PowerStream Inc.

Conservation and Demand Management

2014 Annual Report

Submitted to:

Ontario Energy Board

September 30, 2015

Executive Summary

This annual report is submitted by PowerStream in accordance with the filing requirements set out in the Conservation and Demand Management ("CDM") Code for Electricity Distributors, specifically, the Appendix C Annual Report Template. As this report is PowerStream's final annual report with regards to the 2011-2014 CDM targets, it provides details on PowerStream's CDM activities and verified results for the 2014 reporting year as well as a summary of the activities, accomplishments and challenges across the entire four-year framework.

PowerStream achieved 77.2% and 121.8% of its 2014 peak demand reduction and energy savings targets, respectively. A breakdown of results by program is shown below. PowerStream attributes its 21.8 MW shortfall in demand savings to two factors – Time of Use (TOU) pricing and the cancellation of Demand Response 3 Program (DR3) – both of which were outside of PowerStream's control and which combined represented about 23 MW in lost opportunities.

Table 1 Summary 2011-2014 CDM Results[1]

	2014 Incremental Net Savings		Contribution to Targets	
	Peak Demand (MW)	Energy (GWh)	Net Annual Peak Demand Savings in 2014 (MW)	2011-2014 Net Cumulative Energy Savings (GWh)
IESO-Contracted Province-Wide CDM Programs				
Consumer Program	17.32	14.64	24.22	78.94
Business Program	13.85	63.49	30.86	283.56
Industrial Program	6.33	1.19	6.95	19.78
Home Assistance Program	0.03	0.43	0.11	2.54
Pre-2011 Programs	0.00	0.00	3.05	54.08
Other	0.39	2.15	0.39	2.16
Previous Year Adjustments	2.61	14.03	3.44	49.32
Subtotal	**40.54**	**95.93**	**69.03**	**490.38**
Board-Approved CDM Programs				
BRI Program	0.82	5.84	0.83	5.96
TOU Pricing	3.94	0.00	3.94	0.00
Subtotal	**4.76**	**5.84**	**4.76**	**5.96**
Total Portfolio Results	**45.29**	**101.78**	**73.80**	**496.34**
		OEB Target	**95.57**	**407.34**
		% Target achievement	**77.2%**	**121.8%**

[1] While these results are referred to as *verified*, it is important to understand that they verified *estimates*. The IESO EM&V protocols stipulate a minimum level of confidence and precision for CDM program impact evaluations at 90/10, meaning that the bounds of the estimated impact's 90% confidence interval must be no more than 10% different from the point estimate. IESO staff has indicated that while in some cases a confidence/precision of 95/10 has been achieved, on the whole the portfolio is achieving 90/10.

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1 About this report

On September 16, 2010, the Ontario Energy Board (OEB) issued a Conservation and Demand Management (CDM) Code for Electricity Distributors[2] (the "Code"). The Code sets out the obligations and requirements with which Local Distribution Companies (LDCs) must comply in relation to the CDM targets set out in their licenses. PowerStream's target was to achieve 95.57 MW of demand savings and 407.34 GWh of cumulative energy savings over the period of January 1, 2011 to December 31, 2014.

To comply with the Code requirements, PowerStream filed a CDM Strategy Document[3] to the OEB on October 29, 2010 which laid out a high-level description of how it intended to achieve its CDM targets. The Code also requires a distributor to file annual reports with the Board. This is the fourth such Annual Report by PowerStream. It has been prepared in accordance with the Code requirements and covers the period from January 1, 2014 to December 31, 2014. As this report is PowerStream's final annual report with regards to the 2011-2014 CDM targets, PowerStream has also elected to provide a cumulative summary of the activities, accomplishments and challenges across the entire four-year framework.

[2] http://www.rds.ontarioenergyboard.ca/webdrawer/webdrawer.dll/webdrawer/rec/214820/view/CDM_Code_20100916.PDF

[3] http://www.ontarioenergyboard.ca/OEB/_Documents/EB-2010-0215/PowerStream_CDM%20Strategy_20101029.pdf

2 Board-Approved CDM Programs

In its Decision and Order dated November 12, 2010 in EB-2010-0215 and EB-2010-0216, the OEB ordered that, to meet its mandatory CDM targets, "Each licensed electricity distributor must, as a condition of its license, deliver Board-approved CDM programs, [IESO][4]-contracted province-wide CDM programs, or a combination of the two". PowerStream had two Board-Approved Programs in its service territory during the CDM framework – Time of Use (TOU) pricing (2011-2014) and the Business Refrigeration Incentive Program (Mid-2013 – 2014).

2.1 TOU Pricing

In its April 26, 2012 CDM Guidelines[5], the OEB recognized that a portion of the aggregate electricity demand target for LDCs was intended to be attributable to savings achieved through the implementation of Time of Use (TOU) pricing. The Guidelines provided further direction to LDCs regarding TOU pricing as a CDM program as follows:

- Recognizing that TOU pricing implementation was mandatory for all LDCs, distributors would not have to file a Board-approved CDM program application regarding TOU pricing. The OEB deemed the implementation of TOU pricing to be a Board-Approved CDM program for the purposes of achieving the CDM targets.
- The costs associated with the implementation of TOU pricing are recoverable through distribution rates, and not through the Global Adjustment Mechanism ("GAM").
- The actual savings from TOU pricing that are counted towards LDCs individual CDM targets should be determined by the IESO through an Evaluation, Measurement and Verification (EM&V) of provincial savings, followed by an allocation to distributors by the IESO.

2.1.1 Program Description

Description: In August of 2010, the OEB issued a final determination to mandate TOU pricing for the Regulated Price Plan ("RPP") customers by June 2011, in order to support the Government's expectation for 3.6 million RPP consumers to be on TOU pricing by June 2011, and to ensure that smart meters funded at ratepayer expense are being used for their intended purpose.

The RPP TOU price is adjusted twice annually by the OEB. A summary of the RPP TOU pricing is provided in Table 2.

Target Customer Type(s): Residential and small business customers (up to 250,000 kWh per year)

[4] Original reference in Code was to "OPA-Contracted" referring to Ontario Power Authority. The OPA merged with the Independent Electricity System Operator (IESO) on January 1, 2015. For ease of reading, the current organizational name is used throughout this report.

[5] http://www.ontarioenergyboard.ca/OEB/_Documents/EB-2012-0003/CDM_Guidelines_Electricity_Distributor.pdf

Initiative Frequency: Year-round

Objectives: TOU pricing was designed to incent the shifting of energy usage. Therefore peak demand reductions were expected, and energy conservation benefits may also be realized.

Table 2 RPP TOU Pricing Summary

	Prices (cents/kWh)		
Effective Date	**On Peak**	**Mid Peak**	**Off Peak**
November 1, 2010	9.9	8.1	5.1
May 1, 2011	10.7	8.9	5.9
November 1, 2011	10.8	9.2	6.2
May 1, 2012	11.7	10.0	6.5
November 1, 2012	11.8	9.9	6.3
May 1, 2013	12.4	10.4	6.7
November 1, 2013	12.9	10.9	7.2
May 1, 2014	13.5	11.2	7.5
November 1, 2014	14.0	11.4	7.7

Delivery: The OEB sets the TOU prices; LDCs install and maintain the smart meters; LDCs convert customers to TOU billing.

2.1.2 Participation

PowerStream began transitioning its RPP customers to TOU billing on August 2009. There were 325,129 PowerStream customers enrolled in TOU billing as of September 30, 2013 which represented 99.53% of PowerStream's mandated customer base.

2.1.3 Spending

In accordance with the CDM Guidelines, PowerStream does not have any CDM (GAM funded) costs related to the implementation of TOU pricing, as these costs are recoverable through distribution rates.

2.1.4 Evaluation

In 2013, IESO retained the Brattle Group as the evaluation contractor for assessing CDM savings from TOU pricing. The multi-year study completed in the summer of 2015 and final verified savings were provided to distributors on September 1, 2015 as part of the 2011-2014 Final Results Reporting.

The final verified savings from TOU pricing was assessed at 55 MW province-wide, of which PowerStream has been allocated 3.9 MW. There were no verified energy savings from TOU pricing.

Table 3 IESO verified savings for PowerStream from TOU Pricing (Source: 2014 PowerStream Final Report by the IESO)

Initiative	Net Incremental Peak Demand Savings (kW)				Verified Persisting Progress to 2014 Target (kW)	Net Incremental Energy Savings (kWh)				2011-2014 Net Cumulative Energy Savings (kWh)
	2011	2012	2013	2014		2011	2012	2013	2014	
Other										
Time-of-Use	0	0	0	3,937	3,937	0	0	0	0	0

2.1.5 Additional Comments

The OEB's 2012 CDM Guidelines clarified that savings from TOU pricing, as verified by the IESO, would contribute towards LDCs' CDM targets. However, significant uncertainty and lack of control existed throughout the four year framework as to the actual amount of savings that would ultimately be achieved from TOU pricing. Unlike other CDM programs where results are verified on an annual basis – thereby enabling program changes and other mid-course corrections - the verified results from TOU pricing were not available until eight months after the framework ended. This uncertainty presented a significant risk with limited control to LDCs with respect to achieving their demand savings targets.

Table 4 compares the estimated demand savings from TOU pricing for PowerStream and the Province at the time of 2011-2014 target setting with the actual 2014 savings, as verified in 2015. In 2013, PowerStream became aware, based on preliminary results released by the IESO, that the final TOU results were likely to be much lower than originally anticipated during target setting. PowerStream updated its TOU savings forecast in mid-2013, reducing it by almost 50% to 12.5 MW. This estimate was based on preliminary results released from the IESO in 2013 which suggested a load shifting of approximately 2% of residential demand was being seen from TOU pricing. However, as seen in the table below, there was a further significant drop in final verified savings which were released in September 2015. The final results indicate that the actual demand reduction from TOU pricing was just 0.73% of provincial demand. The 55 MW achieved across the province is less than 18% of what was originally forecasted.

During the setting of the CDM targets in 2010, it was estimated that demand savings from TOU pricing would make up approximately 23% of aggregate distributor demand reduction target of 1330MW. The verified savings show that TOU pricing only contributed 4% towards the target.

Table 4 TOU Savings - Planned versus Actual

Milestone/date	Province Wide	PowerStream Allocation *(7.19% of Province)*
Forecasted 2014 TOU savings used in LDC Target setting (June 2010)	308 MW	22 MW
Verified 2014 TOU savings (September 2015)	55 MW	3.9 MW

Additional discussion regarding the impact of these lower than planned TOU savings on PowerStream's demand target achievement and the mitigating steps taken by PowerStream is provided in Section 4.3.

2.2 Business Refrigeration Incentive (BRI) Program

PowerStream initiated the design of a Board-Approved CDM Program in fall 2012 and filed an application (EB-2013-00705[6]) with the OEB on March 13, 2013. On June 21, 2013, a Decision[7] was made and the OEB approved PowerStream's application as filed. PowerStream launched the BRI Program[8] on September 20, 2013.

PowerStream's BRI Program was the only Board-Approved CDM Program implemented by a distributor during the 2011-2014 framework.

2.2.1 Program Description

Description: The BRI Program promoted the identification and implementation of energy efficient equipment upgrades and maintenance measures to commercial refrigeration equipment. Participants received significant value for participation. Program incentives included a comprehensive on-site electricity audit which provided recommendations for equipment retrofit and maintenance; up to $2,500 in materials and labour to retrofit commercial refrigeration equipment performed by an authorized, licensed refrigeration or electrical contractor; and benchmarking of the facility to understand energy consumption versus other businesses of a similar size and operation. Eligible measures included: anti-sweat heater controls for coolers and freezers, strip curtains for walk-in coolers and freezers, night curtains on display cases, coil cleaning, Electronically Commutated Motor (ECM) upgrades, LED display case lighting, and LED A19 lamps for walk in coolers and freezers.

[6] http://www.rds.ontarioenergyboard.ca/webdrawer/webdrawer.dll/webdrawer/rec/386474/view/PowerStream_APPL_CDM_20130313.PDF

[7] http://www.rds.ontarioenergyboard.ca/webdrawer/webdrawer.dll/webdrawer/rec/400644/view/dec_order_PowerStream_20130621.PDF

[8] In the application to the OEB, this program was referred to as the Direct Install Refrigeration Program. In order to better market the program and reach targeted participants, the program was renamed. The program design did not change.

Target Customer Type(s): General Service customers with an average annual demand of less than 250 kW; must have commercial grade refrigeration equipment used to cool products.

Objectives: The objective of the program was to offer energy efficient installations of commercial refrigeration products and services of up to $2500. The purpose of this program was to assist customers in achieving electricity demand savings, by upgrading to more energy-efficient refrigeration equipment.

Delivery: PowerStream marketed the program and conducted the energy audit and benchmarking aspects of the program. PowerStream engaged third party contractors to conduct the assessment and installation of the commercial refrigeration measures. PowerStream also engaged a third party evaluator, from the IESO's Vendors of Record List, to conduct Evaluation, Measurement and Verification (EM&V) of the program.

Initiative Activities/Progress: PowerStream's key activities specific to the BRI program are summarized in Figure 1. This figure includes activities over the 15 months the program was in market from Q4 2013 through to the end of 2014.

Activities
PowerStream's focus was to quickly build, operate, and maintain the infrastructure for the program while testing different delivery models and marketing to contractors to generate program awareness and participation. Key program delivery activities included: • Contracted a third party contractor to manage the installations. • Contracted a third party evaluator (from OPA's Vendors of Record list) to conduct the EM&V. • In 2014, expanded the delivery model to allow customers the option to use their own 'preferred contractors' instead of utility-hired contractor for assessment and installation. • Hired 3 in-house Commercial Energy Advisors to perform the site energy audits and redeployed an existing staff member to manage the internal BRI phone line for customer intake. • Modified PowerStream's existing Microsoft Dynamics Customer Relationship Management (CRM) database to handle and store all program operational data. • Generating program awareness and acquisition with qualified end users through a highly segmented and targeted marketing effort, including: direct mail, outbound calling, community newspapers adverting, and E-blast campaigns. Moreover, PowerStream focused on promoting the program to contractors by leveraging channel partner relationships and using "Preferred Contractors" to further drive participation.

Figure 1 2013-2014 Activities – BRI Program

2.2.2 Participation

PowerStream launched the BRI program just 3 months after it was approved. As the program was launched late in 2013, much of the effort was on marketing, building the necessary infrastructure, generating program participation, and performing the site audits. There was an

immediate positive response from the market, with 286[9] businesses enrolling in the program in less than four months. By the end of 2013, 249[10] of these participants had site audits completed and 6 of them had their energy savings measures installed.

By the end of 2014, there were 1,032 participants in the program. The number of installations in 2014 was 22% higher than originally planned (Table 5). While overall the program achieved 86% of its original forecast of 1,200 participants, PowerStream's view is that this primarily attributable to a slower than anticipated start in 2013 rather than an indication of lower than forecasted market potential. It is important to note that this program had a firm end-date of December 31, 2014 based on OEB approval and was not extended into 2015 along with the IESO-contracted province wide programs. As such PowerStream needed to wind down marketing and recruitment in late 2014 to ensure that all customers that enrolled in the program could complete their audits and installations prior to the end of 2014, and to minimize any negative customer experiences. PowerStream is confident that there is still significant market potential for this program in its service territory and is very pleased that this program has recently been approved by the IESO as the first LDC designed Regional Program[11] under the new 2015-2020 Conservation First Framework. The BRI Program will be re-launched into PowerStream's territory in early 2016.

Table 5 BRI Program Participation

Participants	2013	2014	Total
Forecast	360	840	1200
Actual	6	1026	1032
% Forecast achieved	1.6%	122%	86%

2.2.3 Spending

The BRI program received OEB approval to deliver the program for a total of $4.1 Million. PowerStream delivered the BRI program from September 20, 2013 to December 31, 2014. By the end of 2014, the actual expenditure on the program was $2.6 Million. Table 6 below identifies the 2013 and 2014 fixed and variable costs to the program.

Overall, $1.5 million less was spent on the program than planned. As seen in Table 7 this variance was primarily driven by lower than forecasted Participant Incentive Payments, which are the costs of the installed equipment. While the program offer was up to $2,500 in free, installed energy efficiency equipment, the actual average value of products installed across all

[9] The evaluation report indicates that only 269 businesses participated in the program in 2013. The reason for the difference is because the evaluation report is not including businesses that enrolled in the program what were later cancelled their application or were found to be ineligible.

[10] The evaluation report indicates that only 234 site audits were performed in 2013. The reason for the difference is because the evaluation report is not including audits completed for businesses that later cancelled their application or were found to be ineligible.

[11] The BRI Program will be delivered in two distributor territories - PowerStream and Collus PowerStream – and therefore is considered a Regional Program, rather than a Local Program, under the Conservation First Framework.

participants was $1,299. This fact, along with the lower than forecasted number of participants, led to lower than forecasted variable program costs. The impacts of these variances, with respect to net program impacts and cost effectiveness, is described in section 2.2.4

Table 6 BRI Program 2013 and 2014 Spending by Expense Category

Expense Category	2013	2014	Total
Fixed Program Costs	**416,783**	**740,678**	**1,157,461**
Program Administration			
Labour	240,185	469,993	710,178
Marketing	86,693	60,992	147,685
EM&V	19,378	160,790	189,240
Other	70,527	48,903	110,358
Variable Program Costs	**6,000**	**1,416,072**	**1,422,072**
Participant Based Funding (PBF)		80,509	80,509
Participant Incentive Payments (PIP)	6,000	1,335,563	1,341,563
TOTAL COST	**422,783**	**2,156,750**	**2,579,533**

Table 7 BRI Program Forecast vs Actual Expenditures

Expense Category	Forecast (2013-2014)	Actual (2013-2014)	Variance
Fixed Program Costs	**1,198,461**	**1,157,461**	**41,000.28**
Program Administration			
Labour	674,124	710,178	-36,054
Marketing	200,000	147,685	52,315
EM&V	158,337	180,168	-21,831
Other	166,000	119,430	46,570
Variable Program Costs	**2,918,300**	**1,422,072**	**1,496,228**
Participant Based Fee (PBF)	120,000	80,509	39,491
Participant Incentive Payments (PIP)	2,798,300	1,341,563	1,456,737
TOTAL COST	**4,116,761**	**2,579,533**	**1,537,228**

2.2.4 Evaluation Results

Pursuant to the CDM Code, PowerStream procured a third-party EM&V contractor from the IESO'S EM&V Vendors of Record list. The key evaluation findings as summarized and provided by the third party evaluator for the BRI program are included in Figure 2 below. The results of the impact evaluations (net-to-gross ratios and realization rates) and net demand and energy savings are outlined in Table 8 below. Please see Appendix A for the full evaluation of the Business Refrigeration Incentives program.

Business Refrigeration Initiative Program – Evaluation Findings

- There were 1,032 participants in the program.
- The impact of the program was the saving of 5.9 GWh over the fifteen months the program was offered, and a reduction in peak summer demand of more than 0.8 MW.
- BRI is a cost effective program with a benefit-cost ratio of greater than 1.3. (The Total Resource Cost test and the Program Administrator Cost test).
- The process being used for the program appears to have worked well, and there is a good level of customer, contractor, and program administrator satisfaction with the program. The vast majority of customers say they have or would recommend the program to colleagues.
- Based on on-site monitoring, the realized gross energy and demand reductions are quite a bit lower than the prescriptive values from the literature, averaging about 64% for energy and 63% for demand of the prescriptive values
- There is a very low free rider rate for these measures due to multiple barriers to upgrading efficiency of refrigeration units, including: lack of awareness of opportunities, lack of awareness of appropriate contractors, financial constraints, and limited availability of several of the technologies in the marketplace.

Figure 2 Business Refrigeration Incentive Program Evaluation Findings

Table 8 Business Refrigeration Incentive Program Evaluation Results

	Peak Summer Demand Reduction	Energy Savings
Realization Rate	0.64	0.63
Net-to-Gross	0.98	0.98
Net Savings	827 kW	5.95 GWh

2.2.5 CDM Variance Account

PowerStream's delivery of the BRI Program a Board Approved CDM Program in 2013 and 2014 created a variance account. Total funding allocated to BRI program was $4.117M of which fixed funding was $1.198M and variable funding was $2.918M. PowerStream's 2013 and 2014 fixed program costs were $1.157M which created a variance of $41K ($1.198M-$1.157M). Total Variable cost for 2013 and 2014 were $1.422M of which $1.698M was recovered, resulting in a variance of $276K ($1.698M-$1.422M). The total variance account amount of $317K ($41K+$276K) will be settled via PowerStream's monthly power bill.

3 IESO-Contracted Province-Wide CDM Programs

Effective February 25, 2011, PowerStream entered into an agreement (Master Agreement) with the IESO to deliver four IESO-Contracted Province-Wide CDM Programs from January 1, 2011 to December 31, 2014. The programs and their associated initiatives included under this agreement are listed in Table 9 below, along with the date each initiative became available to LDCs ("Date Schedule Posted") and the date that the initiative was available to PowerStream customers ("In Market Date"). Further details on each of these program initiatives are provided in Appendix B, C, and D. Several provincial program initiatives set out in Master Agreement in 2011 were either never launched or were discontinued and removed from the market during the 2011-2014 framework. These initiatives are listed in Table 10.

In addition to the programs under the 2011-2014 Master Agreement, results from projects initiated under pre-2011 IESO-funded programs which were completed in or after 2011 are counted towards distributors 2011-2014 targets[12]. For PowerStream, this provision relates to four "pre-2011" programs:

- Electricity Retrofit Incentive Program
- High Performance New Construction
- Multifamily Energy Efficiency Rebates
- Data Centre Incentive Program (LDC Custom Program)

[12] As per OEB Guidelines for Electricity Distributor Conservation and Demand Management (EB-2012-0003), April 26, 2012, page 3.

Table 9 IESO-Contracted Province-Wide CDM Program Initiatives

Initiative	Customer Class	Date schedule posted	PowerStream in Market Date
Consumer Program			
Appliance Retirement	*All residential rate classes*	*Jan 26,2011*	*March 2011*
Appliance Exchange	*All residential rate classes*	*Jan 26, 2011*	*May 2011*
HVAC Incentives	*All residential rate classes*	*Jan 26, 2011*	*March 2011*
Conservation Instant Coupon Booklet	*All residential rate classes*	*Jan 26, 2011*	*March 2011*
Bi-Annual Retailer Event	*All residential rate classes*	*Jan 26, 2011*	*May 2011*
Retailer Co-op	*All residential rate classes*	*n/a*	*May 2011*
Residential Demand Response	*All residential rate classes*	*Aug 22, 2011*	*January 2011*
New Construction	*All residential rate classes*	*Jan 26, 2011*	*January 2012*
Home Assistance	*All residential rate classes*	*May 9, 2011*	*April 2012*
Business Program			
Retrofit	*All general service classes*	*Jan 26, 2011*	*March 2011*
Direct Install Lighting	*General Service < 50 kW*	*Jan 26, 2011*	*March 2011*
Building Commissioning	*All general service classes*	*Feb 2011*	*March 2011*
New Construction	*All general service classes*	*Feb 2011*	*March 2011*
Energy Audit	*All general service classes*	*Jan 26, 2011*	*March 2011*
Small Commercial Demand Response	*General Service <50 kW*	*Jan 26, 2011*	*January 2011*
Industrial Programs			
Process & System Upgrades	*General Service 50 kW & above*	*May 31, 2011*	*June 2011*
Monitoring & Targeting	*General Service 50 kW & above*	*May 31, 2011*	*June 2011*
Energy Manager	*General Service 50 kW & above*	*May 31, 2011*	*June 2011*
Key Account Manager ("KAM")	*General Service 50 kW & above*	*May 31,2011*	*April 2012*
Demand Response 3	*General Service 50 kW & above*	*May 31, 2011*	*June 2011*

Table 10 Discontinued and/or unlaunched IESO-Contracted Province-Wide Program Initiatives

	Status
Consumer Program	
Midstream Electronics	Did not launch. Removed from Master Agreement in Q2, 2013.
Midstream Pool Equipment	Did not launch. Removed from Master Agreement in Q2, 2013.
Home Energy Audit Tool	Did not launch. Removed from Master Agreement in Q2, 2013.
Retailer co-op	Discontinued in 2012
Business Program	
Direct Service Space Cooling	Did not launch. Removed from Master Agreement.
Demand Response 1 (DR1)	No customer uptake for this initiative. Removed from Master Agreement in Q4, 2012.
Demand Response 3 (DR3)	Program cancelled (no further participant enrollment) as of March 31, 2014.
Industrial Program	
Demand Response 1 (DR1)	No customer uptake for this initiative. Removed from Master Agreement in Q4, 2012.
Demand Response 3 (DR3)	Program cancelled (no further participant enrollment) as of March 31, 2014.

3.1 Program Descriptions

3.1.1 Consumer Program

Description: Provided residential customers with programs/tools to help them understand and manage the amount of energy they used throughout their entire home by reducing the household's energy consumption while also helping the environment.

Targeted Customer Type(s): Residential Customers

Objective: To provide incentives to both existing homeowners and developers/builders to motivate the installation of energy efficiency measures in both existing and new home construction.

Activities: PowerStream's activities specific to the Consumer Program are summarized in Figure 3. The targeted customer types, objectives, descriptions of each Consumer Program Initiative are detailed in Appendix B. The Appendix also includes additional comments, provided by the IESO-LDC Consumer Working Group, regarding some of the lessons learned and future opportunities for each Consumer Program initiative.

