-	-	-	-	-	-	0.0
Irrigation	25	12	(13)	144	59	(84)	7.6
MURB New Construction	-	29	29	-	237	237	2.3
Commercial Total	**3,131**	**4,023**	**892**	**13,666**	**16,115**	**2,449**	**2.2**
Industrial						-	
Industrial Efficiency	309	206	(103)	1,566	876	(690)	4.8
Industrial Total	**309**	**206**	**(103)**	**1,566**	**876**	**(690)**	**4.8**
Programs Total	**6,158**	**6,120**	**(38)**	**25,726**	**27,838**	**2,113**	**2.7**
Portfolio Level Activities							
P&E, M&E, Dev	777	994	217			-	
Supporting Initiatives	674	674	0			-	
Total	**7,610**	**7,788**	**179**	**25,726**	**27,838**	**2,113**	**2.4**

Appendix C

COMMERICAL PRODUCT REBATE PROGRAM EVALUATION EXECUTIVE SUMMARY

MAZZI
CONSULTING
SERVICES
real solutions,
measurable results

Eric Mazzi
PhD, P.Eng., PE, CEM

604.992.0489
mcs@telus.net
mazziconsulting.com

FORTIS BC™
Energy at work

Commercial Product Rebate Program Evaluation

Prepared for: FortisBC Inc.

Prepared by:

Iris Sulyma

Ken Tiedemann

Eric Mazzi

Connie Cheng

Date: March 6, 2019

Executive Summary

E1. Introduction

The Commercial Products Rebate Program ("Program") was designed to assist FortisBC Inc. ("FBC" "FortisBC" or the "Company") small and medium-sized commercial customers in identifying and pursuing energy efficient energy improvements to reduce their electricity consumption in existing facilities. The Program is part of the portfolio of Conservation & Energy Management (C&EM) programs which aims at acquiring direct electrical energy efficient conservation (energy and demand) savings in major end-uses of each customer class, as well as accelerating the adoption of energy efficient technologies. The C&EM programs are offered to both directly served and indirectly served customers within the FortisBC electric service area. For the study period from 2016 to May 2018, there were some 2,181 sets of measures installed.

E2. Study Approach

The purpose of this study was to conduct a process and impact evaluation of the Commercial Products Rebate Program for the period 2016 through May 2018. Activities for this process and impact evaluation are to:

- Review program activity;
- Summarize participant and commercial partners (trade ally) characteristics;
- Assess participant and commercial partner awareness;
- Assess participant and commercial partner satisfaction;
- Identify barriers, drivers and opportunities;
- Assess split incentives;
- Assess free ridership:
- Assess spillover;
- Estimate gross impacts;
- Estimate net impacts.

The study uses information from a literature review, program documents, participant surveys and commercial partner surveys through detailed telephone or online surveys and interviews. The analysis included preparation of cross tabulations, interview summaries and multiple methods approaches for free ridership and spillover. FortisBC provided lists of program participants and commercial partners. The following table summarizes the populations, samples and response rates for the participant survey and for the commercial partner interviews. The response rates are robust, and they suggest that the responses are representative of the relevant populations of participants and commercial partners.

Table E1: Populations and Samples

	Method	Populations	Samples	Response Rates
Participants	Email survey with 3 follow ups as needed	148	64	43.2%
Commercial partners	Email request with telephone survey with 3 follow ups as needed	20	9	45.0%

An initial step was to conduct a detailed literature review of some 23 recent evaluations of similar commercial DSM programs. Key findings and results include the following:

- Most utilities have high rates of customer program awareness and customer satisfaction with program processes, incentive levels and program offerings;
- Gross savings are variously based on program tracking data, engineering algorithms, econometric models, site visits, end-use metering, deemed savings and other types of M&V;
- Verified gross savings as a share of reported savings typically range from about 50% to about 110%, with low verified gross savings sometimes due to the fact that some incented products have become standard practice over time;
- Free ridership estimates are often based on multiple-question participant surveys with some studies using quasi-experiments or econometric methods to estimate attribution;
- Net to gross ratios typically vary from about 40% to about 90%. Although all studies attempt to measure free ridership, relatively few studies of commercial DSM programs attempt to measure either participant spillover or market effects.

