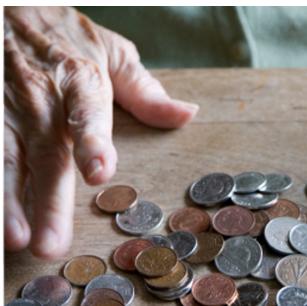
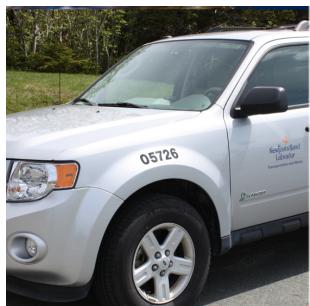




In-depth review of energy efficiency programs



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In-depth review of energy efficiency programs

Details on key programs of interest to NL



This document was prepared for The Government of Newfoundland's Office of Climate Change, Energy Efficiency, and Emissions Trading by IndEco Strategic Consulting Inc and Hollett & Sons Inc.

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Introduction

To assist in the development of the Energy Efficiency Action Plan (Action Plan), the Office of Climate Change, Energy Efficiency and Emissions Trading (CCEEET) released a request for proposal to provide information related to the development of the Action Plan. CCEEET retained IndEco Strategic Consulting (IndEco), which partnered with Hollett & Sons, to carry out this work in two parts.

The first, referred to as the Part A report, was submitted March 31st, 2011; a finalized version will be submitted on June 28th, 2011. For the Part A report, IndEco described the governance structure (e.g. legislation, regulations, policies, plans) for energy efficiency in each Canadian province and compiled a review of the energy efficiency programs available to residential, commercial, and industrial customers in each Canadian province and territory. This research consisted of interviews with key staff at utilities, provincial government ministries, utility regulators and arms-length agencies; program websites; and additional documents provided by the interviewees. The Office of Climate Change, Energy Efficiency, and Emissions Trading selected nine programs of interest for in-depth review for the second part of the research based on the comprehensive list of programs. For this Part B report, the programs selected have particular relevance and applicability to Newfoundland and Labrador. The programs selected fall into three categories: commercial, industrial, and transportation programs.

IndEco, in consultation with CCEEET, developed a set of interview questions covering various aspects of the programs: program description, eligibility criteria, funding, administration and support, program design features, delivery, incentives, and monitoring and verification. Questions that related to delivering a program to customers in geographically isolated or remote areas were also asked. For each program, the concluding section is the program manager's perceived program strengths and weaknesses, and advice to NL as the CCEEET deliberates on the development of provincial programs. When available, program case studies are included for each program.

IndEco contacted the program managers for each of the nine programs and conducted interviews (45 minutes to 1.5 hour in length). The results of these interviews, supplemented by online program content and program documents provided by the program managers, constitute the contents of this report.

Programs included in this research are as follows:

Commercial programs

Product Incentive Program (BC Hydro)

- This is a prescriptive program providing incentives to small and medium businesses (those that spend less than \$200,000 annually on electricity) that replace existing inefficient technologies with new energy efficient products.

- Eligible products include lighting, controls and sensors, heating, ventilation and air conditioning (HVAC), and refrigeration equipment.

Power Smart Partner Commercial Program (BC Hydro)

- This program targets commercial, institutional, and governmental facilities that spend at least \$200,000 annually on electricity.
- Program offerings include a variety of tools and services, such as an energy study, energy management assessment, project implementation funds, employee energy awareness, and recognition.

Continuous Optimization Program for Commercial Buildings (BC Hydro)

- This program assists building owners in retrocommissioning their buildings and maintaining and continually improving the level of efficiency in their buildings.
- Program initiatives include installation of an energy management information system (EMIS), retrocommissioning investigation, implementation of new equipment, and ongoing energy management assistance.

Small Business and Commercial Program (FortisBC)

- This program encourages customers to improve their energy efficiency by offering incentives of \$0.10/kWh based on one year of savings resulting from the project.
- Typical projects include retrofits of lighting, HVAC, water heating, refrigeration equipment, digital controls, motors, building envelope, plus other measures with demonstrable electricity savings.