Activities
Recognizing the potential shortfall against its demand reduction target, PowerStream's main strategy in delivering Consumer Program Initiatives in 2014 was to increase participation in the ***peaksaver* PLUS** program. Two significant initiatives were launched in 2014 to support this strategy. The first was a year-long contest in which residential customers who signed up for ***peaksaver PLUS*** were eligible to win prizes. The grand prize was a suite of ENERGY STAR appliances. The other initiative, launched in Q4 2014, included the addition of a free "Home Energy Checkup" with each ***peaksaver* PLUS** sign-up. Over the 2011-2014 period, key marketing activities for Consumer Program Initiatives included: • Attended **82** community events *(e.g. Kempenfest, Markham Fair, Vaughan Earth Hour)* • Held **151** in-store events *(e.g. Home Depot, Lowes)* • Distributed over **4,200** hand-outs promoting Consumer programs • Reached over **11,500** customers and gathered over **2,000** sign ups during events • Launched "Smart Kids" marketing campaign o Spring and Fall Direct Mail to all residential customers o Over **280** print ads; o Over **2,000,000** bill inserts; o Over **1,000** radio or Community TV ads

Figure 3 2011-2014 Key Activities – Consumer Program Level

3.1.2 Business Program

Description: Provided commercial, institutional, agricultural and industrial organizations with energy-efficiency initiatives to help reduce their electrical costs while helping Ontario defer the need to build new generation and reduce its environmental footprint. Initiatives to help fund energy audits, to replace energy-wasting equipment or to pursue new construction that exceeds our existing codes and standards were available. Businesses could also pursue incentives for controlling and reducing their electricity demand at specific times.

Targeted Customer Type(s): Commercial, Institutional, Agricultural, Multi-family buildings, Industrial

Objective: Designed to assist building owners and operators as well as tenants and occupants in achieving demand and energy savings, and to facilitate a culture of conservation among these communities as well as the supply chains which serve them.

Activities: PowerStream's activities specific to the Business Program are summarized in Figure 4**.** The targeted customer types, objectives and descriptions of each Business Program Initiative are detailed in Appendix C. The Appendix also includes additional comments, provided by the IESO-LDC Business Working Group, regarding some of the lessons learned and future opportunities for each Business Program initiative.

Activities
The primary sales and marketing tactics for delivering the Business Program initiatives and increasing program participation in 2011-2014 included: • Ongoing account management for over **2000** accounts • **65+** events we hosted or participated in • **Small Business (<50 kW)**: Placed more than **25** ads; distributed **65,000+** direct mail pieces; implemented an outbound calling campaigns contacting **13,000+** customers • **Large Business (>50 kW)**: Direct Mail campaign to **63,000+** customers and contractors • **Business Refrigeration Incentive Program**: Developed Benchmarking for businesses with refrigeration

Figure 4 2011-2014 Activities - Business Program Level

3.1.3 Industrial Program

Description: Large facilities discovered the benefits of energy efficiency through the Industrial Programs which were designed to help identify and promote energy saving opportunities. It included financial incentives and technical expertise which helped organizations modernize systems for enhanced productivity and product quality, as wells as provided a substantial boost to energy productivity. This allowed facilities to take control of their energy so they can create long-term competitive energy advantages which reach across the organization.

Targeted Customer Type(s): Industrial, Commercial, Institutional, Agricultural

Objective: To provide incentives to both existing and new industrial customers to motivate the installation of energy efficient measures and to promote participation in demand management.

Activities: PowerStream's activities specific to the Industrial Program are summarized in Figure 5. Most of the Business activities listed in Figure 4 were also applicable to the Industrial Program since the targeted customers of these programs overlapped and most initiatives were available to both Business and Industrial customers**.**

The targeted customers, objectives and descriptions of each Industrial Program Initiative are detailed in Appendix D. The Appendix also includes additional comments, provided by the IESO-LDC Industrial Working Group, regarding some of the lessons learned and future opportunities for each Industrial Program initiative.

Activities
Key 2011-2014 activities specific to the Industrial Program, included: • Recruitment and management of internal 'Energy Manager' resources (2 Roving Energy Managers; 1 Key Account Manager) to work with assigned accounts to increase their participation in available CDM programs • Helped 8 eligible customers hire internal energy managers through the Embedded Energy Manager (EEM) initiative which provides salary subsidization. Provided support to those customers and their EEM's in the achievement of facility-based CDM targets. • Secured new customers in the Demand Response Program and continued to build relationships with aggregators until the program was canceled provincially in March 2014. • Funded and completed 4 Preliminary Engineering Studies and 3 Detailed Engineering Studies.

Figure 5 2011-2014 Activities – Industrial Program Level

3.1.4 Low Income Program (Home Assistance)

Description: This was a turnkey program for income qualified customers. It offered residents the opportunity to take advantage of free installation of energy efficient measures that improved the comfort of their home, increased efficiency, and helped them save money. All eligible customers received a Basic and Extended Measures Audit, while customers with electric heat also received a Weatherization Audit. The program was designed to coordinate efforts with gas utilities.

Targeted Customer Type(s): Income qualified Residential Customers

Objective: To offer free installation of energy efficient measures to income qualified households for the purpose of achieving electricity and peak demand savings.

Activities: PowerStream's activities specific to the Low Income Program are summarized in **Error! Reference source not found.**Figure 6. Appendix E includes additional comments, provided by the IESO-LDC Consumer Working Group, regarding some of the lessons learned and future opportunities for the Home Assistance Program.

Activities
PowerStream launched this Program within its service territory in 2012, using a turnkey third party delivery agent. Major program delivery and customer acquisition activities included: • Competitively procured a third party provider to implement the program • Held close to 60 outreach events/meetings • Distributed over 16,000 HAP brochures • Over 300,000 bill inserts • Direct letters to more than 500 PowerStream customers who received the LEAP grant (sent via local social agencies that manage the LEAP on PowerStream's behalf) • Mail out through Simcoe Ontario Works

Figure 6 2011-2014 Activities - Low Income Program

3.2 Participation

Table 11 provides the number of participants in each IESO-contracted province wide initiative that was offered by PowerStream in each year from 2011 to 2014, based on IESO verified results provided to PowerStream on September 1, 2015. The participation numbers shown for 2011-2013 may differ from previous Annual CDM Reports as these numbers include IESO true-up analysis and reporting for previous program years. This true-up analysis ensures that energy and demand savings are properly categorized in the year that they were achieved and that any omissions and/or errors identified after the release of the verified results are properly accounted and reported.

Table 11 IESO-Contracted Province-wide Programs 2011 to 2014 Incremental Participation

Initiative	Unit	Incremental Activity			
		2011*	2012*	2013*	2014
Consumer Program					
Appliance Retirement	Appliances	2,986	1,664	831	801
Appliance Exchange	Appliances	152	110	187	235
HVAC Incentives	Equipment	8,544	7,788	8,291	10,485
Conservation Instant Coupon Booklet	Items	35,171	2,051	23,098	74,185
Bi-Annual Retailer Event	Items	63,207	70,426	62,717	320,283
Retailer Co-op	Items	134	0	0	0
Residential Demand Response	Devices	2,234	7,780	21,152	28,485
Residential Demand Response (IHD)	Devices	0	6,227	19,678	26,666
Residential New Construction	Homes	9	0	0	66
Business Program					
Retrofit	Projects	183	456	790	923
Direct Install Lighting	Projects	1,945	1,631	2,315	3,037
Building Commissioning	Buildings	0	0	0	1
New Construction	Buildings	3	3	12	17
Energy Audit	Audits	7	11	19	30
Small Commercial Demand Response	Devices	0	0	0	0
Small Commercial Demand Response (IHD)	Devices	0	0	0	0
Demand Response 3	Facilities	12	11	17	18
Industrial Program					
Process & System Upgrades	Projects	0	0	0	0
Monitoring & Targeting	Projects	0	0	0	0
Energy Manager	Projects	0	9	54	35
Retrofit	Projects	34	0	0	0
Demand Response 3	Facilities	11	12	15	22
Home Assistance Program					
Home Assistance Program	Homes	0	430	996	725
Pre-2011 Programs completed in 2011					
Electricity Retrofit Incentive Program	Projects	195	0	0	0
High Performance New Construction	Projects	13	9	4	0
Multifamily Energy Efficiency Rebates	Projects	1	0	0	0
LDC Custom Programs	Projects	5	0	0	0
Other					
Program Enabled Savings	Projects	1	27	10	3
LDC Pilots	Projects	0	0	0	2

*Includes adjustments after Final Reports were issued

PowerStream's overall strategy for the 2011-2014 framework was to focus its efforts on those initiatives with the greatest potential to drive achievement of the energy and demand targets, and which were primarily within PowerStream's control and influence. The top three priority initiatives were ***peaksaver* PLUS**, Retrofit and Direct Install Lighting. While other initiatives, such as Coupons, Residential HVAC and DR3, were expected to contribute significantly to PowerStream's portfolio, these initiatives were primarily administered and marketed centrally by the IESO.

As seen in the table above, PowerStream was successful in driving participation in these three priority initiatives across the four years. The number of ***peaksaver* PLUS** participants grew more than 10-fold, while the number of Retrofit Projects in 2014 was more than double the number of projects in 2011 (including Retrofit and ERIP). PowerStream is particularly proud of its accomplishments with respect to Direct Install Lighting (DIL). While provincially this program peaked in participation in 2009, and there has been much speculation that the market had been fully saturated, PowerStream was able to continue to grow participation through innovative marketing approaches. In 2014, PowerStream had 50% more participants than in 2011. While PowerStream has just over 7% of the General Services <50kW customers in the Province, it was responsible for 13% of all DIL participants across the province in 2014 and 11% over the 2011-2014 period.

Several of the initiatives in the table above show a participation of zero for one or more years. The reasons for this varied by initiative as follows:

- **Retailer Co-op initiative**. This initiative was not available to LDCs after 2011.
- **Residential New Construction**. The initial application process was overly cumbersome and acted as a barrier to developer participation. The process was changed and participation began to grow, however due to the long lead times associated with new construction, it took several years to start seeing actual projects being completed.
- **Small Commercial Demand Response**. While small commercial customers (<50kW) were eligible for the ***peaksaver* PLUS** program , the price caps for devices and In-Home Displays did not support commercial applications and as such PowerStream's strategy was to focus on driving penetration within the residential customer class.
- **Retrofit – Industrial**. Within the Industrial Program, results for the Retrofit Initiative were only tracked and reported separately for Industrial and Business customers in 2011. The participation shown for 2012-2014 for Retrofit under the Business Program includes commercial, institutional and industrial facilities.
- **Process & Systems Upgrade – Capital Incentive**. While there was no capital incentive project completed under the Process & Systems Upgrade Incentive (PSUI) initiative, there were a number of Preliminary Engineering Studies and Detailed Energy Studies completed by customers under PSUI which then led to energy efficiency projects under the Retrofit initiative. While the PSUI initiative offered a greater potential financial incentive than Retrofit, the contractual requirements for Participants were seen as too onerous for customers and acted as a barrier to program participation. It is also important to note that the PSUI program was designed for the Large Customer Class (>5MW). While PowerStream

has many general service customers which are industrial businesses, it only has 2 customers in the >5MW class.

- **Monitoring and Targeting (M&T)**. PowerStream has one M&T participant as of March 2014. This participant agreement is a 2 year term and the project is currently still underway. The resulting savings will be achieved in 2015 and 2016.

3.3 Spending

Table 12 itemizes PowerStream's expenses, by funding category, for each Program Initiative that was offered in 2014. Program Administration Budget (PAB) expenses are further detailed by expense category (as stipulated in the CDM Code, Appendix A) and are shown in Table 13. Participant Based Funding (PBF) and Participant Incentive Payments (PIP) are based on actual participation in applicable initiatives. The Capability Building Funding (CBF) includes the Embedded Energy Managers, Roving Energy Managers, and the Key Account Manager. Pre-2011 Programs were not funded through the 2011-2014 Master Agreement and as such expenditures have not been included.

Table 12 2014 Spending by Initiative ($)

Initiative	PAB	PBF	PIP	CBF	TOTAL
Consumer Program	**2,594,352**	**2,744,153**	**78,500**	**0**	**5,417,005**
Appliance Retirement	102,269				**102,269**
Appliance Exchange	20,454				**20,454**
HVAC Incentives	102,269				**102,269**
Conservation Instant Coupon Booklet	106,621				**106,621**
Bi-Annual Retailer Event	14,739				**14,739**
Residential Demand Response	2,116,986	2,744,153			**4,861,139**
Residential New Construction	131,015		78,500		**209,515**
Business Program	**2,571,833**	**706,270**	**10,801,287**	**0**	**14,079,390**
Retrofit	1,750,012		5,674,903		**7,424,915**
Direct Install Lighting	453,554	706,270	3,588,399		**4,748,223**
Building Commissioning	36,151		5,000		**41,151**
New Construction	236,563		1,410,622		**1,647,185**
Energy Audit	95,553		122,363		**217,916**
Small Commercial DR	Included in Residential Demand Response				
Demand Response 3	Included in Industrial Demand Response 3				
Industrial Program	**414,139**	**0**	**92,500**	**814,094**	**1,320,734**
Process & System Upgrades					**0**
a) preliminary study	512		5,000		**5,512**
b) engineering study	60,995		50,000		**110,995**
c) program incentive	82,381				**82,381**
Monitoring & Targeting	20,324		37,500		**57,824**
Energy Manager	129,640			690,773	**820,413**
Retrofit	Included in Business Retrofit				
Demand Response 3	120,287				**120,287**
Key Account Manager				123,322	**123,322**
Low Income Program	**207,697**	**64,583**	**239,633**	**0**	**511,913**
Home Assistance Program	207,697	64,583	239,633	0	**511,913**
TOTAL Province-wide CDM PROGRAMS	**5,788,021**	**3,515,006**	**11,211,920**	**814,094**	**21,329,042**

Table 13 2014 PAB Spend by Expense Category ($)

Program	Labour Costs	Customer Care, Advertising, Marketing	IT	Other Service Providers	Other	Total
Consumer	695,467	1,660,709	164,817	61,640	11,717	**2,594,351**
Business	1,328,423	351,905	192,957	663,763	34,784	**2,571,833**
Industrial	346,559	31,019	28,139	46	8,377	**414,140**
Low Income	63,385	753	16,080	127,029	450	**207,697**
TOTAL	**2,433,835**	**2,044,386**	**401,994**	**852,479**	**55,328**	**5,788,021**

Table 14 and Table 15 below identify PowerStream's cumulative spend by Initiative and by expense category for the 2011-2014 fiscal years. It is important to note that these expenditures do not reflect the entire delivery costs associated with the energy and demand savings achieved in the same time period, as some administration and participant incentive costs are incurred several months after an energy efficiency project is completed. The 2011-2014 Master Agreement between IESO and Distributors was extended on November 14, 2014 through to the end of 2015 in order to ensure continuity of programs and funding during the 2015 transition year to the 2015-2020 Conservation First Framework.

Table 14 Cumulative 2011-2014 Spending by Initiative ($)

Initiative	PAB	PBF	PIP	CBF	TOTAL
Consumer Program	**6,727,354**	**9,240,674**	**78,500**	**0**	**16,046,528**
Appliance Retirement	532,183				**532,183**
Appliance Exchange	215,723				**215,723**
HVAC Incentives	481,255				**481,255**
Conservation Instant Coupon Booklet	409,245				**409,245**
Bi-Annual Retailer Event	20,863				**20,863**
Retailer Co-op	9,178				**9,178**
Residential Demand Response	4,803,856	9,240,674			**14,044,530**
Residential New Construction	255,051		78,500		**333,551**
Business Program	**7,325,123**	**2,133,885**	**25,297,273**	**0**	**34,756,281**
Retrofit	5,350,482		13,946,702		**19,297,184**
Direct Installed Lighting	1,085,423	2,133,885	9,663,521		**12,882,829**
Building Commissioning	98,097		10,506		**108,603**
New Construction	483,992		1,450,998		**1,934,990**
Energy Audit	307,129		225,546		**532,675**
Small Commercial DR	Included in Residential Demand Response				
Demand Response 3	Included in Industrial Demand Response 3				
Industrial Program	**1,133,866**	**0**	**185,240**	**1,585,230**	2,904,337
Process & System Upgrades					0
a) preliminary study	63,855		25,000		88,855
b) engineering study	177,202		122,740		299,942
c) program incentive	210,525				210,525
Monitoring & Targeting	53,508		37,500		91,008
Energy Manager	338,663			1,281,753	1,620,416
Retrofit	Included in Business Retrofit				
Demand Response 3	278,995				**278,995**
Key Account Manager	11,118			303,478	**314,596**
Low Income Program	**690,580**	**64,583**	**782,060**	**0**	**1,537,223**
Home Assistance Program	690,580	64,583	782,060		**1,537,223**
Pre-2011 Programs Completed in 2011-14	**145,460**	**742,957**	**3,150,425**	**0**	**4,038,842**
Electricity Retrofit Incentive		-	3,018,390	-	**3,018,390**
Data Centre Incentive Program		-	83,260	-	**83,260**
PeakSaver Extension	145,460[1]	742,957	48,775		**791,732**
TOTAL Province-wide CDM PROGRAMS	**16,022,382**	**12,182,099**	**29,493,498**	**1,585,230**	**59,283,210**

Note 1: The $145,460 in Administration costs spend on the Peaksaver Extension is not charged against PowerStream's 2011-2014 PAB.

Table 15 Cumulative 2011-2014 PAB Spend by expense category ($)

Program	Labour Costs	Customer Care, Advertising, Marketing	IT	Other Service Providers	Other	Total
Consumer	2,528,307	3,402,319	253,399	134,490	408,836	6,727,352
Business	3,990,991	972,311	296,710	1,546,649	518,461	7,325,123
Industrial	888,744	91,400	43,654	9,313	100,756	1,133,867
Low Income	244,657	15,412	22,455	365,496	42,560	690,580
TOTAL	**7,652,700**	**4,481,442**	**616,219**	**2,055,949**	**1,070,613**	15,876,922

3.4 Evaluation Results

In order to assess the impacts (energy and demand savings) and the effectiveness of the conservation programs, the IESO conducted EM&V of the IESO-Contracted Province-wide Programs. The key evaluation findings, as applicable to the province as a whole, were summarized by IESO and provided to LDCs (Table 16). PowerStream's verified results for the IESO-contracted province wide programs, as provided by the IESO, are summarized in Table 17 (net-to-gross (NTG) ratios and realization rates), Table 18 (net demand savings) and Table 19 (net energy savings).

Table 16: IESO summary of Province-wide Programs Evaluation Findings (source: IESO)

#	Initiative	IESO Province-Wide Key Evaluation Findings Source: IESO EM&V Summary Findings
Consumer Programs		
1	Appliance Retirement	• 60% decrease in overall participation from 2011. Overall participation increased 7.7% to 22,563 in 2014, from 2013. Greatest decreases seen in the number of refrigerators collected. • Refrigerators and freezers dominate the participation making up 58% and 32% of the total number of measures, respectively. • All measure categories increased but Window Air Condition (WAC) and DH increased 29.6% and 27.0% respectively, much larger than the increases seen in refrigerators and freezers (6.9% and 4.1, respectively). • Total Net Energy and Demand savings increased by 9.0% and 9.5%, respectively •
2	Appliance Exchange	• Steady growth in participation since 2011 with growth plateauing in recent years. Per-unit savings has increased as ENERGY STAR criteria increases and more participants purchase ENERGY STAR replacements • Total number of measures increased 6.5% to 5,685 in 2014. Net Energy and Demand savings also increased by 6.5% since savings assumptions and NTG ratios did not change from 2013 • Vintage of exchanged dehumidifiers remains in the mid-1990's
4	Conservation Instant Coupon Booklet	• The 2014 net annual energy savings increased six times over 2013. This was due two factors; firstly, five times as many coupons were redeemed in 2014, and secondly, the NTG was 53% higher. • The changes to baseline due to phase out of 72W & 100W incandescent bulbs 18% led to lower per unit savings. • Over 0.5 million more Annual Coupons were redeemed in 2014 than in 2013. Overall Coupon Initiatives NTG increased from 1.13 in 2013 to 1.74 in 2014. • There was an increased emphasis in 2014 on promoting events and/or distributing LDC coded coupons. • Coupon redemption data is delivered long after the events; makes it hard to determine effectiveness of events

3	HVAC Incentives	• Electronically Commutated Motors (ECM) measure remained the dominant source of savings since 2011. The number of overall unique participants had increased 24% from 2011. 2014 net savings increased by 20% from 2013. • No net change year-over-year in program NTG ratio. NTG ratio for SEER 15 CACs decreased somewhat but was offset by increases for ECM and SEER 14.5 CACs. • Overall participation increased by 17% from 2013. ECM furnace participation increased by 12%. SEER 14.5 participation decreased by -3%. SEER 15 participation increased by 37%. The number of participants only retrofitting CAC's increased by 44%. • In 2013 & 2014 a direct metering field study of HVAC participants was done to update savings assumptions; per-unit saving for ECM furnace increased by 12.7%, and per-unit saving for SEER 14.5 and SEER 15 CACs decreased 56% and 55% respectively. • Data indicated an increased availability and affordability of efficient furnaces and air conditioners. The availability of ECM technology has more than quadrupled over the last ten years, and in 2014 accounted for about half of all furnaces available for sale • The availability of 14.5 and 15.0 SEER CACs have more than tripled over the last ten years, but the 2014 availability of 14.5 SEER CACs outnumbers 15.0 SEER CACs by a 2:1 ratio. • The price difference between standard efficiency models and incented residential equipment had been reduced by one-third in the last ten years, but had changed little in the last four years. • Participating contractors sold significantly more rebate qualified CACs and furnaces than nonparticipating contractors.
5	Bi-Annual Retailer Event	• 2.5 million more Bi-Annual Event Coupons in 2014 than in 2013. • 1.5 million more from a single retailer. • 0.9 million from 9 new retailers.
7	Residential Demand Response	• Nearly 300,000 load control devices have been installed up until 2014, 78% (230,000) were Tier 1 peaksaverPLUS devices. Approximately one third of Tier 1 load control devices were switches and two thirds were programmable communicating thermostats. About 12% of all Tier 1 load control devices were located in the PowerStream's service territory. • peaksaverPLUS program capacity increased from 93 MW to 113 MW on a year-over-year basis from 2013. • No energy savings could be attributed to the IHD devices. Future program investments in new technologies should be pilot tested prior to integrating into the peaksaverPLUS program.