E3. Results

Program Activity. The Program has four distinct steps. First, opportunity identification includes customer informed awareness about energy efficient measures and commitment to the installation of specific measures. Second, equipment installation includes customer or contractor installation of energy efficient measures. Third, incentive payment includes submission of applications by customers or distributors and release of the rebate. Fourth, the final step includes measurement and verification of measure installation. The Program design was analyzed by building a program logic model, and this analysis examined the chain of relationships among Program inputs, outputs, purpose and goals for each step. Since there are credible and logical linkages among the layers of the logic, and since the assumptions appear to be met, it was concluded that the program design is sound.

Participant and Commercial Partner Characteristics. First, survey participants were asked "Which of the following best represents your position/title in the organization?" In this and a number of subsequent tables, the sample of participant respondents is split into groups: those who indicate that they score a 4

or a 5 on a five-point scale familiarity with the Program scale and who are referred to as familiar respondents, and those who indicate that they score a 1, 2 or 3 on this scale and are referred to as unfamiliar respondents. Two respondents did not provide an answer, so they are not included in the disaggregated results. Business or building owner or co-owner and operations or maintenance managers are the most common position titles for both the familiar and the unfamiliar groups.

Table E2. Position or Title

	All (n=64)	Familiar (n=25)	Unfamiliar (n=37)
Business or building owner or co-owner	31	32	30
Operation or maintenance manager	14	12	16
Executives	11	8	14
Facility or property managers	9	12	5
Office manager/assistant/secretary	8	0	14
General manager	8	12	5
Operation or maintenance technician	6	8	5
Controller/accountant/bookkeeper	5	4	5
Customer service representative	3	8	3
Other	5	4	3

Second, respondents were asked about the hours of operation for lighting for their facility, with 24 hour lighting designated as emergency lighting such as exit signs and all other lighting designated as non-emergency lighting. For all lighting, Monday to Friday, the average was 15.5 hours per day while for Saturday to Sunday the average was 12.9 hours per day.