Retrofit Program (Ontario Power Authority)

- This program offers incentives to non-residential electricity distribution customers for the replacement of existing equipment with high efficiency equipment, as well as for the installation of new control systems to improve the efficiency of operational procedures and processes.
- The program has prescriptive, engineered, and custom options and is delivered by the electricity distribution utilities.

Industrial programs

Power Smart Partner Industrial Program (BC Hydro)

- This program offers services and incentives to assist industrial customers (both transmission and the largest electricity distribution customers) to integrate energy efficiency into their facility operations.
- The program offerings are divided into four steps: plan, discover, upgrade, and support and include funding for site energy managers, audits and assessments, feasibility studies,

project incentives, special conservation rates, and employee energy awareness.

Process and Systems Program (Ontario Power Authority)

- This program provides funding and technical expertise to help industries investigate and assess electricity saving opportunities and modernize key systems for energy efficiency.
- The program offerings include preliminary and detailed engineering studies, project incentives, and funding for site energy managers. The program is delivered by electricity distribution utilities.

Support for the Manufacturing Sector Program (Agence de l'efficacité énergétique)

- This program assists manufacturers to move toward sustainable development and improve their competitiveness by reducing their consumption of certain target fuels (light fuel oil, propane and butane).
- The program provides financial assistance for energy analyses, feasibility studies, analyses of effective integration of better fuel consumption practices, and for facilities to implement the recommended energy efficiency measures.

Transportation programs

Trucks of Tomorrow Program (Climate Change Central, Alberta)

- This program provides rebate incentives for the purchase of equipment that lowers the fuel consumption of trucks (thereby reducing greenhouse gas emissions), as well as for the purchase of hybrid vehicles.
- Equipment included in this program is as follows: auxiliary power units, cab heaters/coolers, gap fairings, skirts, end fairings, and hybrid drive trains.

The program managers were pleased to contribute to this research, and were agreeable to have the CCEET contact them with any additional questions in the future; contacts for the program managers are listed in Appendix A of this report. Wherever possible, links to additional program content or other relevant documents discussed during the interview were provided in the report.

The Final Report, to be submitted on June 30th, will contain an executive summary of Part A and B reports and present the findings regarding the program research and analysis.

Commercial Programs

British Columbia

Product Incentive Program (BC Hydro)

Program description

BC Hydro's Product Incentive Program (PIP) is a prescriptive program providing incentives to small and medium businesses (SMBs) who replace existing inefficient technologies with new energy efficient products. The goal is to obtain technology-based savings from SMBs.

PIP's target market is characterized by energy consumption (generally less than \$200K in electricity consumption annually) and customer type (commercial).

The program was designed to address the five "A" barriers:

Awareness. Most SMBs are unaware there are programs and staff to help them find and implement energy efficient measures. These customers also lack technical knowledge on their options for increasing energy efficiency.

Accessibility. Many newer products are not readily accessible to SMBs, as SMBs often make purchases at retail stores rather than at larger product distributors.

Affordability. Debate among experts continues on the role financing may play as a barrier or enabler of energy efficient projects. Some jurisdictions offer low or no interest loans or on-bill financing to help businesses pay for projects. Other utilities have found customers prefer the up-front lump sum payment or rebate to help pay for measures.

Availability. SMBs often do not have personnel specifically responsible for operations or maintenance.

Acceptability. Some SMBs have had poor experiences with older energy-efficient technologies in the past or do not believe they will achieve benefits within their business.

The PIP is highly cost effective and performing better than anticipated: Total Resource Cost test (TRC) is 3.6 and Utility Cost Test (also known as the Program Administrator Cost Test) is 6.4.

Table 1 Program uptake

Participant type	Energy savings by participant type	Geographic distribution of participants
All	276 GWh	Throughout BC

Program participation eligibility criteria

To participate in the *Product Incentive Program*, commercial customers must be:

- a BC Hydro business customer who spends less than \$200,000 annually on electricity and who does not have a key account manager, or
- a multi-unit residential customer applying for projects in common areas only

The commercial project must meet the following criteria:

- meet the minimum spending threshold of \$50 total financial incentives per application
- only use approved products identified in BC Hydro's eCatalog
- be installed by qualified installers
- Installations in new construction projects are not eligible for incentives under this program.