8	Residential New Construction	• Since 2011, net verified incremental summer peak MW and GWh savings had increased substantially, 0.4MW and 2.3GWh net savings in 2014; this was due to increased participation. • MW savings in the prescriptive track increased from zero summer peak MW savings in 2011 to 352 summer peak kW savings in 2014. In 2014, 2,670 homes received prescriptive incentives, as opposed to 53 homes in 2013, and 3 homes in 2011-2012. • The custom track saw participation for the first time in 2014.One custom project of 55 homes contributed 37 kW savings. • Due to a substantial increase in the number of homes that participated in the Prescriptive track in 2014, energy savings increased over the four years of the initiative. • IESO implemented new deemed savings for performance track homes for 2014, which resulted in improved realization rates for those years. Deemed savings in 2011-2012 underestimated the performance track savings. New deemed savings for performance track homes were developed and implemented, resulting in lower realization rates for 2013 and 2014. • It was determined that one home builder was responsible for 60% of the homes (1,670 out of 2,784 homes) in the initiative in 2014. • ENERGY STAR New Homes was introduced as an eligible measure within the performance track in 2014. • In 2014, prescriptive lighting and prescriptive gas furnace with ECM dominated the savings.
Business Programs		
9	Retrofit	• Total net energy savings increased 4% to 442.7 GWh in 2014. There was a marginal decrease (4%) in total net demand savings from 2013. • 80.3 GWh of net energy savings included to true up 2013. 11.9 MW of net demand savings included to true up 2013. • Prescriptive lighting savings have decreased at the expense of engineered lighting. Engineered lighting savings have increased in project count and average net savings per project. Custom track remains non-lighting dominant, with 76% of custom net energy savings from non-lighting measures. • Total number of projects installed increased 10% to 10,686 from 2013. Energy realization rate for the program dropped by 0.8 points; Increase in engineered track projects (Realization Rate = 87%). Decrease in prescriptive track projects (Realization Rate = 116%). Demand realization rate dropped by 1.8 points, more engineered projects with lower energy and demand realization rates

10	Direct Install Lighting	• 23,784 projects completed (34% increase from 2013). Over 80% of the increase in project counts was in the Service and "Other" business types. • Overall energy 31% increase in total net verified energy savings relative to 2013. LED measures are the new dominant measure type. 59% of net energy savings, 44 percentage point increase from 2013. 68% of projects implemented at least one LED measure. • Energy and demand realization rates decreased 1.8 and 3.1 points, respectively, from 2013. Sampled rural projects had lower energy realization rather than urban projects (63.8% compared to 83.5%) across the 2011 – 2014 sample. Sampled rural projects had lower demand realization rather than urban projects (49.7% compared to 74.1%) across the 2011 – 2014 sample. • The annual proportion of net energy savings from rural projects had increased from 30% in 2011 to 41% in 2014.Net to Gross ratio (NTG) for 2014 remained steady at 94%. • Average Net Energy savings per project: Decreased 1.8% to 3,553 kWh. Average Total Incentives per project: Increased 4.4% to $1,305. Average Direct-Install Incentives per project: Increased 6.8% to $1,241. Average Standard Incentives per project: Decreased 27% to $65.
11	Audit Funding	• 281 province-wide audits were completed in 2014. Per audit estimated savings is 96 MWh and 21 kW in 2014, a 29% increase from 2013. 2013 experienced greater energy and demand savings due to greater number of completed projects. • Time series analysis quantified additional savings from measures implemented after initial program year. An additional 7.2%, 5.0% and 0.1% was added to all previously reported 2011, 2012 and 2013 projects, respectively.
12	Existing Building Commissioning Incentive	• 2 projects completed the Hand-off stage in 2014. Energy realization rate of 116%. Demand realization rate of 202%. Peak savings within the EM&V peak definition were used to calculate verified demand savings

13	High Performance New Construction	• Savings had increased every year of the initiative with an increased participation of 50% from 2013. Additional savings in 2013 were incurred due to true up projects. • In all years of the initiative, most savings came from the custom track. In 2011-2012, the custom track is responsible for 66% of kW savings. In 2013, the custom track provided 67% of kW savings. In 2014, the custom track provided 71% of kW savings. • Energy savings increased over the four years of the initiative. Custom track dominated energy savings for the HPNC initiative. The measures with the greatest impact on low realization rates for prescriptive measures were lighting, unitary AC equipment, high volume low speed (HVLS) fans, and variable frequency drives (VFDs). Realization rates declined slightly for 2014, as a result of the wider variety of measures. • Net-to-gross ratio for the initiative increased by 5%. A high percentage of participants in 2013 indicated that incentives had some influence on the high efficiency decision making. No substantial change to the program in 2014. Lack of spillover is a result of participants indicating that they do not install additional energy efficiency measures beyond those measures that received an incentive. • In 2014 the top three prescriptive measure types were lighting, agribusiness fans and ENERGY STAR appliances. In 2011 and 2012, prescriptive agribusiness provided the most net summer peak kW and net kWh savings. By 2014, however, prescriptive lighting dominated the program.
Industrial Programs		
16	Process & System Upgrades	• 2014 begin to see the promised benefits of the pipeline of PSUI projects, with many long lead time projects come to completion. More Energy Manager projects submitted in 2014; however the savings were lower vs previous year. • Significant increase in energy savings and demand savings, most of which were attributed to the behind-the-meter generation (BMG) projects (4 of the 10 projects in 2014).Energy savings from BMG projects out of all PSUI Capital Projects accounted for 90% of the energy savings and 92% of the demand savings. • Data-tracking systems were cumbersome. Response time from the technical reviewer to customer information requests found to be lengthy. The financing options are considered limited. • Regarding Energy Managers: Persuading upper management to complete non-incentivized projects was a barrier to achieving their non-incentive savings targets. The EEM/REM initiative's static non-incentivized savings targets could have been difficult to achieve after the first or second year, when low or no-cost projects have been implemented. The reporting process was cumbersome because reporting periods were not fixed and were subjects to adjustments

20	Demand Response 3	• DR-3 reductions increased slightly: Contracted summer capacity grew from 224 to 229 MW (+2%). Number of contributors increased from 456 to 516 (+13%). Contributors that exited the program were larger than the new contributors that enrolled in the program; this resulted in an increase in the number of contributors but minimal change to overall program contracted capacity. • Performance levels were relatively constant, 81.9% in 2014 versus 83.2% in 2013. Energy savings was 0 MWh due to no events occurring in 2014. • For most of 2014, DR-3 continued the trend of generally increasing contracted load reduction capability. • The largest 5 customers (1%) account for 20% of the DR-3's summer capacity. The smallest 401 customers (78%) account for roughly the same amount of summer capacity (~20%). The limited diversification had several implications: DR reductions were very sensitive to a small number of customers (large customers strongly influence the overall outcome). The benefits of aggregation are diminished – performance and baselines are more volatile. To diversify, it is necessary to lower transaction costs of enrolling smaller customers.
Home Assistance Program		
21	Home Assistance Program	• 2014 saw an 18% decline in overall participation. 23% decline in energy savings. 17% decline in peak demand savings. • Average per Project Savings = 733 kWh and 0.089 kW. Similar to 2013 (784 kWh and 0.088 kW) • KWh realization rate = 0.77. A decrease of 11% from 2013. Primary reason: installation rates were lower than in 2013. KW realization rate = 0.58. An increase of 32% from 2013. FAST was updated in mid-2014 helping to drive up rate. • Lower installed at time of home visits for hot water measures mostly due to decrease in faucet aerators. Installed at time of home visits from 0.89 in 2013 to 0.61 in 2014. Similar to 2013, low installation rates for programmable thermostats were due to thermostats never being programmed. • Social Housing remained providing the largest source of program participants. 79% of participants were flagged as social housing in tracking data. Challenges remain with difficulty identifying eligible participants not in social housing. • Majority reported either receiving leave-behind materials or some energy saving tips from a program representative. 37% received the "full educational component"—both materials and discussed recommendations with the representative. Significant differences in behavior change between those receiving more comprehensive education and those that do not. • Single implementer has had great success in face of challenging circumstances in part due to: Strong partnerships with trusted local groups to market and deliver program.

Table 17: Verified Realization Rates and Net-to-Gross Ratios by Initiative (Source: 2014 PowerStream Final Report provided by the IESO)

Initiative	Peak Demand Savings								Energy Savings							
	Realization Rate				Net-to-Gross Ratio				Realization Rate				Net-to-Gross Ratio			
	2011	2012	2013	2014	2011	2012	2013	2014	2011	2012	2013	2014	2011	2012	2013	2014
Consumer Program																
Appliance Retirement	1.00	1.00	n/a	n/a	0.50	0.46	0.42	0.42	1.00	1.00	n/a	n/a	0.50	0.47	0.44	0.44
Appliance Exchange	1.00	1.00	1.00	1.00	0.52	0.52	0.53	0.53	1.00	1.00	1.00	1.00	0.52	0.52	0.53	0.53
HVAC Incentives	1.00	1.00	n/a	1.00	0.60	0.50	0.48	0.51	1.00	1.00	n/a	1.00	0.60	0.49	0.48	0.51
Conservation Instant Coupon Booklet	1.00	1.00	1.00	1.00	1.14	1.00	1.11	1.67	1.00	1.00	1.00	1.00	1.11	1.05	1.13	1.70
Bi-Annual Retailer Event	1.00	1.00	1.00	1.00	1.13	0.91	1.04	1.74	1.00	1.00	1.00	1.00	1.10	0.92	1.04	1.75
Retailer Co-op	1.00	n/a	n/a	n/a	0.68	n/a	n/a	n/a	1.00	n/a	n/a	n/a	0.68	n/a	n/a	n/a
Residential Demand Response	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Residential Demand Response (IHD)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Residential New Construction	n/a	n/a	n/a	1.05	n/a	n/a	n/a	0.63	n/a	n/a	n/a	0.58	n/a	n/a	n/a	0.63
Business Program																
Retrofit	0.93	0.93	0.93	0.86	0.73	0.76	0.73	0.71	1.23	1.05	1.05	1.00	0.75	0.76	0.74	0.72
Direct Install Lighting	1.08	0.69	0.82	0.78	0.93	0.94	0.94	0.94	0.90	0.85	0.84	0.83	0.93	0.94	0.94	0.94
Building Commissioning	n/a	n/a	n/a	1.91	n/a	n/a	n/a	1.00	n/a	n/a	n/a	1.16	n/a	n/a	n/a	1.00
New Construction	n/a	n/a	0.97	0.88	0.50	n/a	0.54	0.54	n/a	n/a	0.99	0.87	0.50	n/a	0.54	0.54
Energy Audit	n/a	n/a	1.02	0.96	n/a	n/a	0.66	0.68	n/a	n/a	0.97	1.00	n/a	n/a	0.66	0.67
Demand Response 3	0.76	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1.00	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Initiative	Peak Demand Savings								Energy Savings							
	Realization Rate				Net-to-Gross Ratio				Realization Rate				Net-to-Gross Ratio			
	2011	2012	2013	2014	2011	2012	2013	2014	2011	2012	2013	2014	2011	2012	2013	2014
Industrial Program																
Energy Manager	n/a	1.21	0.90	0.91	n/a	0.90	0.90	0.90	n/a	1.21	0.90	0.96	n/a	0.90	0.90	0.90
Retrofit																
Demand Response 3	0.84	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1.00	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Home Assistance Program																
Home Assistance Program	n/a	0.23	0.54	0.76	n/a	1.00	1.00	1.00	n/a	0.99	0.86	0.73	n/a	1.00	1.00	1.00
Pre-2011 Programs completed in 2011																
Electricity Retrofit Incentive Program	0.77	n/a	n/a	n/a	0.52	n/a	n/a	n/a	0.78	n/a	n/a	n/a	0.52	n/a	n/a	n/a
High Performance New Construction	1.00	1.00	1.00	1.00	0.50	0.50	0.50	0.50	1.00	1.00	1.00	1.00	0.50	0.50	0.50	0.50
Multifamily Energy Efficiency Rebates	0.96	n/a	n/a	n/a	0.68	n/a	n/a	n/a	0.96	n/a	n/a	n/a	0.68	n/a	n/a	n/a
LDC Custom Programs	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Other																
Program Enabled Savings	n/a	n/a	1.00	0.90	n/a	n/a	1.00	1.00	n/a	n/a	1.00	0.94	n/a	n/a	1.00	1.00
LDC Pilots	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Table 18 Verified Net Peak Demand Savings by Initiative (Source: 2014 PowerStream Final Report provided by IESO)

Initiative	Net Incremental Peak Demand Savings (kW)				Verified Persisting Progress to 2014 Target (kW)
	2011	2012	2013	2014	
Consumer Program					
Appliance Retirement	159	94	53	52	355
Appliance Exchange	15	16	39	49	109
HVAC Incentives	2,829	1,635	1,658	2,097	8,219
Conservation Instant Coupon Booklet	80	15	34	150	279
Bi-Annual Retailer Event	112	98	79	534	822
Retailer Co-op	0	0	0	0	0
Residential Demand Response	1,251	3,873	11,897	14,426	14,426
Residential Demand Response (IHD)	0	0	0	0	0
Residential New Construction	0	0	0	9	9
Business Program					
Retrofit	1,225	4,690	5,114	6,546	17,540
Direct Install Lighting	2,106	1,437	2,327	2,609	7,701
Building Commissioning	0	0	0	58	58
New Construction	16	0	778	2,555	3,349
Energy Audit	0	52	79	401	532
Demand Response 3	1,243	1,232	1,921	1,680	1,680
Industrial Program					
Energy Manager	0	19	421	221	336
Retrofit	502	0	0	0	501
Demand Response 3	2,634	3,186	6,406	6,112	6,112
Home Assistance Program					
Home Assistance Program	0	36	45	34	114
Pre-2011 Programs completed in 2011					
Electricity Retrofit Incentive Program	1,958	0	0	0	1,958
High Performance New Construction	211	644	83	0	938
Multifamily Energy Efficiency Rebates	75	0	0	0	75
LDC Custom Programs	81	0	0	0	81
Other					
Program Enabled Savings	0	0	5	242	247
LDC Pilots	0	0	0	144	144
Adjustments to 2011 Verified Results		**107**	**5**	**9**	**119**
Adjustments to 2012 Verified Results			**719**	**770**	**1,489**
Adjustments to 2013 Verified Results				**1,835**	**1,835**
Energy Efficiency Subtotal	**9,368**	**8,736**	**10,715**	**15,702**	**43,370**
Demand Response Subtotal	**5,128**	**8,291**	**20,225**	**22,218**	**22,218**
Verified Adjustments Subtotal	**0**	**107**	**724**	**2,614**	**3,443**
IESO-Contracted LDC Portfolio Total	**14,496**	**17,134**	**31,664**	**40,534**	**69,032**

Table 19 Verified Net Energy Savings by Initiative (Source: 2014 PowerStream Final Report provided by IESO)

Initiative	Net Incremental Energy Savings (kWh)				2011-2014 Net Cumulative Energy Savings (kWh)
	2011	2012	2013	2014	
Consumer Program					
Appliance Retirement	1,160,946	662,323	354,976	347,442	7,686,317
Appliance Exchange	18,962	28,384	69,085	86,818	377,429
HVAC Incentives	5,192,089	2,761,285	2,830,426	3,877,285	38,590,347
Conservation Instant Coupon Booklet	1,295,153	92,817	511,655	2,017,781	8,500,156
Bi-Annual Retailer Event	1,950,839	1,777,858	1,140,456	8,158,701	23,576,545
Retailer Co-op	2,335	0	0	0	9,339
Residential DR	3,239	28,587	16,249	1,219	49,293
Residential DR (IHD)	0	0	0	0	0
Residential New Construction	0	0	0	150,061	150,061
Business Program					
Retrofit	7,512,897	25,834,397	28,469,682	43,902,735	208,208,428
Direct Install Lighting	5,296,278	5,424,343	7,944,313	9,552,857	60,153,159
Building Commissioning	0	0	0	109,537	109,537
New Construction	69,868	0	1,579,613	7,971,154	11,409,852
Energy Audit	0	251,763	436,057	1,958,207	3,585,609
Demand Response 3	48,536	17,913	28,336	0	94,784
Industrial Program					
Energy Manager	0	36,000	3,717,682	1,185,181	6,534,340
Retrofit	3,213,757	0	0	0	12,852,927
Demand Response 3	154,591	76,793	157,656	0	389,040
Home Assistance Program					
Home Assistance Program	0	313,102	595,251	433,704	2,537,142
Pre-2011 Programs completed in 2011					
Electricity Retrofit Incentive Program	9,540,024	0	0	0	38,160,095
High Performance New Construction	1,082,896	2,745,770	221,916	0	13,012,727
Multifamily Energy Efficiency Rebates	194,534	0	0	0	778,138
LDC Custom Programs	533,038	0	0	0	2,132,152
Other					
Program Enabled Savings	0	0	7,515	1,373,950	1,388,980
LDC Pilots	0	0	0	771,514	771,514
Adjustments to 2011 Verified Results		**1,508,750**	**8,134**	**74,084**	**6,359,575**
Adjustments to 2012 Verified Results			**4,051,236**	**3,486,382**	**22,604,292**
Adjustments to 2013 Verified Results				**10,474,225**	**20,352,621**
Energy Efficiency Subtotal	**37,063,617**	**39,928,041**	**47,878,626**	**81,896,927**	**440,524,794**
Demand Response Subtotal	**206,366**	**123,292**	**202,240**	**1,219**	**533,117**
Verified Adjustments Subtotal	**0**	**1,508,750**	**4,059,370**	**14,034,691**	**49,316,488**
IESO-Contracted LDC Portfolio Total	**37,269,983**	**41,560,083**	**52,140,236**	**95,932,838**	**490,374,399**

4 Combined CDM Reporting Elements

4.1 Summary of CDM Target Achievement

In 2014, PowerStream achieved an incremental 45.3 MW of net verified demand savings and 101.8 GWh of net verified energy savings. Combined with previous year results, PowerStream achieved a total of 73.8 MW of net demand savings and 496.3 GWh in cumulative net energy savings against its 2011-2014 targets. This represents 77.2% and 121.8% of PowerStream's demand and energy savings targets, respectively. Table 20 provides a breakdown of these results by Program, while Table 21 compares the final results to 2014 milestones set out in PowerStream's 2013 Annual Report to the OEB in September 2014.

Table 20 Summarized Program Results[13]

	2014 Incremental Net Savings		Contribution to Targets	
	Peak Demand (MW)	Energy (GWh)	Net Annual Peak Demand Savings in 2014 (MW)	2011-2014 Net Cumulative Energy Savings (GWh)
IESO-Contracted Province-Wide CDM Programs				
Consumer Program	17.32	14.64	24.22	78.94
Business Program	13.85	63.49	30.86	283.56
Industrial Program	6.33	1.19	6.95	19.78
Home Assistance Program	0.03	0.43	0.11	2.54
Pre-2011 Programs	0.00	0.00	3.05	54.08
Other*	0.39	2.15	0.39	2.16
Previous Year Adjustments**	2.61	14.03	3.44	49.32
Subtotal	**40.54**	**95.93**	**69.03**	**490.38**
Board-Approved CDM Programs				
BRI Program	0.82	5.84	0.83	5.96
TOU Pricing	3.94	0.00	3.94	0.00
Subtotal	**4.76**	**5.84**	**4.76**	**5.96**
Total Portfolio Results	**45.29**	**101.78**	**73.80**	**496.34**
		OEB Target	**95.57**	**407.34**
		% Target achieved	**77.2%**	**121.8%**

* Includes Program Enabled Savings and LDC Pilots.
** Includes adjustments after Final Reports were issued.

[13] While these results are referred to as *verified*, it is important to understand that they verified *estimates*. The IESO EM&V protocols stipulate a minimum level of confidence and precision for CDM program impact evaluations at 90/10, meaning that the bounds of the estimated impact's 90% confidence interval must be no more than 10% different from the point estimate. IESO staff has indicated that while in some cases a confidence/precision of 95/10 has been achieved, on the whole the portfolio is achieving 90/10.

Table 21 2014 Results vs 2014 Milestones in 2013 Annual Report

Cumulative Progress to Date	2014 Milestone as per 2013 Annual Report (Sept 2014)		2014 Verified Results (Sept 2015)		Variance	
	Savings	% to Target	Savings	% to Target	Savings	% to Target
2014 Net Demand Savings (MW)	**75.1**	**78.6%**	**73.8**	**77.2%**	**-1.3**	**-1.4%**
Province Wide Programs	61.8	64.7%	69.0	72.2%	7.2	7.6%
BRI Program	0.8	0.8%	0.8	0.9%	0.0	0.0%
TOU	12.5	13.1%	3.9	4.1%	-8.6	-9.0%
2011-2014 Net Cumulative Energy Savings (GWh)	**443.4**	**108.9%**	**496.3**	**121.8%**	**52.9**	**13.0%**
Province Wide Programs	437.7	107.5%	490.4	120.4%	52.7	12.9%
BRI Program	5.7	1.4%	6.0	1.5%	0.3	0.1%
TOU	0.0	0.0%	0.0	0.0%	0.0	0.0%

4.2 Energy Savings Target – performance assessment

As shown in the table above, PowerStream's final verified energy savings results were significantly higher than the 2014 Milestone set out in its 2013 Annual Report to the OEB. PowerStream achieved an additional 13% of its energy savings target beyond what was forecasted in September 2014.

In the early years of the four year framework, PowerStream's strategic focus was on harnessing energy savings, as the cumulative nature of the energy target would make the target more difficult to achieve in the latter years. This approach worked well with PowerStream achieving (based on internal results) its energy savings target in August 2014. As will be discussed in greater detail in the next section, PowerStream undertook a number of sales and marketing tactics in the last two quarters of 2014 to drive additional demand reductions. This was done in an attempt to compensate for lost opportunities from the cancellation of the Demand Response 3 program and well as to mitigate the risk of relying on savings from TOU pricing which was outside of the control of the distributors. These tactics were very successful, and resulted in additional energy savings along with additional demand reductions.

4.3 Demand Reduction Target – performance assessment

PowerStream's actual achievement of 77.2% against its demand savings target was slightly below its 2014 Milestone projection of 78.6%. The verified savings from TOU pricing are more than 8.5 MW lower than PowerStream had forecasted in September 2014, however this was offset substantially by PowerStream driving over 7.2 MW more from the Province Wide programs than had been forecasted. This overachievement of the Provincial Programs portfolio is particularly noteworthy when it is understood that there was a loss of 1.2 MW of results associated with peaksaver PLUS devices that had been installed in 2011-2013 as the ex-ante value per installed device was reduced from 0.562 kW to 0.506 kW in the 2014 evaluation

process by IESO. This was also completely outside of PowerStream's control and PowerStream was not aware of this impact until the release of the 2014 verified results in 2015.

Based on final verified results from the IESO, PowerStream felt short of its demand reduction target by 21.77 MW. The shortfall against the peak demand target is attributed to two main factors - TOU pricing and the Demand Response 3 Program (DR3). Both of these initiatives, which were outside of PowerStream's control, contributed far fewer demand savings than was contemplated during the setting of the targets and the design of the provincial CDM programs in 2010.

When LDC CDM targets were established in 2010, it had been estimated that TOU pricing would contribute 308 MW (or 23%) toward the aggregate distributor target of 1330 MW. In 2011, PowerStream estimated – using the same percentage breakdown of resources – that TOU pricing would contribute approximately 22 MW in net demand reduction. However, as discussed in previous sections, TOU pricing only contributed 3.9 MW of demand reduction toward PowerStream's target, representing a negative variance of more than 18 MW.

In March 2014, the Minister of Energy issued a Directive to the Ontario Power Authority which cancelled the OPA's authority to procure any additional MW of capacity under the DR3 program. At the time the DR3 program was cancelled, PowerStream had roughly 6.2 MW (27 customers) who had signed agreements with the aggregators but not yet enrolled in the program. Based on current ex-ante values for DR3 contracts, PowerStream estimates that this represents a lost opportunity of just under 5 MW of savings against its CDM target.

Figure 7 illustrates the significant negative impact of the TOU pricing and DR3 program on PowerStream's demand target achievements. PowerStream estimates that had the TOU pricing achieved results as expected, and had it been able to continue to enrol customers in the DR3 program, that it would have achieved more than 100% of the demand reduction target.

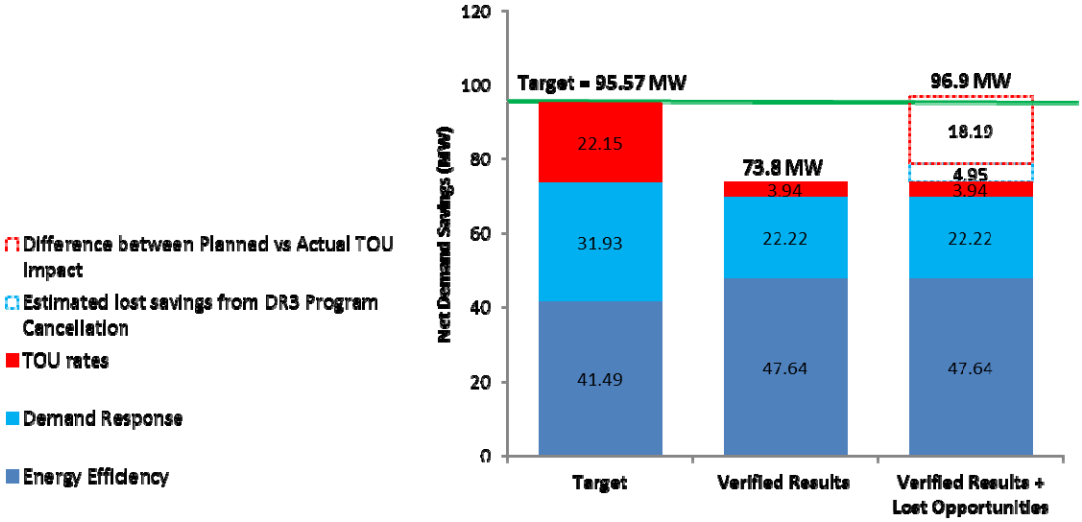

Figure 7 Demand Reductions - Planned vs Actual

As discussed in previous sections and in the PowerStream 2013 Annual CDM Report to the OEB, PowerStream was aware of both of these contributing factors prior to the end of 2014.

PowerStream was aware in mid-2013 that TOU pricing was not likely to achieve the 308 MW provincially that was originally forecasted, and subsequently reduced its forecast. The DR3 program was cancelled in March 2014. In mid-2014, PowerStream's CDM team identified tactics aimed to drive increased demand savings from other CDM programs in an attempt to compensate for the lost DR3 opportunities and the uncertainty associated with the updated TOU forecasted savings (which had already been reduced by almost 50%). Five tactics were selected for implementation based on anticipated impact (MW savings) and ability to implement within a limited time frame. A description of these tactics and summary of results achieved is provided below.

1. *Following up on ERII projects in the pipeline:* Follow up on ERII project that have been sitting in "Pre-approved" or "Draft" status for a while to see if they would require any assistance with the application or the project itself.

   RESULTS: The 'Pre to Post Push' Campaign was launched to help close the top 100 retrofit applications representing over 5MW of potential demand savings. PowerStream staff made calls to applicants and applicant representatives offering support to complete the application process. The effort resulted in closing approximately 1MW of demand savings in the weeks following the campaign.

2. ***Peaksaver* PLUS** *'Last Chance/Home Audit' campaign:* Multi-tactic marketing campaign (bill insert, direct mail, radio, online) with last chance messaging and offering a free in-home energy audit for the first 500 customers. This campaign was planned to be in market from September to November 2014. PowerStream estimated that there was potential to capture 1.5 MW – 2 MW of incremental savings due to this campaign.

   RESULTS: The campaign launched in September 2014. Based on popular demand the offer was extended with a total of 3,952 customers participating in the free energy audit, contributing nearly 2 MW.

3. *ERII "Quick Wins with Lighting" campaign:* Multi-tactic campaign (direct mail, LinkedIn, outbound calling) targeting lighting retrofit projects. This campaign was planned for September to November 2014. PowerStream estimated that there is potential to capture up to 100 LED conversion lighting projects, which could lead to up to 1.5 MW in demand savings.

   RESULTS: PowerStream executed the marketing campaign in September which included multiple tactics: direct mail, LinkedIn, outbound calling campaign, bill inserts and newsletters). This resulted in an increase in the number of new companies applying to the Retrofit program compared to previous quarters that year. A large increase in the number of inbound customer email inquiries on the Retrofit was also observed.