Table E3: Hours of Operation

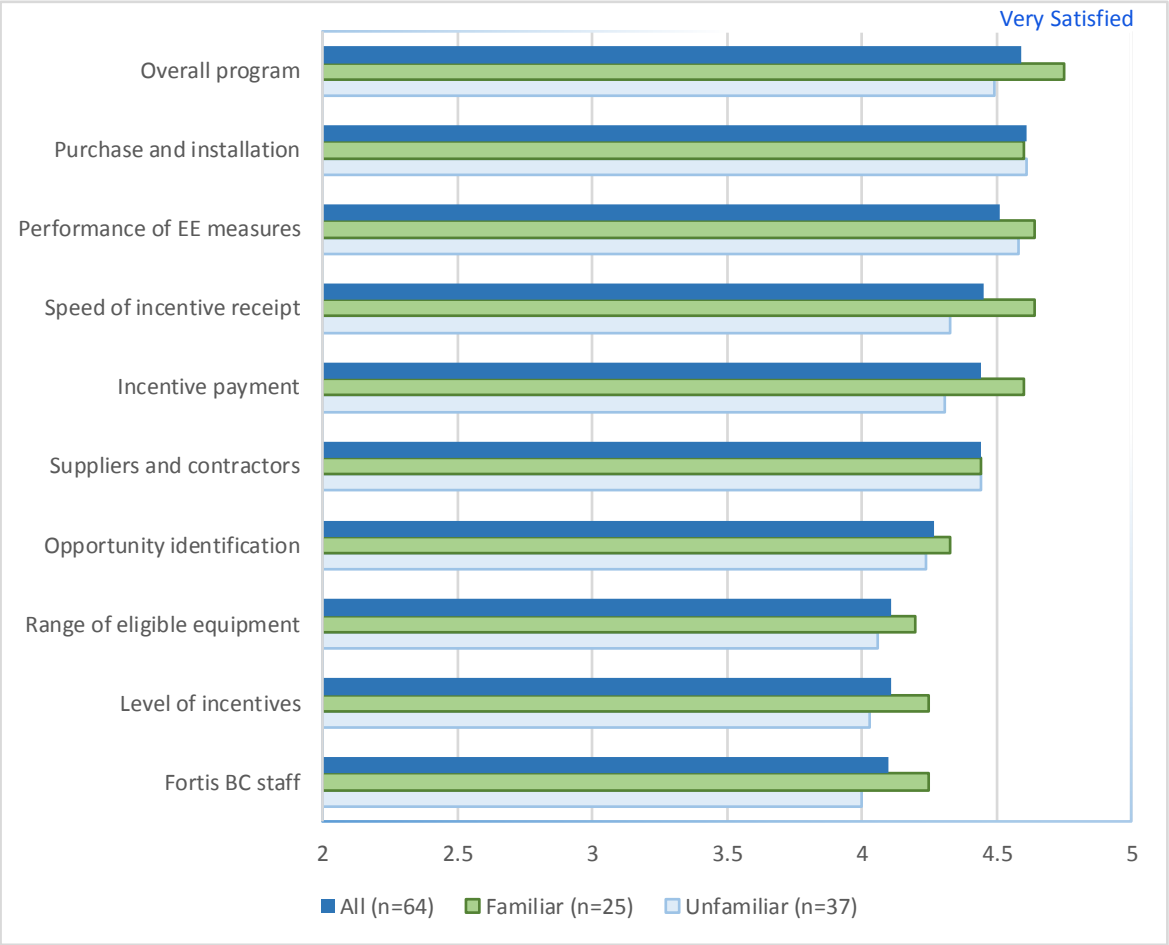
Period	Lighting Use	Daily Hours	Annual Days	Annual Hours
Monday to Friday	All	15.53	261	4053
Saturday to Sunday	All	12.93	104	1345
Monday to Sunday	All			5398
Monday to Friday	Non-emergency	11.72	261	3059
Saturday to Sunday	Non-emergency	7.96	104	828
Monday to Sunday	Non-emergency			3887
Monday to Friday	Emergency	24.00	261	6264
Saturday to Sunday	Emergency	24.00	104	2496

Monday to Sunday	Emergency			8760

Assess Participant and Commercial Partner Awareness. Using a five-point scale, where 1 is not at all familiar and 5 is very familiar, participants were asked "How familiar are you with FortisBC's Commercial Product Rebate Program?" Program familiarity for the whole sample was at moderate levels with 40% of respondents indicating that their level of familiarity was 4 or 5 out of 5, for a mean of 3.2. For some of the following questions, the sample of participants was split into those familiar (4 or 5) and those unfamiliar (1, 2 or 3) with the Program. Commercial partners had a high level of mean program awareness of 4.7.

Assess Participant and Commercial Partner Satisfaction. Again, using a five-point scale where 1 is very dissatisfied and 5 is very satisfied, participants were asked how satisfied they were with various program aspects. The Program achieved high levels of participant satisfaction for the overall program, and for the purchase and installation of equipment, and the performance of energy efficient measures components. The Program also achieved high levels of satisfaction for other aspects including speed of incentive receipt, the incentive payment process, suppliers and contractors and the identification of opportunities. In general, those most familiar with the program provided higher satisfaction ratings than those less familiar with the program.

Exhibit E1: Participant Satisfaction Means



Again, using a five-point scale where 1 is very dissatisfied and 5 is very satisfied, commercial partners were asked how satisfied they were with various program aspects. The Program achieved high levels of commercial partner satisfaction for the overall program, opportunity identification, equipment installation and incentive payments components. The Program also achieved high levels of satisfaction for other aspects including FortisBC activities, commercial partner activities and performance of the energy efficient products. Using a five-point scale, commercial partners were asked how effective the Program was in encouraging the purchase and installation of lighting and non-lighting retrofits, and they responded that the program was quite effective.