Program funding

Historically the program has not had any funding partners. In December 2010 the Provincial Government, under the LiveSmart BC program, offered a 10% top-up to the existing PIP incentives from BC Hydro. The Provincial Government is billed semi-annually to recover the top-up.

Program administration and support

Table 2 Program administration and support

Budget item	Cost (fiscal year April 1-March 31 2011)
Program administration costs including staff, marketing etc	\$2.3M
Number of staff to support the program	12
Incentives	\$6.4M
Program evaluation	Included in program costs
Total	\$8.7M

The internal and external resources to support the program roll out are as follows: program manager, marketing support staff, operations/delivery staff, post-inspectors, engineers, evaluation, IT programmers, Alliance (industry) reps, and customer phone support staff.

The program budgets and targets were determined by a bottom up analysis using previous experience with other programs and based on the BC Hydro Conservation Potential Review report.

Initially, the program was under-performing during the first two years, however it now performs better than expected.

Program design features

As this is a prescriptive program, projects are not pre-screened. If the customer installs an eligible product and meets program criteria, the project is approved.

Some projects are randomly selected for post-inspection. When the program was first launched, a higher percentage of all projects were inspected to keep a close watch over the program. As the number of problems has been minimal, the number of inspections was reduced. The number of inspections is based on the total number of projects, and is not determined based on statistical validity.

Each retrofit project must be complete and the application and supporting documents must be submitted within 120 days of the invoice date in order for the applicant to receive the incentive.

BC Hydro uses the California Evaluation Framework¹ as a guide to undertaking program evaluations.

BC Hydro determines the impact of its energy conservation initiatives in the following manner: first, a complete evaluation plan is prepared covering the scope, issues, timing and expected costs of the evaluation study(s). Second, process, market and impact evaluations are conducted at major milestones or at program completion. Third, evaluations are reviewed and approved by a BC Hydro cross-functional Demand Side Management Evaluation Oversight Committee (EOC) chaired by a Senior Manager from BC Hydro's Engineering Services Business Unit. The EOC membership also has two external senior advisors from Lawrence Berkeley National Laboratory, and from Pacific Gas and Electric Company. This evaluation is done annually.

Program delivery

The program does not have an internal sales force, as the application is self-serve. However, a broad range of marketing channels are used to raise awareness about the program, including direct mail, email, industry relationship management, partnerships with business and trade associations, targeted advertising, bill inserts and community partnerships.

The program does not incur additional costs to serve outlying regions.

¹ The California Evaluation Framework is available for download from this site:
http://www.tecmarket.net/ca_eval_framework.htm. Accessed June 23, 2011.

Incentives design

This is a deemed savings program so there are no other types of incentives offered beside the fixed incentives for listed measures.

Incentive levels are determined based on a combination of installation costs, energy savings achieved, effective measure life, maintenance savings, overall customer payback and cost test results.

Table 3 Incentives

Incentive type	Description	Value	Condition of payment	Timing of payment
Financial (rebate/incentive)	Linear fluorescent lighting	Range of incentives available based on specific equipment.	Meeting program criteria / policies	Upon project completion and review
	Other lighting	There are full lists of equipment options for each type of incentive. ²		
	Controls and sensors			
	Heating, ventilation and air conditioning			
	Commercial kitchens and refrigeration			
	Other non-lighting			

Strengths and weaknesses of program and advice to NL

The program design is very strong, as it enables the program to be delivered in a highly cost-effective manner with limited staff. Another strength is the Power Smart Alliance engagement & participation – the Alliance is the driving sales force behind a significant amount of projects. The Power Smart Alliance is a network of independent contractors and engineers that can help customers select, install and maintain the energy related systems of a facility. The Alliance contractors are registered with BC Hydro to perform installations of energy efficient equipment.

One weakness of the program is that it is not designed to assist customers who are trying to complete a retrofit that is unique or unusual.

² Full lists of eligible equipment are available from http://www.bchydro.com/rebates_savings/product_incentive_program/eligible_technologies.html. Accessed June 15, 2011.

Chateau Victoria Hotel: Product Incentive Program case study³

For three years, the Chateau Victoria Hotel and Suites has been steadily changing light bulbs. Through a careful program of incremental change, it's been installing new technology and shaving money off its power bills, a step at a time.