4. *Following up on HPNC projects in the pipeline:* Conduct monthly follow up phone calls with customers that have been pre-approved to see how their project is proceeding and to see if they would require any help with the application process. This initiative has already been

launched. PowerStream estimates that there is potential to capture up to 1 MW of demand savings from these projects.

RESULTS: This was a low cost, low risk tactic that was quite successful at moving projects from the pre-approved stage through to the post review and final approvals. Staff identified and followed up with all 16 customers. Two post project reviews were initiated in Q4 2014 and delivered 0.5 MW.

5. *BRI head office campaign:* Potential identified to capture up to 1 MW from multi-location customers and franchised retail locations through head office outreach and endorsement. A sales plan has been developed to determine largest opportunities and customer meetings are ongoing.

   RESULTS: Upon further assessment, PowerStream elected to not proceed with this tactic, given the number of other strategies that were being taken and the 'hard stop' regarding PowerStream's inability to deliver the BRI program beyond December 2014. It was decided that a head office marketing campaign would be better deployed when the program was relaunched under the Conservation First Framework with a longer approved program term.

4.4 CDM Strategy Modifications

As the 2011-2014 CDM framework has ended, this section of the Annual CDM Report template is no longer applicable.

Appendix A: BRI Evaluation Report

INDECO
Strategic Solutions for a Changing World™

Evaluation of the *Business Refrigeration Incentives* program

PowerStream *Business Refrigeration Incentives* program

Evaluation

This document was prepared for PowerStream by IndEco Strategic Consulting Inc.

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IndEco report B3872-2

24 April 2015

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Acknowledgements

The IndEco team, consisting of David Heeney, David Taylor, Cindy Yang, and Daniele Magditsch, wishes to thank the many people who assisted us in undertaking this work, including:

Our partners: Sarah Roberton from Environics Research Group who undertook the surveys of participants, and Micah Jarvis, Philip Drader and Bob Michniak from Mindscape Innovations Group who did the on-site monitoring and analysis of the results.

Staff of PowerStream who provided data, insight and support: Lasith Assalaarachchi, Kathleen Cea, Alice Currey, Alyssa Mallins, Hamza Mortage, Fabrizio Pompilii, Steven Rothwell and John Sherin. Special thanks go to Erik Ianuzzo.

PowerStream contractors: Bob Arbuckle (NEDCO, A division of Rexel Canada), David Graham (Green Bison Inc.), and Francesco Montagnese (MGT Mechanical Ltd.) who provided their perspectives through interviews, meetings or both. In addition, a number of the contractors who did a smaller number of installations responded to our request to complete an on-line survey, and their assistance is appreciated.

BRI program participants: owners and managers who agreed to have their equipment monitored, and participants who responded to our on-line participant survey provided information crucial to the evaluation, and the time they invested is acknowledged.

Executive summary

Purpose

This document reports on the results of the evaluation of the Business Refrigeration Incentives program offered by PowerStream from September 2013 to the end of 2014.

Scope and method

The scope of the project considers both process and impact issues related to the project.

Process related issues are based on interviews with persons responsible for delivering the program, including program administrators, auditors, persons responsible for marketing and installers.

Feedback from customers was obtained primarily through on-line surveys of program participants. The first survey was conducted between April 15, 2014 and May 12, 2014. A subsequent survey of later participants was conducted between February 25 and March 17, 2015. All program participants were invited to respond and 103 of participants as of the end of March 2014 agreed to do so, and 60 responded to the second survey in 2015. The survey provided information used in assessing satisfaction with the program, and for determining how much of gross energy savings identified can actually be attributed to the program (i.e. net energy savings.)

Interviews were conducted with the major contractors supporting the project, and a mail-in survey was sent to the smaller contractors, seeking their views on the program. Discussions were also held with PowerStream program administrators.

Selected equipment at a random sample of facilities was logged for a period of time before and after installation of retrofit measures to assess real-world impacts of the installed measures. Measurements were taken at 60 facilities at 297 measuring points, and actual measures were compared to estimated (prescriptive) values. These measured savings were extrapolated from the logged sample to the overall population of participants to estimate savings from the program.

Status of data

Several types of data were used in the analysis, each with its own limitations.

Prescriptive data on estimated savings for particular retrofit measures were provided by PowerStream. Estimated savings were based on a review of the literature, and were based on 'typical' units. The range of potential unit sizes, or usage patterns and their impact on energy use was not available.

Survey data Environics Research Group sent surveys by e-mail to 281 facilities that had participated in the program as of the end of March 2014, and 103 responses were received. Overall, that response rate provides results with a reasonable level of statistical confidence (90%±7%). However, some questions only applied to a subset of the sample, and the confidence that those responses are typical of a large population is lower. The second survey was sent to 386 facilities and 60 responded. This provides a level of statistical confidence comparable to the earlier survey (90%±10%).

Monitoring data Mindscape Innovations Inc. estimated energy savings associated with installed measures on equipment at a sample of facilities using data loggers. Measurements of current were taken at five-minute intervals over roughly a two-week period before and after installation of retrofit measures. Attribution of measured savings to individual measures was done based on typical load profiles of the measures. There are many factors that affect energy use in facilities with commercial refrigeration, and there are consequently wide variations in observed savings across measures.

Main findings

The process being used for the program appears to have worked well, and there is a good level of customer, contractor, and program administrator satisfaction with the program. The vast majority of customers say they have or would recommend the program to colleagues.

By the end of 2014, there were 1,032 participants in the program. The number of installs was below expectation due to a variety of challenges encountered early in the program, including: the late start of the program, difficulty securing retrofit equipment, and changes in installers involved in the program. The number of installs in 2014 was 22% higher than originally planned.

PowerStream made incremental changes to the program throughout the program to address barriers to successful implementation, as they were identified.

PowerStream developed a powerful database for managing the project, which has rich information about program participants and progress of the program.

The impact of the program was the saving of 5.9 GWh over the fifteen months the program was offered, and a reduction in peak summer demand of more than 0.8 MW. These savings net savings, after adjusting for free riders and spillover. Free rider and spillover rates were very low, but can both be expected to increase as awareness and availability of the retrofit technologies grows.

Although these savings are significant, and are associated with a benefit-cost ratio of greater than 1.3 (as measured by the Total Resource Cost test and the Program Administrator Cost test), they are less than was originally anticipated for the program because early ramp

up issues meant that there were fewer installs than originally planned, verified savings are lower than the estimated prescriptive savings, and there were fewer than anticipated installs of the equipment with the greatest unit savings.

Conclusions and recommendations

The overall process used for the program was successful. The barriers the program was designed to address are actual barriers, and the program was effective at chipping away at these. There is a growing interest in realizing the possible energy savings in this sector on the part of customers and contractors.

As a result of the program, not only have more than 1,000 customers implemented measures to increase the efficiency of their refrigeration systems, but contractors in PowerStream's service territory have gained experience in installing retrofit measures and in promoting these to their customers. In addition, PowerStream has worked with equipment distributors to encourage them to stock retrofit technologies in the Ontario marketplace.

As it reintroduces the program into the marketplace, there are a number of trade-offs that PowerStream will have to find the appropriate balance for.

On the marketing side, PowerStream will want to continue its successful strategies, while testing whether it can further increase its reach through other mechanisms, such as direct appeal to customers at their door.

The audit part of the program, and the associated Energy Action Plan have evolved from a somewhat comprehensive consideration of energy use in customers' facilities to a narrower consideration of potential retrofit options for their refrigeration systems; from an aid to the customer more to an aid to PowerStream itself and to installers. In future offerings of the program, greater attention could be given to advising customers of potential energy savings measures, and their benefits. Although PowerStream has increased the emphasis on behavioural measures and good practices in the audits in recent months, it should include generic or specific information on behavioural practices in the Energy Action Plans.

Working with multiple contractors to deliver the program complicates the administration and coordination requirements, but has proven important in ensuring both that PowerStream understands the overall marketplace and how it functions, and in extending the reach of the program into the marketplace. It would be well advised to continue to extend the number of contractors and installers involved in the program, while ensuring good communication of expectations, and monitoring of performance. This will likely require direct marketing to refrigeration contractors operating in the PowerStream service territory.

Particularly with the involvement of more contractors, the quality assurance part of the program will take on increasing importance to

ensure the maintenance of high standards of delivery and customer satisfaction. Where the need for corrective actions is identified, these need to be documented and tracked to ensure that they are implemented.

To ensure that the program remains effective and cost-efficient, PowerStream will need to continue to evaluate energy performance of existing and new technologies. It should ensure that it collects and organizes information on technologies required for the calculation of savings using the quasi-prescriptive formulae documented by the Ontario Power Authority/Independent Electricity System Operator, as well as basic parameters that indicate the likely size of the impact, such as assessments of the state of repair of equipment (captured in the Health Check), and basic parameters on the size of equipment installed (e.g. linear metres or square metres of night curtains and strip curtains).

Finally, it will be important to continue to ensure good communication among all those involved in the program, including the marketing team, auditors, installers, and data loggers. Each of them identified the importance of communication with the others to understand better the market, the program needs and objectives, and the needs and expectations of customers.

Introduction

PowerStream's *Business Refrigeration Incentives* (BRI) program provides energy audits and refrigeration upgrades to qualifying businesses with a peak demand of less than 250 kW within the commercial and institutional sector at no charge for equipment valued up to $2,500. The program aims to overcome the substantial market barriers associated with promoting energy efficient refrigeration equipment upgrades to businesses including: limited awareness of energy use and electricity costs of refrigeration equipment, limited knowledge of opportunities to reduce energy use, limited availability of equipment from distributors, and limited access to capital to upgrade refrigeration equipment.

Target market and eligibility

The BRI program targets business owners within the commercial and institutional sector that have commercial grade refrigeration equipment.

In the PowerStream service territory, there are approximately 3,000 restaurants and 1,000 grocers. In addition, there are many other small commercial businesses with product refrigeration, including florists, medical laboratories, and school cafeterias.

In order to be eligible for the BRI program, customers must:

- Have a General Service (GS) Account with PowerStream. Customers with residential accounts will not be eligible.
- Have an average annual demand of less than 250 kW.
- Have commercial grade refrigeration equipment used to cool products (e.g. food to flowers). Customers with residential refrigeration equipment will not be eligible.

If the facility is leased, the participant must have the authority to have the measures installed as a condition of the lease or with the consent of the owner of the facility.

Program goals and objectives

The overall goal of the BRI program is to achieve electricity savings and demand reductions that will contribute towards PowerStream's 2011-2014 CDM targets. Specific objectives include:

- To achieve electricity savings and peak demand reductions;
- To increase awareness of energy efficiency measures and programs; and
- To stimulate changes in behaviour, technology and market conditions that favour energy efficiency.

Program elements

Eligible participants in the BRI program receive a turnkey service that includes:

- A free electricity audit and assessment;
- A customized report and "Energy Action Plan" based on the electricity audit; and
- Up to $2,500 of eligible refrigeration measures and services provided and installed at no charge.

Table 1 describes the elements of the program that are undertaken to encourage participation and support energy and demand savings in eligible commercial and institutional customers.

Table 1 Description of elements

Element	Description
Direct marketing	PowerStream uses direct marketing methods to promote participation in the program. These include: direct mail inserts, follow up door-to-door community blitz, and direct calling.
Audit	Customers receive a free electricity audit based on the following data: • Customer profile/firmographics (e.g. type of business, operating hours); • Historical electricity consumption; and • Walk through audit results (e.g. load inventory, square footage, age of equipment). Once the customer agrees to the audit, PowerStream schedules and conducts the audit.
Electronic assessment report and work order	PowerStream provides customers with a customized, user friendly (electronic) report and Energy Action Plan that includes a description of: • Key end-uses driving electricity consumption patterns in the facility; • Specific eligible refrigeration recommendations for measures / services to be installed and associated energy and demand savings; • Additional opportunities for energy and demand savings related to other end-uses and other applicable CDM programs[1]; and • A comparative benchmark of the facility's electricity use against similar businesses.

[1] This component was dropped in the later stages of the program.

Element	Description
	PowerStream also provides customers with a work order for up to $2,500 in eligible refrigeration measures.
Follow-up and installation scheduling	PowerStream follows-up with customers to encourage them to sign the work order. Once customers sign the work order agreeing to the installation of measures, PowerStream schedules the installation.
Measure installation	PowerStream arranges for the installation of eligible refrigeration measures of up to $2,500 by a qualified refrigeration mechanic licensed in Ontario. Eligible measures that are included are as follows: • Anti-sweat heater controls for cooler or freezers • Night curtains on display cases • Cleaning cooler/freezer condenser coils • Energy efficient evaporator or condenser fan motors (ECM motor upgrade) • LED display case lighting • Strip curtains for walk-in coolers and freezers.
Quality assurance visit	PowerStream conducts quality assurance visits of a sample of participating facilities. The purpose of the visits is to collect information for EM&V and reinforce participants' confidence in the program.
Customer satisfaction survey	PowerStream delivers surveys to a representative sample of program participants (both customers who proceeded to the direct install phase of the program, and those who did not). The purpose of the surveys is to collect information for EM&V and reinforce participants' confidence in the program.

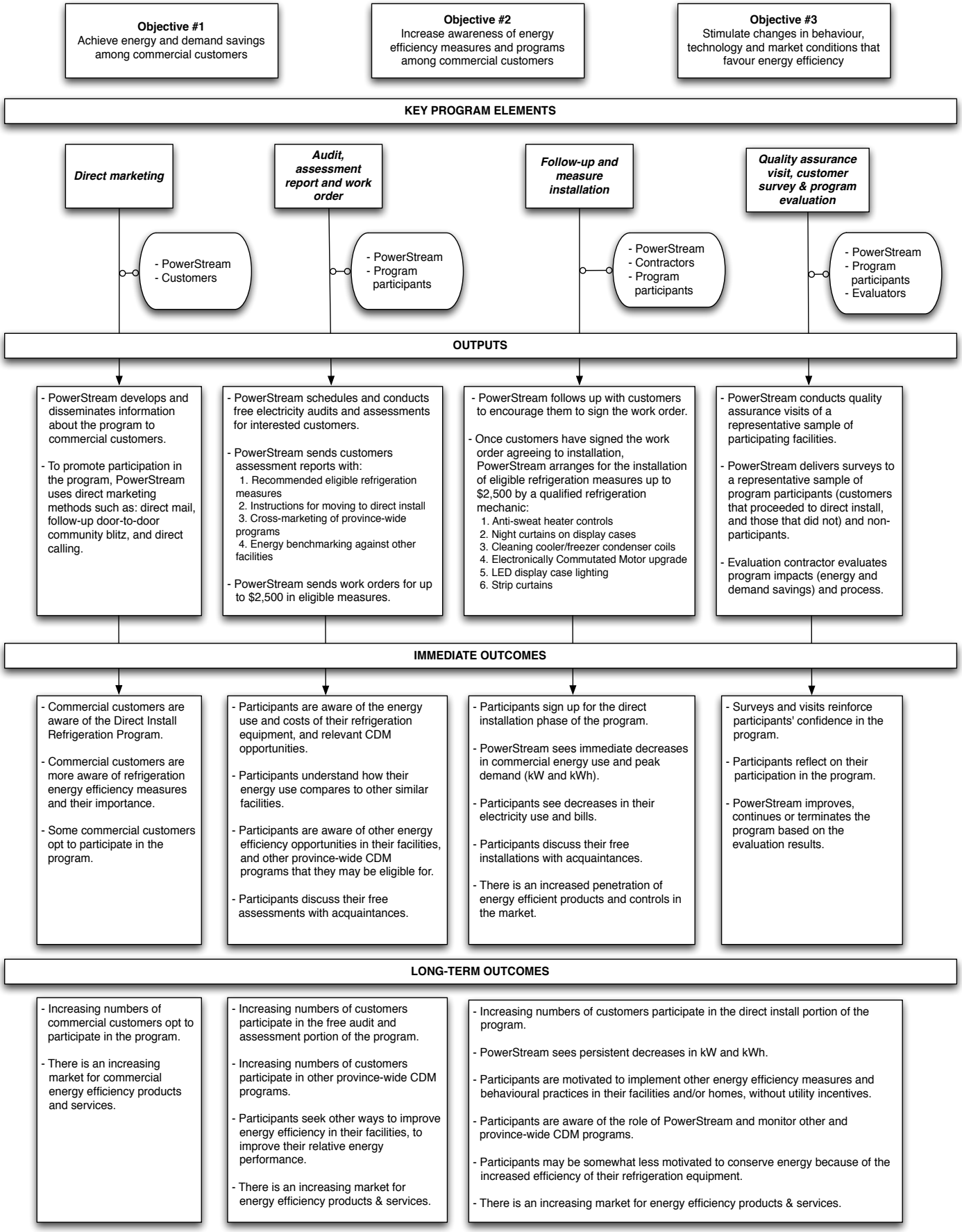
Expected savings

PowerStream estimated that the BRI program would generate 3.3 MW and 19.6 GWh of net savings, representing an additional 3.5% and 4.8% towards PowerStream's 2011-2014 demand and energy targets, respectively.

Grocery stores and restaurants typically use approximately three times the amount of electricity per square foot of retail space compared to offices and other retail businesses. Refrigeration represents the largest single end-use of electricity in these facilities – 50% for restaurants and 72% for grocers.

Logic diagram

The logic model on the next page illustrates the theory of the PowerStream BRI program. The evaluation focuses on the immediate outcomes.


Objective #1
Achieve energy and demand savings among commercial customers
Objective #2
Increase awareness of energy efficiency measures and programs among commercial customers
Objective #3
Stimulate changes in behaviour, technology and market conditions that favour energy efficiency
KEY PROGRAM ELEMENTS
Direct marketing
- PowerStream
- Customers
Audit, assessment report and work order
- PowerStream
- Program participants
Follow-up and measure installation
- PowerStream
- Contractors
- Program participants
Quality assurance visit, customer survey & program evaluation
- PowerStream
- Program participants
- Evaluators
OUTPUTS
- PowerStream develops and disseminates information about the program to commercial customers.
- To promote participation in the program, PowerStream uses direct marketing methods such as: direct mail, follow-up door-to-door community blitz, and direct calling.
- PowerStream schedules and conducts free electricity audits and assessments for interested customers.
- PowerStream sends customers assessment reports with:
1. Recommended eligible refrigeration measures
2. Instructions for moving to direct install
3. Cross-marketing of province-wide programs
4. Energy benchmarking against other facilities
- PowerStream sends work orders for up to $2,500 in eligible measures.
- PowerStream follows up with customers to encourage them to sign the work order.
- Once customers have signed the work order agreeing to installation, PowerStream arranges for the installation of eligible refrigeration measures up to $2,500 by a qualified refrigeration mechanic:
1. Anti-sweat heater controls
2. Night curtains on display cases
3. Cleaning cooler/freezer condenser coils
4. Electronically Commutated Motor upgrade
5. LED display case lighting
6. Strip curtains
- PowerStream conducts quality assurance visits of a representative sample of participating facilities.
- PowerStream delivers surveys to a representative sample of program participants (customers that proceeded to direct install, and those that did not) and non-participants.
- Evaluation contractor evaluates program impacts (energy and demand savings) and process.
IMMEDIATE OUTCOMES
- Commercial customers are aware of the Direct Install Refrigeration Program.
- Commercial customers are more aware of refrigeration energy efficiency measures and their importance.
- Some commercial customers opt to participate in the program.
- Participants are aware of the energy use and costs of their refrigeration equipment, and relevant CDM opportunities.
- Participants understand how their energy use compares to other similar facilities.
- Participants are aware of other energy efficiency opportunities in their facilities, and other province-wide CDM programs that they may be eligible for.
- Participants discuss their free assessments with acquaintances.
- Participants sign up for the direct installation phase of the program.
- PowerStream sees immediate decreases in commercial energy use and peak demand (kW and kWh).
- Participants see decreases in their electricity use and bills.
- Participants discuss their free installations with acquaintances.
- There is an increased penetration of energy efficient products and controls in the market.
- Surveys and visits reinforce participants' confidence in the program.
- Participants reflect on their participation in the program.
- PowerStream improves, continues or terminates the program based on the evaluation results.
LONG-TERM OUTCOMES
- Increasing numbers of commercial customers opt to participate in the program.
- There is an increasing market for commercial energy efficiency products and services.
- Increasing numbers of customers participate in the free audit and assessment portion of the program.
- Increasing numbers of customers participate in other province-wide CDM programs.
- Participants seek other ways to improve energy efficiency in their facilities, to improve their relative energy performance.
- There is an increasing market for energy efficiency products & services.
- Increasing numbers of customers participate in the direct install portion of the program.
- PowerStream sees persistent decreases in kW and kWh.
- Participants are motivated to implement other energy efficiency measures and behavioural practices in their facilities and/or homes, without utility incentives.
- Participants are aware of the role of PowerStream and monitor other and province-wide CDM programs.
- Participants may be somewhat less motivated to conserve energy because of the increased efficiency of their refrigeration equipment.
- There is an increasing market for energy efficiency products & services.

Program participation

The BRI program officially launched on September 20, 2013. The information provided in this section covers program participation from four weeks before the launch date until the end of 2014.

Projected participation

At the start of the BRI program, PowerStream projected 1,200 customers would participate in the program by the end of 2014 (based on an earlier estimated launch date). Table 2 below illustrates the estimated participant breakdown over the two calendar years. (2013 was intended to be from July to December.)

Table 2 Projected participation breakdown (2013-2014)

	Total	Grocer	Restaurant
2013-2014 participants	1200	500	700
2013 participants	360 (30%)	150	210
2014 participants	840 (70%)	350	490

Actual participation

Table 3 depicts the actual breakdown of participation in 2013 and 2014. The grocer category encompasses bakeries, deli shops, convenience stores, dairy and frozen food shops, gas stations, grocery stores, and retail meat stores. The restaurant category includes all restaurant types, including fast food outlets. The 'other' category includes banquet halls, beer and wine stores, flower shops, and pharmacies.

Table 3 Actual participation breakdown (2013-2014)

	Total	Grocer	Restaurant	Other
2013-2014 participants	1,032	348	606	78
2013 participants	6	5	1	-
2014 participants	1,026	343	605	78

NOTE: Although there were installations at 1,032 facilities, some facilities had additional measures installed on a second visit, for a total of 1,096 projects.

Participation in 2014 was 22% higher than originally planned, however this was not enough to offset the lower than planned participation in 2013 that resulted from a later than anticipated start to the program, and some early challenges in getting the program off the ground, including securing adequate inventory of measures.

Participation in 2014 among restaurants exceeded 2014 projections. The final distribution of participants by sector is illustrative of the diversity of market segments using refrigeration; participants included: bakeries, delicatessens, convenience stores, dairy or frozen food shops,

florists, gas stations, pharmacies, retail meat stores, a beer and wine shop, and banquet halls in addition to grocery stores and restaurants.

A list of installed measures is provided in Table 4 below. The ECM motors ranged in capacity from 6 Watt to 1/3 HP. Some ECM motors were installed on condenser fans and some were installed on evaporator fans. Because evaporator fans run continuously, motors installed on evaporator fans resulted in greater energy savings.

LED case lighting also ranged in size from 24″ to 72″, with 48″ being the most common (61%), followed by 60″ (19%) and 36″ (14%).

PowerStream had hoped to install more anti-sweat heater controls, as this is one of the measures with a very significant energy saving. However, contractors reported that there were very few instances where it was possible to readily retrofit a control, as the units were integrated into the doors, and were not readily accessible, or modifiable. In other cases, contractors reported that anti-sweat heaters had already been disconnected by the customer. Some contractors also reported difficulty in getting anti-sweat heater controls from suppliers.

Table 4 List of measures installed

Energy Efficient Measure	Installation Year		Total installed in Program
	2013	2014	
Anti-sweat heater with control (cooler)	-	2	2
Anti-sweat heater with control (freezer)	-	-	-
Clean Condenser Coils (cooler)	43	3,667	3,710
Clean Condenser Coils (freezer)	3	1,233	1,236
ECM fan motor upgrade	46	3,432	3,478
LED case lighting	23	2,367	2,390
LED A19 bulbs	-	718	718
Night Curtains	-	59	59
Strip curtains (walk-in cooler)	2	684	686
Strip curtains (walk-in freezer)	1	353	354
Total	**118**	**12,515**	**12,633**

Table 5 below provides additional information on the firmographics of the program participants who were survey respondents.

Table 5 Firmographics of participant survey respondents

Firmographics	Proportion of respondents
Description of Ownership	
Branch of a chain	0%
Franchise	42%
Independently owned	58%
Rent	84%
Own	16%
Typical Hours of Operation	
Number of days per week	
5	11%
6	17%
7	69%
Other	2%
Number of hours per day	
8	20%
12	47%
16	23%
24	8%
Other	9%

Reasons for participation

When program participants were asked why they first decided to participate in the BRI program, 72% of those responding to surveys indicated that both of the following reasons were equally motivating factors:

1. The opportunity to have the energy usage in my facility reviewed by an energy efficiency expert.
2. The offer of up to $2500 in free energy efficiency upgrades for my facility.

Further to this, survey respondents were asked how appealing they found certain aspects of the program. Table 6 summarizes the percentage of respondents who indicated the program elements were either very appealing or somewhat appealing. The remainder of respondents either found them not very appealing, not at all appealing, or were unable to say.