Table E4: Commercial Partner Satisfaction Means

	n =9
Overall program	4.3
Opportunity identification	4.8
Purchase and installation	4.4
Incentive payment	4.3
FortisBC staff	4.6
Program effectiveness	4.5

Identify barriers, drivers and opportunities for investments in energy efficiency. Participants were asked a detailed set of questions about the importance of various drivers and barriers to their organization in the decision to implement energy efficient projects using a scale of 1 to 5, where 1 is not at all important and 5 is very important. The most important drivers were energy cost savings, and the FortisBC incentive or rebate. For those familiar with the program, past success with energy efficient equipment and programs were also important drivers of the decision to implement a project. For all respondents the most important barriers were: (low) priority to energy efficient projects, business disruption or hassle and inconvenience, as well as availability of capital, funding or budget. For those less familiar with the program, limited knowledge of energy efficient alternatives, lack of time or other priorities and difficulties gaining information about the energy consumption of equipment are also important barriers.

Assess split incentives. Split incentives refer to cases where the facility owner makes decisions about and finances energy efficient improvements, but the benefits of the improvement accrue to the tenant, renter or lessee. For example, the landlord owns the lighting fixtures, but the tenant is responsible for electricity bills. Participants were asked additional questions pertaining to decision making and split incentives. Participants were asked additional questions to understand the importance of split incentives, and there is little evidence from the participant survey that this a problem for this Program.

Estimate gross impacts.

Fortis BC provided Mazzi Consulting with detailed spread sheets covering about one-sixth of program activity for the period of the evaluation. This included number of products incented, base kW, efficient kW, deemed hours of use and other variables for some 66 product categories. A first step was to undertake an analysis of the energy savings as shown in Appendix 1. The base kW, efficient kW and hours of use for each of the 66 product categories were reviewed and found to be reasonable. However, for three lighting categories and one non-lighting category there were missing savings estimates, and these savings were estimated and listed as "Additional savings." Table E5 provides gross evaluated energy and demand savings based on the analysis of the sample of projects.

Table E5: Summary Sample Gross Energy and Demand Savings

	Nº. of products	Sum kW	Sum kWh
Total lighting	52,681	914	3,719,690
Total non-lighting	950	159	339,418
Total all	53,631	1,073	4,127,332
Additional savings			253,400

Table E6 provides a summary of total gross evaluated energy and demand savings. This analysis increased energy savings by 1.0%. Evaluated gross energy savings are 25,102 MWh and evaluated gross demand savings are 3,439 kW.

Table E6: Total Gross Energy and Demand Savings

	Savings
Program reported energy savings	24,849 MWh
Additional savings	253 MWh
Evaluated gross energy savings	25,102 MWh
Peak to energy factor	0.137
Estimated gross demand savings	3,439 kW

Estimate free ridership. Free ridership refers to program participants who receive a financial incentive to install energy efficient measure(s) which would have been installed even without the financial incentive. Insight into relevant customer behaviour can be gained by asking questions about pre-Program participation, customer knowledge, behaviour and purchase intentions. Two alternative free ridership calculations were made. The average of the two free ridership approaches undertaken was 0.27 or 27%.

Estimate spillover. Spillover refers to Program participants who implement additional energy conservation measures without financial incentive from FortisBC, because of the influence of the Program. Again, insight into relevant customer behaviour can be gained by asking questions about energy efficient installations, or intent to install without a Program incentive. Two alternative spillover calculations were made, and the average of the two spillover estimates was 0.43 or 43%.

The rationale for triangulation using multiple methods is provided in the methodology section. Using the average free rider and spillover estimates, the net to gross ratio is 1 – 0.27 + 0.43 = 1.16.

Estimate Net Impacts. The following table provides total net evaluated energy and demand savings based on an analysis of the sample of projects provided by FortisBC. Evaluated net energy savings are 29,118 MWh and evaluated net demand savings are 3,989 kW.