Table 6 Degree of program aspect appeal to program participant survey respondents

Program aspect	Very appealing / somewhat appealing
The program is offered by PowerStream.	93%
The program is designed to help me reduce my electricity bills.	94%
The program will pay for the first $2500 of equipment I need.	94%
The program saves me from having to find a contractor.	84%

Partial participants

In addition to those participants identified above, who proceeded to installation, some customers were 'partial participants'. Partial participation in this report is defined as having completed an audit but not the installation. There are several reasons why participants may have not proceeded to installation, including: they were deemed ineligible, they decided not to proceed, or they were unable to complete the installation within the timeframe of the program. Table 7 illustrates the distribution of customers who have completed audits within the program but had not completed the installation.[2]

If the program is to be delivered again, results of this program would suggest that PowerStream can expect approximately 120 audits will be required for every 100 participants.

Table 7 Partial program participants

	Total	Grocer	Restaurant	Other
Total Partial Participants	179	44	112	23
2013 Partial Participants	27	11	13	3
2014 Partial Participants	152	33	99	20

[2] The data in Table 7 are based on the program participant records provided by PowerStream. However, other information provided suggests that there were additional partial participants as the total number of facilities receiving installs was 1,032 and all but 30 of these received audits, and there were 1,286 audits in total. These would suggest the number of partial participants was 284.

Process evaluation

This section reviews the key elements of the BRI program (as outlined previously in Table 1), including the direct marketing, audit and assessment, installation, and quality assurance stages. The process evaluation focuses on identifying:

- What were the major barriers to program participation for customers and conversely, what is motivating customers to participate?
- How effective were the various marketing and outreach methods?
- Views on the initial telephone assessment with a PowerStream representative.
- How useful was the energy audit and the Energy Action Plan for program participants?
- Views on the assessment and installation process including opinions of installers, installed equipment and logistics of the installation. Are the resources assigned to the program sufficient?
- A review of the quality assurance and quality control (QA/QC) initiatives
- Consideration of the evaluation, monitoring and valuation initiative (EM&V)
- Any recommendations by program participants and non-participants on improving the program.
- Process improvements for key program elements as the program moves forward.

The process evaluation of the BRI program considers the results of the two surveys of program participants, a survey of the smaller contractors, and interviews and discussions with the larger contractors and key program administrators.

Participant surveys were conducted in April-May 2014 and in February-March 2015. In the 2014 survey, responses were received from 54 customers who had completed the installs, 43 who had only completed the audit, and 6 who dropped out of the program. The 2015 survey received responses from 34 participants who had completed installs, 22 who had completed the audit, and 4 who dropped out of the program.

Energy efficiency in facilities using significant refrigeration

Facilities that use a significant amount of their electricity for refrigeration range from franchises to individually owned businesses and they have varying degrees of familiarity with energy using equipment and opportunities to reduce their energy use. Contractors

reported that they do not frequently see efficiency retrofits when visiting customers' sites, and several mentioned that equipment is often poorly maintained.

The Business Refrigeration Incentives Program was intended to address a number of perceived or anticipated barriers to improved energy efficiency including:

- Lack of knowledge about opportunities – the program provided auditors to give customers information about their facility and its energy use.
- Limited funds available to implement upgrades – the program provided up to $2,500 per participant to implement the upgrades.
- Uncertainty about whether efficiency measures can be counted upon to realize the anticipated savings – PowerStream deemed it important that its own staff meet with customers because they are seen as independent, and reliable.
- Uncertainty about who can be called to implement energy efficient upgrades – PowerStream made contractors available to perform the installs, while permitting customers who had an existing contractor they are comfortable with to use that contractor if they preferred.

Surveys of participants and contractors confirmed that these were barriers to implementation. When asked about why they wanted to participate in the program, 82% of participants who responded to our survey said it was primarily because of the audit offered (10%), or equally because of the audit and the financial incentive (72%).[3] Approximately 88% of participants surveyed who had an opinion on the matter, said that the program had made them aware of opportunities they were not previously aware of.

90% said they participated because of the incentive, either alone (18%) or equally with the audit (72%). 84% of participants said the value of the incentive was an appealing aspect of the program.

93% said an appealing aspect of the program was that PowerStream offered it, and 93% agreed or agreed strongly that it was important that a PowerStream employee do the audit. 84% were attracted by the fact that the program saved them from having to find a contractor.

Direct marketing

Core marketing activities included a direct mail communication piece, outbound calling campaigns, and web and print advertising. North American Industrial Classification System (NAICS) codes were used to identify eligible customers, and both non-participants and participants of other PowerStream CDM programs (e.g. small business lighting) were

[3] Though 33% subsequently said they only agreed to the audit to get the $2500 incentive.

approached for the BRI program. The pre-qualification procedure involved identifying participants who are current PowerStream customers, have an energy demand less than 250 kW, and have refrigeration equipment.

The direct mail piece was sent out in batches of 500.

After the initial mailing, customers were contacted by telephone. The outbound calling campaign consisted of a 10-minute phone survey where information on energy use, monthly energy bills, and contact details were collected. Most of the total appointments booked were a result of the outbound calling campaign.

Customers who did not sign up right away were sent a second mailing.

In addition, PowerStream fielded calls from customers who heard about the BRI program and called PowerStream for more information.

Some contractors suggested that PowerStream would benefit from more direct, face-to-face marketing, particularly when contractors (or auditors) are already at a particular site, and considering the large geographic area that constitutes PowerStream's service territory. Contractors have used this approach with some success for the Small Business Lighting program: when doing an install at one site, they take the opportunity to visit neighbours and encourage them to sign up for the program. The recent evaluation of the SBL program[4] heard the same story: that while large customers typically know about the range of initiatives available, small and medium sized businesses require 'feet on the street' to conduct face-to-face outreach.

Some contractors in the BRI program did encourage their installers to approach businesses near where they were doing installs about participating in the program, and this seemed to work particularly well in reaching customers who weren't reached by the other marketing messages, for example due to language barriers. However, there are no data on how many customers joined the program through this channel, and therefore the relative effectiveness of this channel.

PowerStream has also produced a number of case studies for distribution to potential participants, and has posted them on its website. Contractors emphasized that customers want to see that there are 'real' savings from the measures, and these case studies help address this desire.

In delivering this program again, program administrators need to continue to be aware of the pacing of installs and marketing efforts. Installations must not be delayed significantly beyond customer sign-up. Delays that occurred early in the program were a source of frustration for some customers, and led to a number of cancellations of participation.

[4] Nexant. 2014. *Final Report: Evaluation of 2013 Business Incentive Programs*. Submitted to Ontario Power Authority. p.60

Initial telephone assessment

After the direct marketing campaign, eligible customers were contacted by PowerStream to partake in an initial screening process where they were provided further information on the BRI program and the process. The majority of participants surveyed indicated that they were somewhat satisfied (23%) or very satisfied (75%) with the initial screening process and that the PowerStream employee they spoke with clearly explained the program and was adequately able to answer questions (81%). Very few customers indicated that the initial assessment was too long (6%) or that they were not satisfied (2%).

Audit

Through December 2014, PowerStream completed 1,286 audits for the BRI program. Participants said that they were generally pleased with the audits and were appreciative that PowerStream staff members were closely involved in each stage of the program delivery. Figure 1 provides a breakdown of customer satisfaction level based on survey responses from 125 customers who completed the audit phase of the BRI program.

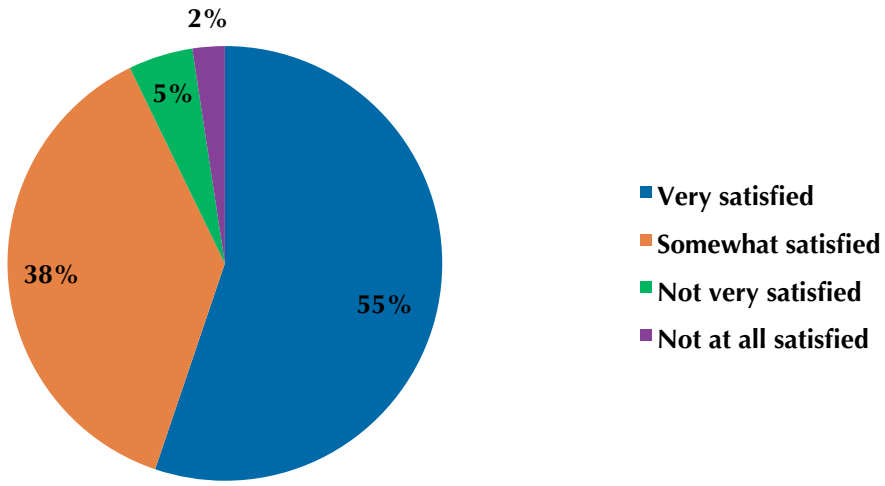


Figure 1 Satisfaction of survey respondents who completed the audit phase

The few respondents who were dissatisfied indicated that the audit was not sufficiently detailed or lacked information on anticipated savings. Over three-quarters of participants responding to the survey agreed or strongly agreed that the auditor clearly explained the purpose of the audit (83%), was able to help with any questions the customer had regarding equipment in their facility (79%), and was able to adequately identify energy savings (78%). Of the 1,286 customers who were audited, 1,002 signed up for an assessment/installation.

PowerStream (and others) have pointed to the challenges in identifying suitable auditors for existing programs, and indicated this might be a

problem for a greatly expanded program. However, refrigeration contractors asked about this did not consider it to be a problem.

PowerStream also updated the original audit process by automating and scaling back the audits. As a result, more audits were conducted partway through the first year. A maximum of four one-hour audits were completed each business day. Audits included a walk through (not a complete inventory) and energy benchmarking. Customers received a brief report from the auditor, which was also passed directly to the installers. Overall, survey respondents were satisfied with the Energy Action Plan and indicated that the plan was understandable (81%), useful (79%) and at an appropriate level of detail (85%).

One-third of survey respondents in the later survey indicated they had taken actions identified in the audit.[5] Of that third, measures taken were identified as lighting or LED lighting (36%); switching off when not in use or at night (21%); minimizing door openings, installing curtains or insulating (21%); and improved maintenance of cleaning (7%).

Customers indicated significant levels of satisfaction with the audits. In offering this program again, PowerStream ought to consider:

- Contractors emphasized the importance of auditors gaining a reasonable understanding of refrigeration systems. Auditors found it helpful to shadow installers for short periods of time, to facilitate gaining this understanding.
- Some contractors felt that auditors had oversold the program, and what they could expect from the installers, leading to expectations not being met by the installer. This was alleviated somewhat by the introduction of a Health Check form that was completed by the installer, explaining why installations were limited by the state of the customer's equipment and what maintenance or repairs might be required before retrofits could be undertaken. More recent Energy Action Plans qualified that some of the recommended retrofits may not be possible depending on the state of the customer's equipment.
- A key independent variable in many of the quasi-prescriptive calculations is compressor rating. Although identified as a field on early versions of the audit form, this value was often missing. It is not identified as a field on the most recent Equipment Inventory template.

[5] This question was not presented in the first survey, which was conducted close to the time of the audits. The question asked was which *non-refrigeration* measures were implemented. [emphasis added], but the responses were not clearly specific to non-refrigeration, and it is not possible to distinguish from the answers whether or which actions mentioned are actions taken by subsequently by the installer, or under an other saveONenergy program.

- The nature of the audits was such that non-refrigeration actions the customer might take were sometimes provided verbally, and typically did not have specific potential savings estimates associated with them, which could later be verified. In other cases, specific estimates of potential actions and savings were provided, but there was no mechanism to follow-up to see if these actions had been implemented. Consequently, it was not possible to attribute specific energy savings to the audits themselves.[6]
- Contractors pointed out that in some cases, the customer equipment was not being operated and maintained properly. In the early days of the program, the auditors' Energy Action Plans focused on what equipment could be retrofitted, but did not typically speak to the role of proper operation and maintenance in maintaining efficiency, though behavioural measures were given greater emphasis later in the program.[7]

Program administrators viewed the audits as invaluable to them in understanding what kinds of equipment exist in the field, customers' understanding of energy issues, and information and feedback that led to program improvements.

As presently constituted, the audits will need to be justified on the basis of good will generated, customer satisfaction, and PowerStream information gathering.

Assessment and measure installation

As outlined in the initial program plan, information from the audit went on to the assessor who then sub-contracted the work out to the installers. PowerStream would review the bill of materials prior to the installation to ensure that all of the energy saving opportunities were being captured.

PowerStream supplied contractors

The contractors found that the time and resource requirements for undertaking the assessment were significant due to the nature of the equipment and the needs for disassembly, in some cases, to identify retrofit opportunities. It was deemed more efficient to undertake the retrofit right away, rather than to schedule an additional visit. In response, PowerStream integrated the assessment and installation stages

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[6] More recent Energy Action Plans, which are the written report the customer receives, do not appear to have *any* information about non-refrigeration measures, or behavioural measures, nor do they have estimated savings. We believe this significantly limits their usefulness to customers. They do continue to provide energy use per unit area for both the specific facility and comparable facilities.

[7] As an example of customer instruction on behavioural actions, see Southern California Edison's *6 steps for energy-efficient refrigeration*. **https://www.sce.com/NR/rdonlyres/275165F7-BC6D-4ED2-A281-560167889F86/0/Refrigeration_Equipment_Guide.pdf** . Although we were advised that there was an increased emphasis on behavioural measures, examples of recent Energy Action Plans provided by PowerStream did not include these types of measures.

of BRI program delivery. The installers, along with site owners, made the final decisions on what equipment was to be updated and what the overall retrofit involved.

There were lessons learned from the experience of working with several contractors involved in the program and trying out several different contractual models.

- Few contractors have familiarity with the full range of measures offered under the program; some were more comfortable with lighting measures, and some with motors. With experience, it became clearer what measures needed to be carried in inventory to ensure they were available and not omitted or required a second site visit.
- Contractors commonly encountered equipment that was poorly maintained or otherwise in poor condition, and were reluctant to make changes because of the risk that failure would be attributed to the retrofit measures. The 'Health Check' form mentioned above addressed this.
- PowerStream program administrators reported that the program experienced the greatest success with a contractor model that paid contractors per measure installed (with no Participant Based Funding). Rather than paying a fee for each participant (regardless of how many measures were installed), contractors were paid per measure installed. This encouraged contractors to implement as many measures as was practical. Contractors who operated under this model felt that their compensation was fair and reasonable. By working with several contractors, over time PowerStream became aware of typical market prices and was able to offer payments that were fair to installers and to ratepayers.
- A participant agreement that allowed payments to be made directly to contractors, rather than participants simplified the process, and contractors stated that the felt greater comfort that they would be paid for work undertaken.

Customer supplied contractors

If customers had an existing relationship with a contractor, PowerStream allowed them to use this contractor to undertake the install. PowerStream referred to these contractors as "preferred contractors". Preferred contractors undertook 130 projects. In most cases, it was the contractor who approached PowerStream and asked whether one of their customers would be eligible for the program. PowerStream provided information on what measures were eligible, and reviewed the contractor's proposed billings for reasonableness.

PowerStream required preferred contractors to provide proof that they were licensed to do the work, provided overview of their installs,

including undertaking quality assurance visits at all sites where they undertook installs.[8]

The 'preferred contractor' stream allowed additional contractors to become familiar with the program, and increased market knowledge of retrofit measures and their appropriate use.

Contractors approached PowerStream to become 'preferred contractors'. PowerStream did not market the program directly to contractors.

Customer satisfaction with installs

Despite some minor issues, most customers who completed the installation phase were satisfied with the process. Figure 2 below provides a breakdown of customer satisfaction level based on survey responses from 88 customers who completed the installation phase. However, these satisfaction levels are somewhat lower than what PowerStream has seen for other services it provides, where annual customer satisfaction surveys have seen a satisfaction level of 86% to 88%.

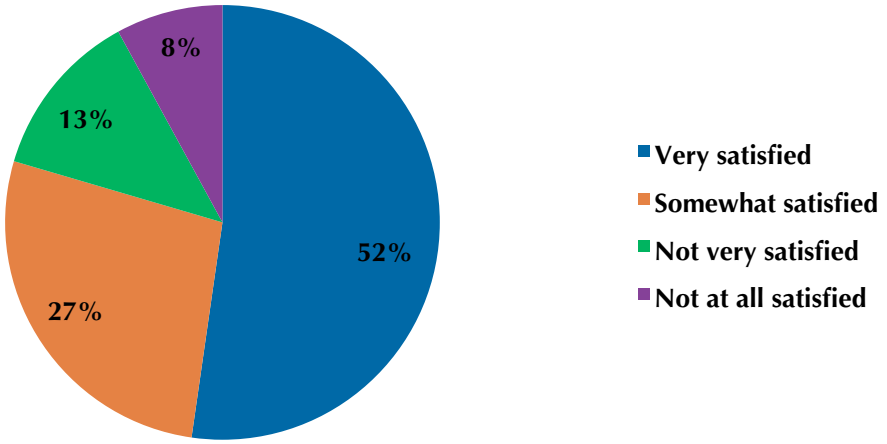

Figure 2 Satisfaction level of survey respondents who completed the installation phase

Reasons for dissatisfaction include: work not being completed as promised, contractor did not have the proper parts, the work took longer than expected, contractor was in a rush or did not keep the appointment, and the customer was not convinced that there are any real savings.

PowerStream had concerns with some aspects of the audit early in the program, and took steps to improve customer satisfaction.

[8] The intensity of QA/QC checks can be expected to decrease as PowerStream becomes more comfortable with the contractor, and the contract becomes more familiar with the program and PowerStream's expectations.

Table 8 below provides a summary of how much respondents strongly agreed or agreed with the various aspects related to the installation phase. The remainder of respondents either disagreed, strongly disagreed or neither agreed nor disagreed. The table compares responses in early spring of 2014 to responses in the remainder of the program. It appears that efforts to improve customer satisfaction were successful.

Table 8 Reasons for satisfaction from survey respondents who completed the installation phase

Reason	Strongly agree / agree (May 2014)	Strongly agree / agree (March 2015)
I was able to schedule a time for the installation that was convenient for me.	83%	88%
The Installer arrived at the scheduled time.	83%	97%
The Installer made an effort to ensure that the installation did not disrupt my business operations.	83%	91%
The Installer's work was completed in a professional manner.	78%	82%
I was given the opportunity to express my views on which equipment I preferred to be retrofitted.	70%	62%
The Installer was able to help me with any questions I had regarding the equipment in my facility.	70%	82%
The Installer clearly stated which equipment would be retrofitted, and provided suitable reasoning.	69%	82%
The Installer had all the necessary equipment to complete the retrofit.	69%	76%

As new contractors were brought into the program, PowerStream auditors worked closely with them during initial installs, and emphasized the importance of customer service to increase customer satisfaction.

Another indicator of satisfaction is the referral rate. 64% of survey respondents indicated that they have recommended the BRI program to business colleagues. Of those who have not recommended the program to a business colleague (yet), 63% said it was somewhat (33%) or very (29%) likely that they would recommend the program to a business colleague. A similar finding resulted from questions during QA/QC visits of 333 businesses: 89% of participants said they would recommend the program to colleagues.

Early in the program, the pace of installs was much slower than planned. Some of the obstacles to a faster installation rate included difficulties in contracting with qualified installers, stocking the technology/equipment to be installed, and maintaining sufficient inventory on hand to address the widely varying technologies and situations encountered in the field. Early in 2014, PowerStream began

to receive inquiries from additional contractors about the program, and from distributors interested in carrying inventory of measures used in the program. These are positive signs.

Among the steps that PowerStream took to improve the pace of installations are:

- Constant monitoring of the rate of installation, the value of measures installed (including relative to what was identified in the initial audit), and close communication with the contractor engaged to deliver the program.
- Changes to the installation protocol, to integrate the assessment and installation phases, and attempting to ensure installer's vehicles have an extensive inventory of potential measures.
- Exploring different contractor payment models to explore whether the contractor's and the program's objectives can be aligned.
- Discussions with additional equipment distributors about their ability and willingness to stock the technology measures required by the program.
- Providing additional training to auditors (e.g. by shadowing installers) so that they have a better ability to identify potential savings.

These steps were effective in increasing the pace of installations.

Incentives

PowerStream offered a maximum incentive of $2,500 per facility. The average installation had a cost of $1,300 and 144 of the 1032 (14%) of facilities retrofitted received $2,400 or more. 59 of those 144 (41%) facilities went beyond the $2,500, using their own money.

Contractors have suggested that the fixed incentive level creates problems for both smaller and larger customers:

- Smaller customers have been disappointed to find that the upgrades for which they were eligible were less than the $2,500 that it was suggested they could receive.
- Larger customers were unable to implement all of the measures that they might have if the incentive had been higher.

Contractors also advised that most customers eligible for the program would be unwilling to undertake these measures of their own accord, and want to see savings before they act. For example, they would like to see whether the initial retrofits result in savings before implementing additional measures at their own cost.

Recent Energy Action Plans are more cautious about the suitability of customer equipment for retrofit.

In light of the percentage of participants exceeding the $2,500 threshold, and the fact that 40% of those who did paid for additional

measures to be implemented, we do not see a compelling reason to change the incentive structure.

Participant agreement

Partway through the program, an important change was made to the participant agreement, allowing payment to go directly to the contractor, rather than requiring the incentive to go to the participant, and then having the participant pay the contractor. Contractors saw this as an important change: increasing their comfort with the program and willingness to undertake retrofits.

Quality assurance / quality control visit

Upon completion of the audit and installation, from late 2013 to early 2015, PowerStream conducted quality assurance / quality control (QA/QC) visits to a sample of participating facilities (333 businesses). The purpose of the visits was to collect information for EM&V and reinforce participants' confidence in the program. QA/QC visits were given to projects where customers had expressed concern or disappointment with the install, at all sites where certain contractors did the install, and at a random sampling of other sites.

PowerStream's auditors made the QA/QC visits. The results were documented on a QA/QC Checklist. The Checklist provided a means to capture the auditor's assessment of the adequacy of the install undertaken, some information on the customer's satisfaction or concerns, and to identify follow-up actions.

The checklist evolved over time, though we were surprised to notice that some of the areas that had been particular areas of concern in earlier QA/QC visits were removed from the checklist, though auditors would still comment on some of these. In particular, the three areas removed from the checklist were "Did the contractor complete all reasonable and eligible measures to maximise the incentive?", "Did the subcontractor leave the Participant details of the warranty?", and "Did the subcontractor leave the emergency contact information in case of premature equipment failure?". In the earlier QA/QC visits, these received a no answer 71%, 82% and 82% respectively of the time.

Corrective actions could have been of two types: specific to the particular customer (e.g. this customer needs to be sent the warranty information), and more general to the program (e.g. contractors need to ensure that customers receive warranty information). It is not clear how these corrective actions were tracked and how it was ensured they were completed.

Overall, thirty-three percent of QA/QC reports indicated there were additional retrofit opportunities that were not addressed. This is an improvement over the initial QA/QC visits in 2014, where 71% of the 17 sites visited did not have all retrofit opportunities addressed. One common reason reported was that contractors did not have enough equipment available at hand.

When all retrofit opportunities were implemented, 86% of customers positively rated their involvement in the program. Meanwhile, only 60% of customers positively rated their experience when retrofit opportunities were not maximized.

Sixteen percent of visits reported problematic installed measures and 26% of those entries reported corrective actions however, all but one had not documented follow-up updates.

Although QA/QC was targeted towards customers who had issues with their general contractor, the most frequent rating of the program was "Satisfied". When asked to rate the program on a scale from 1 to 5, more than half gave it a 5, and the average score was 4.1.

Evaluation, monitoring and valuation

In support of the impact analysis, monitoring of before and after energy use was undertaken at 60 facilities and a total of 297 measurement locations. Facilities to be monitored were identified by PowerStream, and were selected at random, though groups of five facilities within close proximity were chosen at a time, to reduce travel requirements. One consequence of the random selection process was that anti-sweat heaters, for which there were only two installations even though they are expected to be the measure with the greatest savings were not monitored in the program.

The plan was that equipment to be retrofitted would be monitored for two weeks before and two weeks after installation to measure changes in energy use that could be attributed to the measure. Measurements were sometimes for longer periods, depending on the scheduling of the installation of retrofit measures, and of the data logging equipment installation and removal.

Major process issues and suggestions that emerged during the program included:

- The importance of having monitoring and valuation persons meet with installers early in the program as experts in data monitoring are not likely to be experts in refrigeration systems. Installers and those responsible for monitoring met at a few sites early in the project to gain familiarity.
- Changes were made to the audit report to assign numbers to refrigeration units to track which units were monitored, which received retrofits, etc.
- Challenges with scheduling installation of data meters and installations meant that monitoring sometimes had to occur for more than the planned 4 plus weeks to get measurements for two weeks after install. In part due to the slow pace of installs early in the program, the monitoring team sometimes encountered customers who forgot they were part of the program; maintaining communication with participants is also important.

- The monitoring team needed to have good communication with others on the program team, including auditors who provided hints on what units were likely candidates for retrofit, with installers on whether it was worth monitoring particular units (e.g. would retrofits be possible on refrigeration units designed for foreign markets?), and with program administration staff on concerns expressed by customers, or equipment in poor repair.

An important source of information to support both the process and impact parts of the evaluation was surveys of participants. To undertake these, contact information collected by PowerStream was used. Even though we offered responders an incentive of $50 for completing the survey, we were somewhat disappointed by the response rate, though it was typical for Environics is seeing for business surveys (15.5% for the Feb-Mar 2015 survey), a higher response might be realized if customers are advised as part of the participant agreement that they are required or requested to assist in an evaluation of the program if chosen to respond to a survey, or if a higher incentive could be offered.

Given the wide variety of sizes and other characteristics of cooling equipment, the OPA has not given prescriptive values for the measures that PowerStream included in the BRI program, but rather provides "Quasi-Prescriptive" measures that require a calculation based on certain characteristics of the equipment. PowerStream does not appear to be collecting information on the independent variables for these calculations (e.g. compressor rating, length or number of doors for display cases). Some of these might be looked up based on the manufacturer and model number, which *is* requested in the refrigeration inventory template.

Overall program administration

Although not a step in the program *per se*, PowerStream has also developed thorough tools and process for managing the program, including: a comprehensive database on program participants that tracks both information about the participants as well as their status within the program (the CRM). In addition, when installations were lagging audits, it produced a weekly 'dashboard' reports on progress in the preceding week, issues that require resolution, and their urgency. Once these lags disappeared, the dashboard report was no longer deemed necessary and was discontinued.

PowerStream continued to make improvements to the program administration as needs or opportunities arose.

Impact evaluation

In this section we consider various components of the impact of the program, including measures of the energy savings and demand reductions from activities undertaken as part of the program. The discussion takes into account:

- Gross prescriptive energy savings and demand reductions
- Measured gross energy savings and demand reductions at a sample of facilities
- Net energy savings and demand reductions
- Other impacts of the program.

Gross prescriptive energy savings and demand reductions

In PowerStream's application to the Ontario Energy Board for the program, it provided estimated energy savings and demand reductions for the measures that it intended to introduce to the market. Estimated saving by measure were assembled based on a review of the literature.

Although not originally anticipated to be a measure, contractors identified opportunities to replace standard incandescent bulbs (for example, in walk-in coolers or freezers) with A19 LED bulbs. The prescriptive value for these was taken from the values in the IESO 2014 Measures and Assumptions List for restaurants (which have the lowest savings from these types of bulbs).

The 'prescriptive' values are presented in Table 9.

Applying these unit savings by measure to the number of measures installed through the program yields the gross prescriptive energy savings and demand reductions. These are shown in Table 10.

Table 9 Prescriptive measure characteristics as presented in PowerStream application for the Business Refrigeration Incentives program

Measure	Annual demand savings, gross kW	Gross energy savings, kWh	Source	Lifetime	Source
Anti-sweat heater control - Cooler	0.51	1,250	a	12	f
Anti-sweat heater control - Freezer	0.51	1,250	a	12	f
Strip curtains - Walk-in cooler	0.43	486	a	5	g
Strip curtains - Walk-in freezer	0.57	642	a	5	g
Night curtains on cases	0.00	888	b	5	g
Clean condensor coils - Cooler	0.05	438	c	1	g
Clean condenser coils - Freezer	0.18	1,576	c	1	g
ECM fan motor upgrade	0.09	1,202	d	15	g
LED case lighting	0.04	367	e	15	e

Sources:
a Greensaver, 2007. Direct install small business pilot interim report for Ontario Power Authority
b BC Hydro 2012. Hydro Product Incentive Program Calculator
c Clean Air Foundation, 2006. Ontario Convenience Store Association Report for Conservation Bureau
d Fisher Nickel, 2006. Evaporator fan motor energy monitoring report for Pacific Gas & Electric
e Lighting Solutions, 2012. On-site evaluation of convenience store refrigeration retrofits
f Bonneville Power Administration, 2012. BPA EnergySmart equipment terms and conditions
g Ontario Power Authority, 2010. OPA's measures and assumptions list

Table 10 Gross energy savings and demand reductions based on prescriptive values

Installs and gross savings in 2013

Measure	# installed in 2013	Gross prescriptive demand savings per unit (kW/unit)	Gross first year prescriptive energy savings per unit (kWh/unit)	Total estimated first year gross demand reduction (kW)	Total estimated gross first year energy savings (kWh)	Total estimated gross energy savings through 2014 (kWh)
Anti-sweat heater control - Cooler		0.51	1,250			
Anti-sweat heater control - Freezer		0.51	1,250			
Strip curtains - Walk-in cooler	2	0.43	486	0.87	972	972
Strip curtains - Walk-in freezer	1	0.57	642	0.57	642	642
Night curtains on cases			888			
Clean condensor coils - Cooler	43	0.05	438	2.15	18,834	18,834
Clean condenser coils - Freezer	3	0.18	1,576	0.54	4,728	4,728
ECM fan motor upgrade	46	0.09	1,202	4.19	55,292	110,584
LED case lighting	23	0.04	367	0.87	8,441	16,882
LED A19 bulbs		0.04	210			
Total	**118**			**9.19**	**88,909**	**152,642**

Installs and gross savings in 2014

Measure	# installed in 2014	Gross prescriptive demand savings per unit (kW/unit)	Gross prescriptive first year energy savings per unit (kWh/unit)	Total estimated first year gross demand reduction (kW)	Total estimated gross first year energy savings (kWh)	Total estimated gross energy savings through 2014 (kWh)
Anti-sweat heater control - Cooler	2	0.51	1,250	1	2,500	2,500
Anti-sweat heater control - Freezer		0.51	1,250			
Strip curtains - Walk-in cooler	684	0.43	486	297	332,424	332,424
Strip curtains - Walk-in freezer	353	0.57	642	202	226,626	226,626
Night curtains on cases	59		888		52,392	52,392
Clean condensor coils - Cooler	3,667	0.05	438	183	1,606,146	1,606,146
Clean condenser coils - Freezer	1,233	0.18	1,576	222	1,943,208	1,943,208
ECM fan motor upgrade	3,432	0.09	1,202	312	4,125,264	4,125,264
LED case lighting	2,367	0.04	367	90	868,689	868,689
LED A19 bulbs	718	0.04	210	29	150,421	150,421
Total	**12,515**			**1,337**	**9,307,670**	**9,307,670**

Installs and gross savings over the life of the program

Measure	# installed over lifetime of program	Gross prescriptive demand savings per unit (kW/unit)	Gross prescriptive first year energy savings per unit (kWh/unit)	Total estimated gross demand reduction (kW)	Total estimated gross energy savings through 2014 (kWh)
Anti-sweat heater control - Cooler	2	0.51	1,250	1	2,500
Anti-sweat heater control - Freezer		0.51	1,250		
Strip curtains - Walk-in cooler	686	0.43	486	298	333,396
Strip curtains - Walk-in freezer	354	0.57	642	203	227,268
Night curtains on cases	59		888		52,392
Clean condensor coils - Cooler	3,710	0.05	438	186	1,624,980
Clean condenser coils - Freezer	1,236	0.18	1,576	222	1,947,936
ECM fan motor upgrade	3,478	0.09	1,202	316	4,235,848
LED case lighting	2,390	0.04	367	91	885,571
LED A19 bulbs	718	0.04	210	29	150,421
Total	**12,633**			**1,346**	**9,460,312**

PowerStream records in its database the date the install was completed, and the work order showing what specific measures were undertaken or installed. Based on these prescriptive values, the overall gross savings from the program through 2014 are 9.5 GWh and 1.3 MW of peak summer demand.

Gross energy savings from the audit component of the program

In addition to these savings, there is anecdotal information about savings that occurred as a result of the audits themselves. For example, one audited facility was found to have an inappropriately programmed thermometer and once this was corrected, there were significant reductions in overall electricity use.

One-third of those surveyed indicated that they had implemented non-refrigeration measures that had been recommended by the audit, including the following types of measures: lighting (36%), switching equipment off when not in use or at night (21%), minimizing door opening, installing curtains, or insulation (21%), improving maintenance and cleaning (7%) and others (7%).[9]

Unfortunately, there is not a practical way to identify all measures taken as a result of the audits, and to report on energy savings (or demand reductions) associated with them.

Verified gross energy savings

Monitoring was undertaken of 60 facilities at 297 measuring points over the period between September 2013 and December 2014 to measure actual energy savings that were realized from measures installed in these units. To measure actual savings, a data logger was placed on units at randomly selected facilities for approximately five-week periods consisting of two weeks before installs were undertaken, a week during installs, and two weeks after measures were installed.

The measurement points were determined on a system-basis, rather than on a facility basis. Each refrigeration system was measured individually, with a boundary defined as including the energy into the refrigeration system. For greater clarity, the measurement boundary did not include the interactive impact of the refrigeration system's impact on the facility's heating and cooling loads. In many instances, a participant location had more refrigeration systems than there were current transformers to measure them. In these instances, the refrigeration systems to be measured were selected based on the system's eligibility for the retrofits included in the program. If the technicians identified that a system would not be eligible (European motors, for example), then they did not select that system for measurement.

Each measurement point corresponds with one current transformer. Some refrigeration systems were assigned multiple measurement points, as appropriate to capture all of the energy. For example, stand-alone display coolers only had one measurement point, which was the power line feeding the unit. Walk-in coolers often have multiple measurement points, relating to the number of circuits feeding the unit; often including a compressor, another measurement point for the fans, and in some cases, a separate measurement point for the lights. In the instances where a walk-in cooler was fed by a three-phase compressor, there was a measurement point for each of the phases.

Each data logger took current measurements (in amps) at five-minute intervals. The voltage for each connection was measured as a spot-

[9] Although the question asked explicitly about *non*-refrigeration measures, the measures identified appear to include refrigeration measures.

measure at the time the data logger was installed, and it was assumed that it did not change substantially during the measurement period.

The total system energy consumption (kWh) was calculated as the aggregate current for the baseline and reporting periods respectively, multiplied by the system voltage. The savings are calculated by subtracting these two values, and normalizing for the length of time.

In instances where multiple retrofits were completed on one refrigeration system, the savings were divided and attributed to the various retrofits based on the observed energy patterns that relate to each of the retrofits, or based on which measurement point the savings were observed on. For example, an ECM evaporative fan motor on a walk-in cooler would show a reduction in the demand of the measurement point on the fan circuit, and would also show a reduction in the duty cycle of the compressor on the measurement point for the compressor, so both of these savings would be attributed to the evaporative fan motor replacement. If there was a condenser fan motor retrofit on this same system, it would present as a reduction in the demand of the compressor, because the compressor and condenser fan motor are on the same circuit however the condenser fan motor does not affect the duty cycle of the compressor.

A limitation of the methodology is that it does not include a measurement of the thermal loads on the refrigeration units, or account for variation in the thermal loads. As such, if a system realizes more use during the reporting period than the baseline period, the measurements may show an increased energy use in spite of effective energy conservation retrofits. The methodology also does not account for other behavioural changes, such as HVAC technicians doing repairs to the compressors during the measurement period without reporting them to the program operators.

One expects the actual measurements to deviate somewhat from the literature values for numerous reasons, including natural variation in the population of refrigerators (e.g. age, usage patterns, size, etc.), variation in the measures installed (e.g. capacity of motor, type of LED lamp, etc.) To account for this, actual observations are compared to expected savings, and the ratio of these is the 'realization rate'.

We were, however, surprised by how much variation was observed across the units measured, with a number of units using *more* electricity after measures were installed, or units with no measures installed were observed to use considerably less energy. Although in some cases there are clear explanations for why this might be, in others there is no obvious reason.

In many cases, multiple measures were installed on the same units. By examining specific changes in load over time, e.g. as the compressor came on and went off, or as the business opened or closed, Mindscape estimated how much of the observed changes in energy use could be attributed to individual measures. In some cases, it was also possible to exclude changes that were clearly unrelated to any of the measures installed in the unit. Based on 5 minute observations of current,

average changes in demand were estimated, and from these, annual energy savings were calculated.

Demand reductions during peak summer and winter periods were calculated using the methodology in the OPA's 2011 Quasi-Prescriptive Measures and Assumptions report.[10]

Savings measured in the sample, and extrapolated to the population of measures are presented on Table 11.

As the tables make clear, measured savings differ from those values from the literature. The ratio of actual to predicted values may be referred to as the realization rate. The overall realization rate for the program is 64%. Unit savings are significantly lower than expected for LED display lights, and condenser coil cleaning.

[10] Mindscape also examined actual changes in demand over the 1:00 pm – 7:00 pm weekday periods that relate to summer peak times, and the 6:00 pm to 8:00 pm weekday periods that make up winter peak times and concluded that the relationship between average and peak demands suggested by the OPA Quasi-Predictive Methods and Assumptions report were reasonable.

Table 11 Installs and verified gross savings

Installs and verified gross savings 2013

Measure	# installed in 2013	Annual gross energy savings (kWh/unit)	Annual gross verified winter peak demand savings (kW)	Annual gross verified summer peak demand savings (kW)	Total verified first year energy savings (kWh)	Total verified energy savings through 2014 (kWh)
Anti-sweat heater control - Cooler						
Anti-sweat heater control - Freezer						
Strip curtains - Walk-in cooler	2	480	0.16	0.15	960	1,921
Strip curtains - Walk-in freezer	1	548	0.09	0.09	548	1,096
Night curtains on cases		1,380				
Clean condensor coils - Cooler	43	289	1.43	2.08	12,436	12,436
Clean condensor coils - Freezer	3	243	0.08	0.12	730	730
ECM fan motor upgrade	46	1,007	5.26	5.41	46,316	92,632
LED case lighting	23	190	0.76	1.05	4,372	8,744
A19 LED bulbs		133				
Total	**118**		**7.80**	**8.91**	**65,363**	**117,559**

Installs and verified gross savings 2014

Measure	# installed in 2014	Annual gross energy savings (kWh/unit)	Annual gross verified winter peak demand savings (kW)	Annual gross verified summer peak demand savings (kW)	Total verified first year energy savings (kWh)	Total verified energy savings through 2014 (kWh)
Anti-sweat heater control - Cooler	2	1,250	0	0	2,500	2,500
Anti-sweat heater control - Freezer						
Strip curtains - Walk-in cooler	684	480	55	52	328,458	328,458
Strip curtains - Walk-in freezer	353	548	33	31	193,461	193,461
Night curtains on cases	59	1,380			81,402	81,402
Clean condensor coils - Cooler	3,667	289	122	177	1,060,540	1,060,540
Clean condensor coils - Freezer	1,233	243	35	50	300,213	300,213
ECM fan motor upgrade	3,432	1,007	393	404	3,455,583	3,455,583
LED case lighting	2,367	190	79	108	449,915	449,915
A19 LED bulbs	718	133	13	13	95,360	95,360
Total	**12,515**		**730**	**836**	**5,967,432**	**5,967,432**

Installs and verified savings over the life of the program

Measure	# installed over lifetime of program	Annual gross energy savings (kWh/unit)	Annual gross verified winter peak demand savings (kW)	Annual gross verified summer peak demand savings (kW)	Total verified energy savings through 2014 (kWh)
Anti-sweat heater control - Cooler	2	1,250	0	0	2,500
Anti-sweat heater control - Freezer					
Strip curtains - Walk-in cooler	686	480	56	53	330,379
Strip curtains - Walk-in freezer	354	548	33	31	194,557
Night curtains on cases	59	1,380			81,402
Clean condensor coils - Cooler	3,710	289	124	179	1,072,977
Clean condensor coils - Freezer	1,236	243	35	50	300,943
ECM fan motor upgrade	3,478	1,007	398	409	3,548,215
LED case lighting	2,390	190	79	109	458,658
A19 LED bulbs	718	133	13	13	95,360
Total	**12,633**		**738**	**845**	**6,084,991**

Note: prescriptive values were used for anti-sweat heater controls because no units were measured

Net energy savings and demand reductions

Net energy savings and demand reductions are estimated by applying a "net to gross factor" that may take into account a number of components, most typically spillover and free riders.

Spillover

"Spillover" measures impacts of the program, beyond those directly associated with the measures installed by the program. In the context of this program, these might include four types of impact:

- Measures implemented by participants that are beyond what is covered by the $2500 incentive offered by the program.
- Participation in other saveONenergy programs, encouraged by their participation in the BRI Program.
- Measures taken by participants because of their experience with the program, but not measured by the program (and not part of another saveONenergy program. For example, a participant choosing to implement energy efficiency measures in other, non-refrigeration parts of his or her facility.
- Measures taken by non-participants because of the existence of the program but not measured by the program. For example, non-participants may hear about the program and implement some of the measures on their own, even though they decide not to participate in the program.

Some participants (59) did install measures that cost more than the maximum $2,500 incentive. Although technically spillover, we did not have information on which specific measures were above and beyond the incentive payment, but we did capture the savings from these measures in Table 11. In the cost effectiveness analysis that follows, the cost of these measures is not attributed to PowerStream.

The vast majority (92%) of survey respondents said they were likely to participate in other saveONenergy programs, with most of those (68%) saying they were very likely to. Savings from their participation in these programs will be captured in the evaluation of those programs, and is not a direct benefit of this program. Rather, this program may be seen as a marketing tool for those other programs (and them for the BRI program).

A significant number (92%) of survey respondents indicated they expect to implement other energy saving measure in their facility in the future, as a result of having participated in the BRI program. Of those, 59% said they were 'very likely' to, and 33% said they were 'somewhat' likely to. Unfortunately, responses were not specific enough to measure the savings likely to accrue.

We also asked installers whether they are seeing customers who have heard about the program but who are outside PowerStream's service territory requesting the measures, or if they are getting requests for additional maintenance or equipment upgrade from program participants. There is some anecdotal information suggesting a small amount of spillover, but it is not practical to attribute specific saving amounts.

Free riders

Free riders are persons who would have adopted the technologies or behaviours promoted by the program even if the program did not exist. The free rider rate can only be estimated, using a number of methodologies. For this project, the free ridership is estimated based on responses to questions to the program participants.

We estimate the free rider rate based on responses to questions related to whether the participants had plans to undertake an audit or upgrade their refrigeration system prior to hearing about the program, whether the program made it possible for them to implement the measures earlier than they otherwise would have, and how important energy and energy efficiency is to their overall business plans. We also asked them what about the program was appealing to them.

Depending on their answers to the questions, they are identified as a free rider, a partial free rider, or not a free rider.

Most respondents (72%) indicated that they had no plans to upgrade their refrigeration equipment in advance of hearing about the BRI program. Of the remaining 24%, only about 5% indicated they had specific plans to do so. In the second survey, conducted in February and March 2015, we also asked them how much they had allocated in their budgets to making these upgrades, and none had allocated anywhere near the $2,500 offered by the BRI program; one respondent said $500, and one said $0. Of those with plans, or considering upgrading, we asked if the program allowed them to upgrade sooner than they otherwise would have, and 92% agreed it had. From these responses, it is clear that the free rider rate is very low. If we consider that of the 5% with specific plans, the half who said the program did not allow them to implement measures earlier than they otherwise would have are free riders, and that about half of those who said it did allow them to implement earlier would have anyway, the free rider rate works out to 3.41% (percentages above are approximate). This ignores that those who had allocated budgets (~2.3%) had allocated funds far lower than offered by the program.

Curiously, a full 66% of respondents said energy was very important to them, and the remaining 34% said it was important. No respondents said it was not important to them.

In addition to these considerations, which speak to the *intent* of participants, we also considered the availability of individual measures, and whether or not participants likely would have had the *ability* to implement these measures in the absence of the program.

Some program contractors found it difficult to obtain some of the measures, and the difficulty of acquiring and maintaining the technologies was one of the constraints on the number of installs completed, particularly early in the program. These suggest it would have been very difficult for participants to install these measures in the absence of the program, and the free ridership was decreased to reflect this difficulty.

We also considered the extent to which the measures are already being implemented in the marketplace. We surveyed installers involved in the program on the availability of the measures, and on whether or not they are seeing the measures installed in the field.

There was considerable variation in their responses for individual measures, with some installers considering the same measures (e.g. anti-sweat heater controls) almost impossible to source, and others finding it very easy. Overall survey results are presented in Table 12.[11]

Table 12 Installer ratings of difficulty of finding measures

	Rating of 1 (Impossible) - 5 (Very easy)						
Measure	Impossible	Very difficult	Somewhat difficult	Fairly easy	Very easy	**Response Count**	**Weighted Average**
ECM fan motor upgrade		2	3	2	1	8	3.25
LED case lighting		1	2	2	2	7	3.71
Strip curtains - Walk-in cooler				4	3	7	4.43
Strip curtains - Walk-in freezer				4	3	7	4.43
Clean condenser coils - Freezer			1	2	4	7	4.43
Clean condensor coils - Cooler			1	2	4	7	4.43
Night curtains on cases			2	2	1	5	3.80
Anti-sweat heater control - Cooler	1		4		1	6	3.00
Anti-sweat heater control - Freezer	1		4		1	6	3.00

The weighted scores were converted into a percentage and multiplied by the free rider rate above to determine the adjusted free rider rate, taking into account availability. The results and the associated net to gross ratio (NTGR) are shown in Table 13.

[11] The specific question asked was "How difficult would it be for a refrigeration contractor not involved in the BRI program to obtain the retrofit technology measures associated with the BRI program?"

Table 13 Adjusted free rider rates and net to gross ratio by measure (NTGR)

Measure	Contractor rating of ease of obtaining measures (1–5)	Ease of obtaining	Adjusted free rider	NTGR
ECM fan motor upgrade	3.250	0.563	0.019	0.981
LED case lighting	3.714	0.679	0.023	0.977
Strip curtains - Walk-in cooler	4.429	0.857	0.029	0.971
Strip curtains - Walk-in freezer	4.429	0.857	0.029	0.971
Clean condenser coils - Freezer	4.429	0.857	0.029	0.971
Clean condensor coils - Cooler	4.429	0.857	0.029	0.971
Night curtains on cases	3.800	0.700	0.024	0.976
Anti-sweat heater control - Cooler	3.000	0.500	0.017	0.983
Anti-sweat heater control - Freezer	3.000	0.500	0.017	0.983

Applying this NTGR to the gross savings from Table 11 yields the net energy and demand savings shown on Table 14.

Table 14 Net energy savings and demand reductions from the program

	Peak winter demand (kW)	Peak summer demand (kW)	In year energy savings (kWh)	Cumulative savings through 2014 (kWh)
2013				
Prescriptive savings	-	9	88,909	152,642
Verified savings	8	9	65,363	117,559
Realization rate		0.97	0.74	0.77
NTGR	0.98	0.98	0.98	0.98
Net savings	8	9	64,074	115,362
2014				
Prescriptive savings	-	1,337	9,307,670	9,307,670
Verified savings	730	836	5,967,432	5,967,432
Realization rate		0.63	0.64	0.64
NTGR	0.98	0.98	0.98	0.98
Net savings	715	818	5,842,824	5,842,824
Overall program				
Prescriptive savings	-	1,346		9,460,312
Verified savings	738	845		6,084,991
Realization rate		0.63		0.64
NTGR	0.98	0.98		0.98
Net savings	722	827		5,958,186

Other impacts of the program

As outlined on the logic model, there were a number of immediate or long-term outcomes that the program was hoping to achieve, in addition to gaining participants, and the energy savings and the demand reductions discussed above. These include:

- Participant awareness of other energy efficiency opportunities in their facilities and other province-wide CDM programs that they may be eligible for
- Participants discuss their free assessments with acquaintances
- There is an increasing market for commercial energy efficiency products and services.

Participants were asked about these issues in the participant surveys, and the respondents' results are presented in Table 15.

Table 15 Other impacts based on survey respondents

Other impacts of the program	Number of persons responding	Number indicating yes	
Awareness			
Looked at the provided Energy Action Plan	125	42%	
Plan to look at the provided Energy Action Plan	125	22%	
Checked usage on-line after the audit	125	14%	
Implemented non-refrigeration measures recommended in the audit	43	33%	
Became aware of opportunities to save energy	80	88%	a
Likely to implement additional energy saving measures	88	92%	b
Likely to participate in other saveONenergy programs after BRI	88	92%	b
Participated in other saveONenergy programs after BRI	88	19%	
Recommended program to colleagues			
Already recommended	88	64%	
Likely to recommend (those who haven't already)	32	63%	b

Notes: a. Respondents answered Strongly Agree or Somewhat Agree
b. Respondents answered Very Likely or Somewhat Likely

In addition to these impacts there were also impacts in the marketplace and to the capacity of the sector to supply and install these measures from the involvement of three contractor groups, involving multiple installers, and ten 'preferred contractors' who were selected by customers to do their installs. PowerStream staff and installers also engaged in discussions with multiple equipment distributors and manufacturers to encourage them to make the measures more readily available in the Ontario market.

Cost-effectiveness evaluation

The Ontario Energy Board expects that programs offered by LDCs will be cost-effective, as measured by various tests prescribed by the Ontario Power Authority, and in particular the Total Resource Cost test (TRC) and the Program Administration Cost test (PAC). A description of these and how they are calculated is provided in the OPA's *Cost Effectiveness Guide*.[12]

The TRC test compares anticipated benefits (in avoided energy use and demand) over the lifespan of the measure against the costs of the program (technology and administration) over its life. All dollars are expressed in present value. The PAC test considers only costs borne by the LDC for incentives and administration.

The benefits associated with the net energy savings and net demand reductions identified above, over the weighted average lifespan of the measures installed have a value of almost $3.3 million as expressed in 2013 dollars.

The total costs for the program from 2013 to 2015 is $2.6 million in nominal dollars. This value includes costs associated with customer incentives to buy equipment, program administration (fees), legal, shared services, equipment, labour, EM&V, and marketing. The breakdown of these costs is presented in Table 16.

Table 16 Cost breakdown for Business Refrigeration Incentives Program 2013 -2015 (nominal dollars)

Cost	2013	2014	2015	Total
Incentives paid by Powerstream	$12,314	$1,328,524		$1,340,838
Participant based funding	$900	$74,450		$75,350
Program (Labour, EM&V, Marketing, etc.)	$416,783	$677,416	$60,503	$1,154,702
Total PowerStream costs	$429,997	$2,080,390	$60,503	$2,570,890
Additional equipment cost borne by participants		$13,763		$13,763
Total program cost	$429,997	$2,094,153	$60,503	$2,584,653

The net TRC benefits for the three months the program was offered in 2013 are -$390,000, suggesting that the program was not cost effective in 2013. However, with the increasing number of installs in 2014, the net TRC benefits for 2014 are $1.21 million, and the overall net benefits for the 15 months of the program are $842 thousand. Expressed as a ratio, the TRC test results were 0.09, 1.58, and 1.34 for 2013, 2014, and the overall program, respectively.