Table E7: Total Net Savings

	Gross Energy (MWh)	Gross Peak (kW)	Net to Gross Ratio	Net Energy (MWh)	Net Peak (kW)
2016 to May 2018	25,102	3,439	1.16	29,118	3,989

E4. Conclusions and Recommendations

1) Program Design

Program design was examined by undertaking a literature review of recent commercial evaluations, reviewing Program documents, and building a program logic model. The Program has four main components or steps, and for each component the evaluation team examined the relationship among Program inputs, outputs, purposes and goals. It was concluded that these linkages are plausible for each component, so that the Program design is both valid and well designed to meet Program goals.

Recommendation 1: Continue to use the point-of-sales approach to provide a convenient and cost-effective means of increasing market penetration of energy efficient lighting and non-lighting products to the Company's commercial customers.

2) Program Offer

Program offers were examined by undertaking a review of program offerings for the period covered by the evaluation and surveying Program participants. Products covered by the rebates include lighting measures, commercial food service equipment, refrigeration equipment, and heating, ventilation and air conditioning equipment. The range of product offerings is similar in scope to those in other jurisdictions such as the Deemed Commercial offers of the California investor owned utilities. Participants are generally satisfied with both the range of products offered and the incentive levels.

Recommendation 2: Continue to offer a wide range of lighting and non-lighting products through the Program. No substantial changes are recommended for the range of products incented through the Program. Take-up of energy efficient lighting products has been impressive, but there appear to be substantial opportunities for growth in non-lighting products.

3) Marketing

The Program has achieved high levels of participation with some 751 projects from 2016 through May 2018. However, participation has been concentrated on a limited range of products (including LED lamps, interior LED luminaires and exterior LED luminaires) and a limited set of sectors (about one-half of survey respondents in the retail, manufacturing/light industrial and civic/related segments). Many other survey respondents are unfamiliar with the program.

Recommendation 3: To ensure that the Program continues to generate a high level of electricity savings, it is recommended that increased marketing efforts be directed at business segments which represent substantial potential for electricity savings, but which are at present underrepresented in terms of Program participants.

4) Participant Satisfaction

The Program achieved high levels of participant satisfaction for the overall program and for the purchase and installation of equipment, and the performance of energy efficient measures components. The Program also achieved high levels of satisfaction for other aspects including speed of incentive receipt, the incentive payment process, suppliers and contractors, and the identification of opportunities.

Recommendation 4: Continue to provide comprehensive and timely service to current and potential Program participants and trade allies.

5) Project Tracking

The Program produces information on projects at the incentive payment phase. However, this information is not provided in a consistent matter on project spreadsheets and the Program tracking databases.

Recommendation 5: Revise protocols for data collection to ensure that they meet the needs of Program planning, implementation and evaluation.

6) Deemed Gross Savings

Gross savings estimates use deemed savings based on a variety of utility and energy organization sources. Deemed kW savings use credible baseline assumptions, and they are updated periodically as the market evolves. With a limited number of exceptions, such as emergency lighting, hours of operation are assumed to be common across building types.

Recommendation 6: Collect information on building type (and possibly space type) as part of the incentive application process, and then use this information to estimate project-specific energy savings estimates. Consider collecting information on non-energy benefits such as improved process efficiency, increased production and reduced maintenance costs through participant surveys.

7) Net to Gross

Current evaluation best practices emphasize the use of multiple methods to estimate free riders, spillover and net to gross ratio. Multiple methods are frequently viewed as a means of reducing risk of inaccurate estimates through risk diversification.

Recommendation 7: Use two or more methods to estimate free riders and to estimate spillover in order to reduce risk of using a single method.

8) Net Savings

Net energy and peak savings are based on evaluated gross savings and the net to gross ratio, and these are in line with ratios of evaluated to reported savings found in the literature review.

Recommendation 8: Use the evaluated energy and peak savings from this evaluation in Program reporting.

Appendix D

COMMERICAL PRODUCT REBATE PROGRAM EVALUATION FULL REPORT

CONFIDENTIAL