A summary of the cost effectiveness evaluation is presented in Table 17.

[12] Ontario Power Authority. 2010. *Conservation and Demand Management Cost Effectiveness Guide*. Available at http://www.powerauthority.on.ca/sites/default/files/OPA%20CDM%20Cost%20Effectiveness%20Test%20Guide%20-%202010-10-15%20F.pdf

Table 17 Overall program cost effectiveness

	2013	2014	Overall
Total Resource Cost (TRC) test			
Benefits ($)	$39,580	$3,289,220	$3,328,800
Costs ($)	$429,767	$2,083,766	$2,486,430
Net benefits ($)	-$390,187	$1,205,454	$842,370
Benefit-cost ratio	0.09	1.58	1.34
Program Administrator Cost (PAC) test			
Benefits	$39,580	$3,289,220	$3,328,800
Costs	$429,997	$2,097,752	$2,527,749
Net benefits	-$390,417	$1,191,468	$801,051
Benefit-cost ratio	0.09	1.57	1.32
Levelized Unit Energy Cost (LUEC)			
Benefits (MWh)	608	50,209	50,816
Costs ($)	$429,997	$2,097,752	$2,527,749
Levelized Unit Energy Cost ($/MWh)	$707.8	$41.8	$49.7

Note: Dollar amounts are in constant 2013 dollars.

There were relatively few participants (59) who undertook installs above and beyond the $2500 direct install maximum, so the PAC results are quite similar to the TRC results.[13] For almost all participants, the program paid the full cost of the install, thus the costs under the PAC are somewhat higher as incentives were paid to the small number of free riders that is estimated.

The relatively poor results in 2013 reflect significant program initiation costs that were incurred in 2013. As discussed in the participation section above, only six installations were completed, though 269 participants had registered, 217 participants had signed agreements, and 234 field audits had been completed.

The OPA's cost effectiveness guide recognizes that the sort of situation that occurred in 2013 is typical of multi-year programs, and suggests annual reporting for information purposes, but that the overall cost effectiveness assessment should be based on the full duration of the program. By this measure, the program is cost-effective.

[13] The Total Resource Cost (TRC) test includes all technology costs; so customer-incurred costs for measures installed beyond the $2500 are included. Also for the TRC, technology costs are *not* included for free riders, as these would have been incurred even if the program did not exist. In contrast, the Program Administrator Cost (PAC) test does *not* include costs associated with measures beyond the incentive offered, but incentives paid to free riders are included in the cost. This explains why costs are slightly different for the two tests in Table 17.

Conclusions and recommendations

PowerStream's Business Refrigeration Incentives (BRI) program provides several benefits to program participants, each of which is valued by the majority of participants:

- An on-site audit of energy use and major energy using equipment and identification of steps that the customer can take to reduce energy use
- A turnkey installation of up to $2500 worth of energy saving refrigeration equipment.

The program is designed to overcome the barriers to greater energy efficiency in facilities that have significant energy demand for refrigeration.

The program was initiated in September 2013 and ran through 2014. PowerStream has included the program in its plan for the *Conservation First* framework that runs from 2015 to 2020.

Process findings

The process being used for the program appears to have worked well, and there is a good level of customer, contractor and program administrator satisfaction with the program. The vast majority of customers say they have or would recommend the program to colleagues. Table 18 provides a summary of the process findings, as reported by the various actors in the program.

PowerStream made incremental changes to the program throughout the program to address barriers to successful implementation, as they were identified.

Direct marketing through incoming and outgoing calling was the primary entry point for persons participating in the program, and is where the greatest effort was extended. This approach appears to have been effective. PowerStream realized 86% of its target participants, even though the program started late, with more participants in 2014 than originally planned for.

The initial telephone assessment process was effective at assessing eligibility and interest of prospective participants. There is a very low number (3%) of participants dropping out of the program once they pass this screen. Some installers persuaded facility owners or managers near where they were doing installs to apply for the program, based on cold calling at their door.

Table 18 Summary of process findings

Program element	PowerStream	Contractors/ installers	Participants	EM&V team
Marketing	Deemed successful -- exceeded expectations after start-up	Suggested more face-to-face sales and some did on their own	Report high level of satisfaction with information provided and customer service	Recommend more testing of face-to-face marketing and direct marketing to channel
Audit	Deemed very important. Acknowledge that audits have become more general and of use primarily to PowerStream and auditors, not customers	Used information from the audits to prepare for installation, but generally did not find the audit necessary or useful	High satisfaction with audit	Recommend returning to audits providing customer with more information on overall energy saving opportunities, including behavioural actions
Energy Action Report	-	Some concern that unrealistic customer expectations were created (partly addressed through qualifiers in recent reports and the "Health Check")	Most deemed EAP useful, understandable and appropriate level of detail.	Note that recent EAPs lack detail for customers, and do not document recommended behavioural actions
Contractor involvement	Eager to involve more contractors, need quality assurance	-	High percentage see benefit of PowerStream finding contractor for them	Encourage broader involvement in the program to promote market change.

Program element	PowerStream	Contractors/ installers	Participants	EM&V team
Assessment & install	QA/QC reports point to ultimate satisfaction with assessment & install but need for on-going monitoring	Emphasize value of "Health Check" report	Report high levels of satisfaction with installation.	QA/QC follow-up on audits will remain important as more contractors involved.
Incentives	-	Suggested variable incentive scale	Mostly no comment, though significant percentage said the $2500 was the reason for participating	No change recommended at this time
QA/QC	Consider important and useful	-	-	Recommend better documentation of follow-up actions
EM&V process	-	Need good communicatio n with installers to ensure effectiveness	-	Emphasize importance of communicatio n across actors. Recommend collecting input data required for quasi-prescriptive formulae.

Note: Blank cells do not necessarily mean the actor has no opinion on this element of the program. They were not asked about this element, and did not volunteer comments.

The audit is valued highly by program participants, and is important to building rapport between PowerStream and the participants. In theory, it should help participants to think about energy use comprehensively, not just about individual energy using parts of their business (like refrigeration). A high percentage of participants who responded to surveys indicated an intention to take other measures to reduce energy

use, and to participate in other saveONenergy programs. However, it has proven difficult to attribute specific energy savings to the audits, and they appear to have become less comprehensive (and consequently less useful to customers) over time.

After some initial challenges in keeping up the number of installs with the sign-ups and audits, problems related to difficulty carrying inventory, and having adequate number of installers were overcome, and the pace of installs in 2014 was greater than planned. In the end, PowerStream made use of multiple contractors and installers, including "preferred" contractors who came forward to PowerStream on behalf of their customers. An important innovation to the program was the introduction of the Health Check assessment of equipment that explains to customers when installs cannot be completed because of the state of their equipment, and what maintenance or repairs are required before the retrofits may be undertaken.

Quality assurance and compliance (QA/QC) visits were conducted at more than 300 facilities including facilities where problems with the install had been identified, facilities where installs were done by "preferred contractors" and a sample of other facilities. These visits were important to tracking the adequacy of installs, customer feedback, and the identification of corrective actions required, both specific to that customer and to the program as a whole.

Actual before and after monitoring was conducted on equipment at 60 customer sites to get 'real world' information on the performance of the measures. Facilities were chosen at random, and the process required good communication between the customer, PowerStream, auditors, installers and the data logging team to coordinate logistics, to identify what equipment to monitor, and to ensure that installs were done on a timely basis so that data logging equipment could be moved to the next site. The randomized nature of the selection process meant that no sites with anti-sweat heater controls – the measure with the greatest anticipated savings – were monitored.

Impact findings

By the end of 2014, there were 1,032 participants in the program.

As a result of the program, not only have more than 1,000 customers implemented measures to increase the efficiency of their refrigeration systems, but contractors in PowerStream's service territory have gained experience in installing retrofit measures, and in promoting these to their customers. In addition, PowerStream worked with equipment distributors to encourage them to stock retrofit technologies in the Ontario marketplace.

In spite of this success, the number of installs was below expectation due to a variety of challenges encountered early in the program. The

number of installs in 2014 was 22% higher than originally planned. In 2013, there were significantly fewer installations than had been planned for reasons including: the late start of the program, challenges in getting qualified installers, and problems getting access to the technological measures needed for the installations. In addition, there were fewer installations of some of the measures with the greatest expected savings. Consequently, the impact of the program was less than hoped for during the planning stages. An overview of the key program results is presented in Table 19.

Table 19 Overview of impact results

Program metric	Finding
Number of installs completed	1,032
Number of audits completed	1,200
Average cost of measures installed	$1,300
Summer demand realization rate	0.63
Energy realization rate	0.64
Gross verified summer demand savings (kW)	836
Gross verified winter demand savings (kW)	738
Gross verified annual energy savings (GWh)	6.08
Net to gross ratio	97.9%
Net summer peak demand savings (kW)	827
Net winter peak demand savings (kW)	722
Net annual energy savings (GWh)	5.96

The realization rates are averages across all measures, based on extrapolating from units that had monitoring equipment installed on them to the population of measures. There is a wide variation in the savings realized within measure types due to factors related to usage, variation in equipment size (e.g. for motors), severity of cleaning required/done (for condenser coil cleaning), and other factors. In many cases, it is not clear what circumstances the prescriptive values are associated with.

As expected, free ridership for the program (estimated for all participants through April 2014) was very low as this is a sector that does not regularly invest in energy efficiency improvements. Their ability to do so is compounded by the unavailability of many retrofit technologies in the market. As customers become more aware of the measures, and they become more available, the free rider rate (and the spillover rate) can be expected to increase.

As measured by the Total Resource Cost (TRC) test and the Program Administrator Cost test (PAC), the program was cost-effective, with respectable benefit-cost ratios greater than 1.3.

Conclusions and recommendations

Process

Overall, the program was carefully and comprehensively managed, with a state of the art CRM system that captures customer information and tracks progress. The system was refined as challenges, opportunities, and needs were identified.

As it reintroduces the program into the marketplace, PowerStream should continue to review the structure and usefulness of each aspect of the program.

While continuing with its mail and telephone based direct marketing, it should test whether it can further increase its reach through other mechanisms, such as direct appeal to customers at their door, and through increased engagement of "preferred contractors". The latter will likely require more specific marketing to the channel, rather than focusing almost exclusively on the customer.

The audit stage was only ever able to provide limited information to enable quantification of potential energy savings, and this has diminished as the program proceeded. We believe PowerStream should choose between two options as it considers extending the program: revert to the original intention of the audits, or further reduce their frequency and importance to the program.

A return to the original intention of the audits would mean that the audits provide customers with information that is as specific as possible about things they can do to reduce their electricity bills, including: retrofitting their refrigeration equipment using the Business Refrigeration Incentives program, retrofitting other equipment, taking advantage of other PowerStream incentive programs, and other energy saving measures they could take, including behavioural measures affecting refrigeration equipment, and other aspects of their operations. Ideally, the auditors would provide the customer with as specific as possible estimates of potential savings (in energy units and dollars), and random QA/QC follow-ups would inquire about actions taken.

Alternatively, as PowerStream and its installers gain greater experience with the program and greater familiarity with the kinds of retrofits that are possible and useful, there is likely to be reduced need for these early visits to support refrigeration retrofits specifically. Instead, PowerStream may want to integrate these PowerStream staff visits with some but not all scheduled installs, particularly focusing on installs that involve new contractors who are less familiar with the BRI program, other programs offered by PowerStream and with PowerStream's expectations for customer service. PowerStream could still provide a package to customers by mail, or through the installer, with information on their energy use, benchmarks, case studies on refrigeration installs, and advice on efficient operation of their equipment, including behavioural measures they can take to reduce energy use.

Based on consultation with PowerStream senior staff, the first of these two options is more consistent with PowerStream's objectives for the program, and the customer service it provides.

In both options for the audits, it is important that PowerStream continue to engage more members of the larger community of service professionals involved with refrigeration systems, even though this complicates the administration and coordination of the program. Installers should be expected to provide PowerStream with the independent variables it requires for calculating impacts of measures, including rated capacity of condensers, COP, length of open displays or number of doors, and sizes of equipment installed (e.g. motor rating, length or area of strip curtains and night shades.) PowerStream has demonstrated the importance of ongoing communication with these professionals to maintain its standards of quality, and to gather intelligence for its own use. As it has done, it should also continue to look for new technologies that it might integrate into the program.

The QA/QC visits are an important source of information for tracking the progress and performance of the program. Greater attention should be given to documenting and tracking completion of recommended corrective actions. That would include ensuring that installers are advised of and understand those corrective actions. QA/QC visits should continue to include discussions with customers on operating schedules, satisfaction with the installation and the program, as well as physical inspection of equipment and installed measures. Customers should also be asked about additional energy savings measures they have taken since participating in the program. The more specific the information about these can be, the more likely that it will be possible to quantify spillover impacts.

Impact

The impact of the program was significant, even if below initial expectations. Planning estimates of the impact were based on a fairly optimistic start-up schedule, and estimated savings from the literature that appear in retrospect to have been somewhat optimistic. The data for the units that were monitored before and after implementation show actual savings were lower than expected based on values seen in the literature. In addition, there was significant variation observed across units and facilities. Some of this variation is inevitable as a result of variations in activity within facilities and other exogenous factors. Some of it relates to variations within the measures (e.g. motor capacity) that is not reflected in the values from the literature. Collection of the independent variables required for the quasi-prescriptive calculation of impacts will likely be helpful, but additional on-site monitoring at installation sites should be undertaken to ground-truth these formulae. Where retrofit measures are being installed in small numbers, if possible, the random selection of facilities to be monitor should be

supplemented with measuring of these measures which may not be captured by the random selection alone.

The cost effectiveness of the program when offered again can be expected to be higher than was seen for the existing program which involved significant start-up costs; cost effectiveness in 2014 alone, measured by TRC and PAC tests, was greater than 1.5. Future cost effectiveness will depend on specifics of program design, as well as the mix of measures employed, and the avoided costs used in the analysis.

The overall broad objectives of the program, and the desired outcomes the program was trying to achieve were met, including:

- Objective #1 – Achieving energy and demand savings among commercial customers. Savings of almost 6 GWh and more than 0.8 MW were achieved through the program. Immediate outcomes desired relate to this objective:
  - 1,032 customers signed up for and participated in the program, through installation. An additional 179 customers had audits done on their facility.
  - the savings and demand reductions were realized within PowerStream's service territory
  - at no cost to them, customers have realized dollar savings associated with the reduced use, and some of these savings will continue to accrue for many years.
- Objective #2 – Increase awareness of energy efficiency measures and programs among commercial customers. 76% of survey respondents indicated that the program made them aware of opportunities to save energy that they were not previously aware of. Other immediate outcomes desired related to this objective include:
  - thousands of customers were made aware of the program through direct mails, direct calling, PowerStream's website, contractor contacts and participant referrals
  - 1,286 customers received audits of their facilities and an Energy Action Plan that identified possible refrigeration retrofit measures.
  - participants' Energy Action Plans showed their energy use compared to similar facilities on a unit area basis, and 65% percent of those who received the plan read it, or intend to read it. 81% of those who read the EAP found it understandable.
  - participants indicated a high level of awareness or energy costs and programs, based on their intent to participate in other saveONenergy programs (92%), and to implement additional energy saving measures (92%).

- Objective #3 – stimulate changes in behaviour, technology and market conditions that favour energy efficiency – in addition to involving customers, the program also engaged 13 contractors and their installers in implementing energy saving retrofit measures. It created a demand for and actively encouraged distributors to stock refrigeration retrofit technologies. Other immediate outcomes related to this objective include:
    - 64% of participants have already recommended the program to colleagues, and 63% of those who have not indicate that they are likely to.
    - many of the most significant measures installed – ECM motors and LED case lighting – had a very low rate of installation in retrofit application in advance of the program. 3,478 ECM motors and 2,390 display case LEDs were installed through the program.
    - the high referral rate and satisfaction level indicate confidence in program.
    - PowerStream made on-going improvements to the program, and has incorporated the program into its CDM plan for 2015 to 2020.

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Appendix B: Consumer Program Initiatives

A. APPLIANCE RETIREMENT INITIATIVE (Fridge and Freezer Pick-Up)

Target Customer Type(s): Residential Customers

Initiative Frequency: Year-round

Objectives: Achieve energy and demand savings by permanently decommissioning certain older, inefficient refrigeration appliances located in Ontario.

Description: This is an energy efficiency Initiative that offers individuals and businesses free pick-up and decommissioning of old large refrigerators and freezers. Window air conditioners and portable dehumidifiers will also be picked up if a refrigerator or a freezer is being collected.

Targeted End Uses: Large refrigerators, large freezers, window air conditioners, and portable dehumidifiers.

Delivery: IESO centrally contracts for province-wide marketing, call centre, appliance pick-up, and decommissioning process. LDC provides local marketing and coordination with municipal pick-up where available.

In Market Date: March 2011.

Additional Comments (as provided by LDC-IESO Program Working Group):

- Due to the duration of the program, and the revised appliance eligibility requirements to a minimum age of 20 years old, this initiative appears to have reached market saturation and has been under consideration for removal from the portfolio.
- IESO's results are very responsive to province-wide advertising, IESO provincial marketing should continue to play a key role.
- Better relationships with retailers may play a role in increasing participation in this initiative. Retailers can provide opportunities to capture replacement appliances and have them decommissioned after a sale has been committed.
- In an effort to capture additional savings in the perceived last year of the initiative, the eligibility requirement for refrigerators was revised from 20 years old to 15 years old in Q2 2014, prior to the conclusion of this program by December 31, 2014.
- Due to the announcement by the IESO that the Appliance Retirement program was going to cease at the end of 2014, many LDCs lowered (or removed) their marketing support for the program.
- The end of 2014 saw several events that caused disruption in the Appliance Retirement program. ARCA Canada Inc., the provincial administrator and pick-up agent of appliances, had lowered internal staffing requirements

B. APPLIANCE EXCHANGE INITIATIVE (Exchange Events)

Target Customer Type(s): Residential Customers

Initiative Frequency: Spring and Fall

Objective: The objective of this initiative is to remove and permanently decommission older, inefficient window air conditioners and portable dehumidifiers in Ontario.

Description: This initiative involves appliance exchange events. Exchange events are held at local retail locations and customers are encouraged to bring in their old room air conditioners (AC) and dehumidifiers in exchange for coupons/discounts towards the purchase of new energy efficient equipment. Window air conditioners were discontinued from the program in 2013.

Targeted End Uses: Window air conditioners and portable dehumidifiers

Delivery: IESO contracts with participating retailers for collection of eligible units.

In Market Date: May 2011.

Additional Comments (as provided by LDC-IESO Program Working Group):

- This initiative, eligible measures and incentive amounts are influenced by the retail partner with very limited involvement from the LDCs. The restrictive, limited and sometimes non-participation of local stores can diminish the savings potential for this initiative.
- To date there has only been one retailer participant in the Appliance Exchange Initiative.
- Evaluation, Measurement, and Verification ("EM&V") results indicated that the value of savings for retired window air conditioners ("WAC") has dropped resulting in the retail participant not accepting window ACs during the Spring 2013 event.
- Notification to LDCs regarding retailer participation and eligible measures continues to be delayed. Improved communications will aid in appropriate resource allocation and marketing of the initiative.
- This initiative may benefit from the disengagement of the retailer and allowing LDCs to conduct these events, possibly as part of a larger community engagement effort, with the backing of the IESO's contractor for appliance removal.
- The initiative appears to require more promotion from retailers and LDCs.

C. HVAC INCENTIVES INITIATIVE (Heating and Cooling Incentives)

Target Customer Type(s): Residential Customers

Initiative Frequency: Year-round

Objective: The objective of this initiative is to encourage the replacement of existing heating systems with high efficiency furnaces equipped with Electronically Commutated Motors (ECM), and to replace existing central air conditioners (CAC) with ENERGY STAR® qualified systems and products**.**

Description: This is an energy efficiency initiative that provides rebates for the replacement of old heating or cooling systems with high efficiency furnaces (equipped with ECMs) and ENERGY STAR® qualified CACs by approved Heating, Refrigeration, and Air Conditioning Institute (HRAI) qualified contractors.

Targeted End Uses: Central air conditioners and furnaces

Delivery: IESO contracts centrally for delivery of the program and distributors are encouraged to convince local contractors to participate in the initiative.

In Market Date: March 2011.

Additional Comments (as provided by LDC-IESO Program Working Group):

- Incentive levels appear to be insufficient to prompt participants to upgrade HVAC equipment prior to end of useful life. An Air Miles incentive was introduced in 2013 to try and encourage early replacement.
- This initiative is contractor driven with LDCs responsible for marketing efforts to customers. More engagement with the HVAC contractor channel should be undertaken to drive a higher proportion of furnace and central air conditioner sales to eligible units.
- There are cases where non-participating contractors are offering their own incentives (by discounting their installations to match the value of the IESO incentive) to make the sale. As this occurs outside of the initiative, savings are not credited to LDCs. IESO should consider this in future program impact evaluation studies.
- Changes to the schedules in 2014 to allow for incentives for new installations, rather than strictly replacement units, may prove to be effective in providing greater results, increasing provincial participation by 20% over 2013.

D. CONSERVATION INSTANT COUPON BOOKLET INITIATIVE (Coupons)

Target Customer Type(s): Residential Customers

Initiative Frequency: Year-round

Objective: The objective of this initiative is to encourage households to purchase energy efficient products by offering discounts.

Description: This initiative provides customers with year-round coupons. The coupons offer instant rebates towards the purchase of a variety of low cost, easy to install energy efficient measures and can be redeemed at participating retailers. Booklets were directly mailed to customers and were also available at point-of-purchase. Downloadable coupons were also available at www.saveoneenergy.ca.

Targeted End Uses: ENERGY STAR® qualified standard compact fluorescent lights (CFLs), ENERGY STAR® qualified light fixtures, lighting control products, weather stripping, hot water pipe wrap, electric water heater blanket, heavy duty plug-in timers, advanced power bars, clothesline, and baseboard programmable thermostats

Delivery: The IESO develops the electronic version of coupons and posts them online for download. PowerStream distributes coupons at local events. The IESO enters into agreements with retailers to honour the coupons.

In Market Date: March 2011.

Additional Comments (as provided by LDC-IESO Program Working Group):

- The timeframe for retailer submission of redeemed coupons vary from retailer to retailer, and in some cases has been lengthy. The delays and incomplete results reporting limits the ability to react and respond to initiative performance or changes in consumer behavior.
- The product list could be distinctive from the Bi-Annual Retailer Event Initiative in order to gain more consumer interest and uptake.
- Program evolution, including new products and review of incentive pricing for the coupon initiatives, should be a regular activity to ensure continued consumer interest.
- All coupons have been provided with LDC custom coding in 2014 which allows LDCs to promote coupons based on local preferences. However, LDCs were not provided with customer coded coupon results until early 2015 and thus, had no indication of their redemption rates.
- Consumer experience varies amongst retailers offering coupon discounts which can limit redemptions. For example, a particular high volume 'participating retailer' does not accept coupons and has their own procedure. In addition, some retailers have static lists of eligible products and will not discount eligible products unless the product on the list.
- The saveONenergy programs would benefit from specific end cap displays, aisle product stands and product-specific areas. Having products throughout a retail environment weakens the impact.

E. BI-ANNUAL RETAILER EVENT INITIATIVE (Retailer Events)

Target Customer Type(s): Residential Customers

Initiative Frequency: Bi-annual events

Objective: The objective of this initiative is to provide instant point of purchase discounts to individuals at participating retailers for a variety of energy efficient products.

Description: Twice a year (Spring and Fall), participating retailers host month-long rebate events. During the months of April and October, customers are encouraged to visit participating retailers where they can find coupons redeemable for instant rebates towards a variety of low cost, easy to install energy efficient measures.

Targeted End Uses: Same as the conservation instant coupon booklet initiative

Delivery: The IESO enters into arrangements with participating retailers to promote the discounted products, and to post and honour related coupons. LDCs also refer retailers to the IESO.

In Market Date: May 2011.

Additional Comments (as provided by LDC-IESO Program Working Group):

- This initiative is strongly influenced by the retail participants and has no direct involvement from the LDCs.
- LDCs have the opportunity to stage in-store events to drive the distribution of LDC-coded coupons and promotion of other programs in the portfolio; however, this requires cooperation from the local retailer and LDC staff resources.
- The product list has had minimal changes over the past four years.
- Limited engagement of local retailers can restrict the savings potential for this initiative.
- Program evolution, including new products and review of incentive pricing for the coupon initiatives, must be a regular activity to ensure continued consumer interest.
- The product list could be distinctive from the Conservation Instant Coupon Initiative in order to gain more consumer interest and uptake.
- A review conducted by the EDA Consumer Working Group in 2011 identified three areas of need for initiative evolution: 1) introduction of product focused marketing; 2) enhanced product selection; and 3) improved training for retailers as retail staffs tend not to be knowledgeable regarding the products or promotion.
- This initiative may benefit from a more exclusive relationship with a retailer appropriate to the program. There should be a value proposition for both the retailer and LDC.
- Independently, the Retailer Co-op and Bi-Annual Retailer Event Initiative may not present a value for the investment of LDC resources to support these events and should be backed by a strong residential portfolio.

F. NEW CONSTRUCTION PROGRAM (New Home Construction)

Target Customer Type(s): Residential Customers

Initiative Frequency: Year-round

Objective: The objective of this initiative is to provide incentives to participants for the purpose of promoting the construction of energy efficient residential homes in the Province of Ontario.

Description: This is an energy efficiency initiative that provides incentives to homebuilders for constructing new homes that are efficient, smart, and integrated (applicable to new single family dwellings). Incentives are provided to homebuilders who install energy efficient measures as determined by a prescriptive list or via custom options, or by meeting or exceeding the EnerGuide performance rating system.

Targeted End Uses: All-off switch, ECM motors, ENERGY STAR® qualified CAC, lighting control products, lighting fixtures, EnerGuide 83 whole home, EnerGuide 85 whole homes

Delivery: Local engagement of builders is a responsibility of the LDC and will be supported by the IESO air coverage driving builders to their LDC for additional information.

In Market Date: January 2012.

Additional Comments (as provided by LDC-IESO Program Working Group):

- This initiative provides incentives to home builders for incorporating energy efficiency into their buildings. To support this, LDCs need to provide education to consumers regarding the importance of choosing the energy efficient builder upgrade options without an immediate benefit to the consumer.
- In 2012 the application process was streamlined, however continues to be too cumbersome for builders. This, combined with limited return, has resulted in this initiative continuing to under-achieve.
- Administrative requirements, particularly with individual home modeling, must align with perceived stakeholder payback.
- The addition of LED light fixtures, application process improvement, and moving the incentive from the builder to the home-owner may increase participation.
- This initiative may benefit from collaboration with the natural gas utilities.

G. RESIDENTIAL DEMAND RESPONSE PROGRAM (peaksaver and peaksaver PLUS™)

Target Customer Type(s): Residential and Small Commercial Customers

Initiative Frequency: Year-round

Objective: The objectives of this initiative are to enhance the reliability of the Independent Electric System Operator (IESO)-controlled grid by accessing and aggregating specified residential and small commercial end uses for the purpose of load reduction, increasing consumer awareness of the importance of reducing summer demand, and providing consumers their current electricity consumption and associated costs.

Description*:* In ***peaksaver***PLUS™ participants are eligible to receive a free programmable thermostat or switch, including installation. Participants also receive access to price and real-time consumption information on an In Home Display (IHD).

Targeted End Uses: CACs, electric water heaters, and pool pumps

Delivery: PowerStream manages the initiative, procure the technology, install the control devices (through procured service provider), and promote/market the initiative.

In Market Date: January 2011 – ***peaksaver***. May 2012 – ***peaksaver*** **PLUS**.

Additional Comments (as provided by LDC-IESO Program Working Group):

- The variable funding associated with installing a load controllable thermostat is not sufficient unless it is combined with an IHD. This might not be possible at all times or when IHD is optional.
- Smart meters installed by most LDCs do not have the capability to communicate directly to an IHD and any mass replacement of newly installed meters with communicating abilities is not fiscally responsible. When proposing technical initiatives that rely on existing LDC infrastructure or technology there should be an extensive consultative process in order to prevent this type of problem in the future.
- Introduction of new technology requires incentives for the development of such technology. Appropriate lead times for LDC analysis and assessment, product procurement, and testing and integration into the smart meter environment are also required. Making seemingly minor changes to provincial technical specifications can create significant issues when all LDCs attempt to implement the solution in their individual environments.
- Given the different LDCs' smart meter environments and needs, each LDC is positioning the initiative with subtle differences. As such, greater program flexibility is required to address unique LDC needs

Appendix C: Business Program Initiatives

A. RETROFIT (EFFICIENCY EQUIPMENT REPLACEMENT INCENTIVE)

Target Customer Type(s): Commercial, Institutional, Agricultural, and Industrial Customers

Initiative Frequency: Year-round

Objective: The objective of this Initiative is to offer incentives to non-residential distribution customers to achieve reductions in electricity demand and consumption by upgrading to more energy efficient equipment for lighting, space cooling, ventilation, and other measures.

Description: The Equipment Replacement Incentive Initiative (ERII) offers financial incentives to customers for the upgrade of existing equipment to energy efficient equipment. Upgrade projects can be classified into either: 1) prescriptive projects, where prescribed measures replace associated required base case equipment; 2) engineered projects, where energy and demand savings and incentives are calculated for associated measures; or 3) custom projects for other energy efficiency upgrades.

Targeted End Uses: lighting, space cooling, ventilation, and other measures

Delivery: PowerStream manages the initiative, reviews and approves applications, conducts site visits (via third party service providers), pays approved applications, and promotes/markets the initiative. Applications are submitted online via the saveONenergy website.

In Market Date: March 2011.

Additional Comments (as provided by LDC-IESO Program Working Group):

- A large proportion of LDC savings are attributed to ERII.
- Capability building programs from industrial programs have had very positive contributions to ERII program.
- A number of customer-facing issues in iCon (the IESO's centralized application system) have been resolved; however, key LDC administrative back office processing issues continue to be a challenge. For example, currently LDCs are unable to record back office information to complete review and approval process using iCon.
- Applicants and applicant representatives continue to express dissatisfaction and difficulty with the online application system. This issue has been addressed by LDCs through application training workshops, Key Account Managers ("KAMs"), channel partner/contractor training and LDC staff acting as customer application representatives. Although this has been an effective method of overcoming these issues and encouraging submissions, it also reflects on the complexity and time consuming nature of the application process. As such, applicant representatives continue to influence the majority of applications submitted. Continued development of channel partners is essential to program success.
- Lighting is still the most popular measure. Other market sectors are not as engaged yet, specifically the mechanical sector. There continues to be significant barriers to program participation from HVAC (Unitary AC) and compressed air channel partners

- Prescriptive and engineered worksheets provide a much needed simplified application process for customers. However, the eligible measures need to be updated and expanded in both technology and incentive amounts to address changing product costs and evolution of the marketplace.
- A focus on demand incentives has limited some energy project opportunities. In particular, night lighting projects have significant savings potential for customers but tend to have incentives of 10% or less of project cost.
- The requirement to have a customer invoice the LDC for their incentive is very burdensome for the customer and results in a negative customer experience and another barrier to participation.
- There is redundancy in the application process as customers may need to complete a worksheet and then enter most of that information over to the online application form. This can be cumbersome.
- Processing head office application became much easier for the lead LDC after schedule changes came into effect in August 2013. The changes implemented allowed the lead LDC to review and approve all facilities in a head office application on behalf of all satellite LDCs under certain circumstances.
- Streamlining of the settlements systems resulted in significant improvement in the payment process in 2013.
- Introduction of several new prescriptive measure worksheets including Plug Loads and Refrigeration were introduced in September 2014 allowed for new opportunities, albeit late in the framework.
- The Ministerial Directive provides continuity of the conservation programs for the participant, with clear direction on LDC administrative funding for 2015, which helps to avoid a gap in program delivery.

B. DIRECT INSTALL LIGHTING INITIATIVE (Small Business Lighting)

Target Customer Type(s): Small Commercial, Institutional, Agricultural facilities and multi-family buildings

Initiative Frequency: Year-round

Objective: The objective of this initiative is to offer a free installation of eligible lighting and water heating measures of up to $1,500 to eligible owners and tenants of commercial, institutional and agricultural facilities and multi-family buildings, for the purpose of achieving electricity savings and peak demand savings.

Description: The Direct Installed Lighting (DIL) Initiative targets customers in the General Service <50kW account category. This Initiative offers turnkey lighting and electric hot water heater measures with a value up to $1,500 at no cost to qualifying small businesses. In addition, standard prescriptive incentives are available for eligible equipment beyond the initial $1,500 limit.

Target End Uses: Lighting and electric water heating measures

Delivery: PowerStream was responsible for marketing and promotion and used a third party service provider to enrol the customers, conduct the energy audit/walk-through, install the efficient measures, and dispose of the old equipment.

In Market Date: March 2011.

Additional Comments (as provided by LDC-IESO Program Working Group):

- LED lighting was introduced in 2013 as a new measure and has been well received by customers who may not have previously qualified for DIL eligible upgrades. This is an efficient product with a long estimated useful life.
- Cold start high output lighting was removed from the program. This particularly affected the farming customers who now have limited options within the program.
- Successful execution of the previous version of this initiative has resulted in reduced potential for the 2011-2014 initiative in some LDC's territories.
- The inclusion of a standard incentive for additional measures increased project size and drove higher energy and demand savings results in some situations. However, LDCs are unable to offer these standard incentives to prior participants. The ability to return to prior participants and offer a standard incentive on the remaining measures has potential to provide additional energy and demand savings.
- Many customers are not taking advantage of any additional measures, which may present an opportunity to for future savings with a new program offering.

C. EXISTING BUILDING COMMISSIONING INCENTIVE INITIATIVE (Commissioning)

Target Customer Type(s): Commercial, Institutional, and Agricultural Customers

Initiative Frequency: Year-round

Objective: The objective of this initiative is to offer incentives for optimizing (but not replacing) existing chilled water systems for space cooling in non-residential facilities for the purpose of achieving implementation phase energy savings, implementation phase demand savings, or both.

Description: This initiative offers participant incentives for scoping study phase, investigation phase, implementation phase, and hand off/completion phase of the project

Targeted End Uses: Chilled water systems for space cooling

Delivery: PowerStream manages the initiative, reviews and approves applications, conducts site visits (via third party service providers), pays approved applications, and promotes/markets the initiative. Paper-based applications are submitted directly to PowerStream.

In Market Date: March 2011.

Additional Comments (as provided by LDC-IESO Program Working Group):

- Initiative name does not properly describe the initiative.
- There was minimal participation for this initiative. It is suspected that the lack of participation in the program is a result of the initiative being limited to space cooling and a limited window of opportunity (cooling season) for participation.
- Participation is mainly channel partner driven, however the particulars of the initiative have presented too much of a significant barrier for many channel partners to participate.
- The customer expectation is that the program be expanded to include a broader range of measures for a more holistic approach to building recommissioning and chilled water systems used for other purposes should be made eligible and considered through change management.
- This initiative should be reviewed for incentive alignment with ERII, as currently a participant will not receive an incentive if the overall payback is less than 2 years.

D. NEW CONSTRUCTION AND MAJOR RENOVATION INITIATIVE (New Construction)

Target Customer Type(s): Commercial, Institutional, Agricultural and Industrial Customers

Initiative Frequency: Year-round

Objective: The objective of this initiative is to encourage builders of commercial, institutional, and industrial buildings (including multi-family buildings and agricultural facilities) to reduce electricity demand and/or consumption by designing and building new buildings with more energy-efficient equipment and systems for lighting, space cooling, ventilation and other measures.

Description: The New Construction initiative provides incentives for new buildings to exceed existing codes and standards for energy efficiency. The initiative uses both a prescriptive and custom approach.

Targeted End Uses: New building construction, building modeling, lighting, space cooling, ventilation and other measures

Delivery: PowerStream managed the initiative with the assistance of a third party service provider, including marketing and sales, reviewing and approving applications, conducting site visits, and administering incentive payments.

In Market Date: March 2011.

Additional Comments (as provided by LDC-IESO Program Working Group):

- With the Ministerial Directive issued December 21, 2012, facilities with a completion date near the end of 2014 with some confidence that they will be compensated for choosing efficiency measures.
- Participants have until the end of 2014 to submit their applications for the projects that will be completed in 2015. However savings achieved will be accounted for in the new framework (2015 - 2020).
- The custom application process requires considerable customer support and skilled LDC staff. The effort required to participate through the custom stream exceeds the value of the incentive for many customers.
- There are no custom measure options for items that do not qualify under the prescriptive or engineered track as the custom path does not allow for individual measures, only whole building modelling.
- The requirement to have a customer invoice the LDC for their incentive is very burdensome for the customer and results in a negative customer experience and a potential barrier to participation.

E. ENERGY AUDIT INITIATIVE (Audit Funding)

Target Customer Type(s): Commercial, Institutional, Agricultural and Industrial Customers

Initiative Frequency: Year-round

Objective: The objective of this initiative is to offer incentives to owners and lessees of commercial, institutional, multi-family buildings and agricultural facilities for the purpose of undertaking assessments to identify all possible opportunities to reduce electricity demand and consumption within their buildings or premises.

Description: This initiative provides participants incentives for the completion of energy audits of electricity consuming equipment located in the facility. Energy audits include development of energy baselines, use assessments and performance monitoring and reporting.

Targeted End Uses: Various measures

Delivery: PowerStream manages the initiative, review and approve applications, conduct site visits (via third party service providers), pay approved applications, and promote/market the initiative. Paper-based applications are submitted directly to PowerStream.

In Market Date: March 2011.

Additional Comments (as provided by LDC-IESO Program Working Group):

- The introduction of the new audit component for one system (i.e. compressed air), has increased customer participation.
- The energy audit Initiative is considered an 'enabling' initiative and 'feeds into' other saveONenergy initiatives.
- LDCs are receiving some savings towards their targets from an audit which is mainly attributable to operational savings.
- Audit reports from consultants vary considerably and in some cases, while they adhere to the initiative requirements, do not provide value for the participant. A standard template with specific energy saving calculation requirements should be considered.
- Customers look to the LDCs to recommend audit companies. A centralized prequalified list provided by the IESO may be beneficial.
- Participants are limited to one energy audit which restricts enabling and direction to the other initiatives. This has been revised in 2014 and LDCs are now able to consider additional customer participation when presented with a new scope of work.
- Consideration should be given to allowing a building owner to undertake an audit limited to their lighting system. This way they may receive valuable information from a neutral third party regarding the appropriate lighting solution for their facility instead of what a local supplier would like to sell.
- The requirement to have a customer invoice the LDC for their incentive is very burdensome for the customer and results in a negative customer experience and a potential barrier to participation.

Appendix D: Industrial Program Initiatives

A. PROCESS & SYSTEMS UPGRADES INITIATIVE (PSUI)

Target Customer Type(s): Industrial, Commercial, Institutional, and Agricultural Customers

Initiative Frequency: Year-round

Objectives: The objectives of this initiative are to:

- Offer distribution customers capital incentives and enabling initiatives to assist with the implementation of large projects and project portfolios;
- Implement system optimization project in systems which are intrinsically complex and capital intensive; and
- Increase the capability of distribution customers to implement energy management and system optimization projects.

Description: PSUI is an energy management initiative that includes three initiatives: (Preliminary Engineering Study (PES), Detailed Engineering Study (DES), and Project Incentive Initiative (PII)). The incentives are available to large distribution connected customers with projects or portfolio projects that are expected to generate at least 350 MWh of annualized electricity savings or, in the case of Micro-Projects, 100 MWh of annualized electricity savings. The capital incentive for this Initiative is the lowest of:

a) $200/MWh of annualized electricity savings
b) 70% of project cost
c) A one year payback

Targeted End Uses: Processes and systems

Delivery: PowerStream's Key Account Manager (KAM) works with targeted customers to identify possible projects that will be eligible for PSUI.

In Market Date: June 2011 – PSUI available. KAM hired April 2012.

Additional Comments (as provided by LDC-IESO Program Working Group):

- Numerous energy studies have been submitted and completed. This is a strong indication that there is potential for large projects with corresponding energy savings. Most of these studies have been initiated through Energy Manager and Key Account Manager ("KAM") resources.
- This initiative is limited by the state of the economy and the ability of a facility to complete large capital upgrades.
- There is typically a long sales cycle for these projects, and a long project development cycle. As such, limited results are expected to be generated in 2014. The majority of the results are expected in 2015 with a much reduced benefit to cumulative energy savings targets.
- Delays with processing funding payments have caused delayed payments to participants beyond contract requirements. In some cases, LDCs have developed a separate side

agreement between the LDC and participant acknowledging that the participant cannot be paid until the funds are received.

- Given the size of the projects involved, the contract required for PSUI is a lengthy and complicated document. A key to making PSUI successful is the new agreement for 'small' projects with simplified and less onerous conditions for the customer.
- To partially address this, changes were made to the ERII program which allowed smaller projects to be directed to the commercial stream. Most industrial projects to-date have been submitted as ERII projects due to less onerous contract and M&V requirements. Therefore, PSUI engineering studies and LDC's industrial resources (e.g., Energy managers, KAMs) contribute significant savings to other programs such as ERII.
- A business case was submitted by the Industrial Working Group in July 2012 which changed the limit for a small project from 700 MWh to 1 million dollars in incentives. This would allow more projects to be eligible for the new small capital project agreement and increase participant uptake, while still protecting the ratepayer. This small capital project agreement was finalized through change management in September 2013.
- The requirement for customer invoice to the LDC and provide proof of payment to consultants for their incentive is very burdensome for the customer and results in a negative customer experience and another barrier to participation.

B. MONITORING & TARGETING INITIATIVE (M&T)

Target Customer Type(s): Industrial, Commercial, Institutional and Agricultural Customers

Initiative Frequency: Year-round

Objective: This initiative offers access to funding for the installation of Monitoring and Targeting systems in order to deliver a minimum savings target at the end of 24 months and sustain for the term of the M&T Agreement.

Description: This initiative offers customers funding for the installation of a Monitoring and Targeting system to help them understand how their energy consumption might be reduced. A facility energy manager, who regularly oversees energy usage, will now be able to use historical energy consumption performance to analyze and set targets.

Targeted End Uses: Various measures

Delivery: PowerStream's Key Account Manager (KAM) works with targeted customers to identify possible projects that will be eligible for M&T.

In Market Date: June 2011 –M&T available. April 2012 – KAM hired.

Additional Comments (as provided by LDC-IESO Program Working Group):

- The M&T initiative is targeted at larger customers with the capacity to review the M&T data. This review requires the customer facility to employ an energy manager, or a person with equivalent qualifications, which has been a barrier for some customers. As such, only five applications has been completed in 2014, province wide.
- The savings target required for this initiative can present a significant challenge for smaller customers.
- Through the change management process in 2013, changes were made to ERII to allow smaller facilities to employ M&T systems.

C. ENERGY MANAGER INITIATIVE (Energy Managers)

Target Customer Type(s): Industrial, Commercial, Institutional and Agricultural Customers

Initiative Frequency: Year-round

Objective: The objective of this initiative is to provide customers and LDCs the opportunity to access funding for the engagement of energy managers in order to deliver a minimum annual savings target.

Description: This initiative provides customers the opportunity to access funding to engage an on-site, full time embedded energy manager, or an off-site roving energy manager who is engaged by the LDC. The role of the energy manager is to take control of the facility's energy use by monitoring performance, leading awareness programs, and identifying opportunities for energy consumption improvement, and spearheading projects. Participants are funded 80% of the embedded energy manager's salary up to $100,000 plus 80% of the energy manager's actual reasonable expenses incurred up to $8,000 per year. Each embedded energy manager has a target of 300 kW/year of demand savings from one or more facilities. LDCs receive funding of up to $120,000 for a Roving Energy Manager plus $8,000 for expenses.

Targeted End Uses: Various measures

Delivery: PowerStream was responsible for encouraging large customers to take opportunity of the Energy Manager initiative.

In Market Date: June 2011.

Additional Comments (as provided by LDC-IESO Program Working Group):

- The Embedded Energy Managers ("EEMs") have proven to be a popular and useful resource for larger customers. There are approximately 50 EEMs and 22 Roving Energy Managers ("REMs") being utilized by customers across the province.
- LDCs that are too small to qualify for their own REM are teaming up with other utilities to hire a REM to be shared by the group of utilities.
- At the beginning, it took longer than expected to set up the energy manager application process and unclear communication resulted in marketing and implementation challenges for many LDCs.
- Some LDCs and customers are reporting difficulties in hiring capable REMs and EEMs, in some instances taking up to several months to have a resource in place.
- There have been a number of studies identified by energy managers and they have been able to build capacity and deliver energy savings projects within their respective large commercial/industrial facilities.
- The requirement that 30% of targets must come from non-incented projects is identified as an issue for most EEMs/REMs. The EDA Industrial Working Group has proposed to remove this requirement for REMs only as they are not resident full time at a customer facility to find the non-incented savings.

D. KEY ACCOUNT MANAGER (KAM)

Target Customer Type(s): Industrial, Commercial, Institutional and Agricultural Customers

Initiative Frequency: Year-round

Objective: This initiative offers LDCs the opportunity to access funding for the employment of a KAM in order to support them in fulfilling their obligations related to the PSUI. The KAM is considered to be a key element in assisting the consumer in overcoming traditional barriers related to energy management and help them achieve savings since the KAM can build relationships and become a significant resource of knowledge to the customer.

Description: The funding will be available for an LDC or a group of LDCs servicing a minimum of five Distribution Consumers each having at least 5MW of Annual Peak Demand. Funding for KAM is allocated on the basis that a fully-employed KAM is one who is employed on a full-time basis servicing ten Distribution Consumers each having at least 5MW of Annual Peak Demand.

Targeted End Uses: Various measures

Delivery: PowerStream was responsible for applying and receiving approval to hire a KAM. PowerStream's KAM is responsible for working with large customers in identifying energy savings opportunities and encouraging them to participate in the most appropriate programs.

In Market Date: April 2012 – PowerStream hired a KAM in April 2012

Additional Comments (as provided by LDC-IESO Program Working Group):

- Customers appreciate dealing with a single contact to interface with an LDC, a resource that has both the technical and business background who can communicate easily with the customer and the LDC.
- Finding this type of skill set has been difficult. In addition, the short-term contract and associated energy targets discourage some skilled applicants resulting in longer lead times to acquire the right resource.
- This resource has been found by some LDCs to be of limited value due to the part-time nature of the position and limited funding. In addition, the position role has been too narrow in scope to provide assistance to the wider variety of projects with which LDCs may be struggling.

E. DEMAND RESPONSE 3 (DR3)

Target Customer Type(s): Industrial, Commercial, Institutional and Agricultural Customers

Initiative Frequency: Year-round

Objective: This initiative provides for Demand Response (DR) payments to contracted participants to compensate them for reducing their electricity consumption by a pre-defined amount during a DR event.

Description: Demand Response 3 (DR3) is a demand response initiative for commercial and industrial customers, of 50 kW or greater to reduce the amount of power being used during certain periods of the year. The DR3 initiative is a contractual resource that is an economic alternative to procurement of new generation capacity. DR3 comes with specific contractual obligations requiring participants to reduce their use of electricity relative to a baseline when called upon. This Initiative makes payments for participants to be on standby and energy payments for the actual energy reduction provided during a demand response event. Participants are scheduled to be on standby approximately 1,600 hours per calendar year for possible dispatch of up to 100 hours or 200 hours within that year depending on the contract.

Targeted End Uses: Commercial and industrial operations

Delivery: DR3 is delivered by Demand Response Providers (DRP), under contract to the IESO. The IESO administers contracts with all DRPs and Direct Participants that provide in excess of 5 MW of demand response capacity. The IESO provides administration including settlement, measurement and verification, and dispatch. LDCs are responsible for outreach and marketing efforts.

In Market Date: June 2011 – March 2014.

Additional Comments (as provided by LDC-IESO Program Working Group):

- Until early 2013, customer data was not provided on an individual customer basis due to contractual requirements with the aggregators. This limited LDCs' ability to effectively market to prospective participants and confirm savings.
- The Industrial Working Group had a discussion with the IESO and representatives of the Ministry on proposed changes for the DR3 program. No program improvements were made in 2013. However, it was accepted that prior participants who renew their DR3 contract within the 2011-2014 term will contribute to LDC targets.
- As of 2013, aggregators are able to enter into contracts beyond 2014. This has allowed them to offer a more competitive contract price (five years) than the previously limited one- to two-year contracts. However on March 31, 2014 the Minister of Energy issued a directive entitled "Continuance of the IESO's Demand Response Program under IESO management" which restricts the IESO from granting any more contract schedules to aggregators, as the program is being transitioned from the OPA to the IESO. This decision will prevent the DR3 program from continuing to grow until the IESO is ready to assign DR3 capacity through a new auction process.

- Metering and settlement requirements are complicated and can reduce customer compensation amounts, and present a barrier to some customers.
- Compensation amounts have been reduced from the previous version of this program and subsequently there has been a corresponding decrease in renewal rates.

Appendix E: Low Income Program

Target Customer Type(s): Income Qualified Residential Customers

Initiative Frequency: Year-round

Objective: The objective of this program is to offer free installation of energy efficiency measures to income qualified households for the purpose of achieving electricity and peak demand savings.

Description: This is a turnkey program for income qualified customers. It offers residents the opportunity to take advantage of free installation of energy efficient measures that improve the comfort of their home, increase efficiency, and help them save money. All eligible customers receive a Basic and Extended Measures Audit, while customers with electric heat also receive a Weatherization Audit. The program is designed to coordinate efforts with gas utilities.

Targeted End Uses: End uses based on results of audit.

Delivery: PowerStream, through a third party service provider, conducts outreach to eligible participants in collaboration with social agencies. Participants may also enrol directly with the PowerStream. PowerStream's service provider conducts the energy audit/walk-through, the installation of the efficient measure, and the disposal of the old equipment. PowerStream, together with the service provider, were also responsible for marketing and promotion.

In Market Date: April 2012.

Additional Comments (as provided by LDC-IESO Program Working Group):

- The process for enrolling in social housing was complicated and time consuming. This was addressed in late 2012 and showed benefits since 2013.
- The financial scope, complexity, and customer privacy requirements of this initiative are challenging for LDCs and most have contracted this program out. This initiative may benefit from an IESO contracted centralized delivery agent.