"We started with all of our exit signs, changing them over to LED [light-emitting diode] lights," says Dennis Powell, in charge of maintenance for the 177-suite property. "Last fall, we completed installing new light strips over the wet bars in all the suites – we changed the big round "Fat Albert" incandescent bulbs for CFLs [compact fluorescent lamps]."

The hotel has also changed ceiling lights in the suites, cutting energy usage down by replacing 60 watt incandescent bulbs with 13 watt CFLs. And they've switched the lights in the hotel's entry canopy, along with using energy-efficient LEDs in the extensive holiday light display.

"This coming fall, we'll start work on changing all the hallway lighting," says Powell. That switch will shift from T-12 fluorescent tubes to newer, more efficient T-8 tubes – and save significantly on energy, since the hallways lights must be on 24 hours a day. "We also have an 18,000 square foot office building attached to the hotel – and we're planning to change all the ceiling lights there as well," he adds.

Powell has a few guidelines for making a switch to new lighting. He watches new technologies as they develop, using a Power Smart Alliance member company to help keep him on top of options. He's not keen to switch too soon – he wants to feel certain that the technology is appropriate and reliable first.

For example, he says the earliest CFLs were too large for some hotel fixtures and didn't produce a warm, inviting light (they now come in a variety of shapes and sizes, and colour temperatures). With some LED floodlights, Powell is concerned about the amount of heat they generate. And in restaurant areas where the lights must be able to dim, he's waiting to ensure that the new dimmable high-efficiency lamps are durable.

What is not up for question, however, is whether the process of change will continue. "The management here are very conscious of environmental issues," says Powell. "We recycle paper, cardboard, metal, plastic, glass, and organic material – we've been doing this for a number of years. So upgrading the lighting is just a further step to that."

Powell says with such a large property he has not tracked the specific energy savings for any specific retrofit – but he knows the efficiencies are adding up.

³ Reference: Winham, Nina. BC Hydro website. Available from: http://www.bchydro.com/powersmart/success_stories/commercial_offices_other/chateau_victoria.html. Accessed June 24, 2011.

"Just on the canopy, the wattage of the lights before was 4,100 watts, and it's now down to about 1,150 – so I know the savings are there," he comments. (The new canopy lights alone save about \$700 per year in electricity costs – and the hotel has added to the savings by using a photocell to switch the lights off when not needed.)

The Chateau Victoria has also made use of relevant incentives from BC Hydro's Product Incentive Program to defray the cost of buying new equipment.

The savings and incentives are important – but in the end, it's the hotel's environmental ethic (the Hotel Association of Canada has awarded the Chateau Victoria four out of five "Green Keys" in its eco-rating system) that has propelled its steady shift.

"They're definitely on board," says Powell of the management team. Which means he's probably already planning which light bulbs will get changed next.

Power Smart Partner Commercial Program (BC Hydro)

Program description

The *Power Smart Partner Program* is open to commercial, government and institutional facilities with annual expenditures of at least \$200,000 on electricity (or about 4 GWh/year). The program offers a variety of services, tools and funding for large commercial customers. The tools to identify savings opportunities include:

Energy Study: A comprehensive examination of the energy-using systems of a facility producing detailed recommendations. The program includes:

- Co-funding, with the potential for 100% funding of the energy study
- A list of pre-qualified consultants capable of performing detailed commercial energy studies. (Note: To qualify for funding, the consultant must be a registered member of the Power Smart Alliance.)
- Access to Power Smart technical and energy management resources throughout the energy study process

Energy Management Assessment: Provision of an energy management assessment and a rating of the organizational energy performance. The assessment includes:

- A diagnostic workshop, bringing together senior management from across the company for a strategic process review. Managers respond to a series of questions to establish the energy management performance of the company. The workshop is held annually to track progress and highlight new opportunities
- A detailed report rating the organizational performance on 22 elements, identifying the five most critical areas for improvement and recommending actions
- A benchmark analysis comparing the organization to others within the same industry along with best practice targets

Energy Manager Online: Provision of information about the Energy Manager Program and resources for Energy Managers.

The funding and support to implement energy efficiency measures for the *Power Smart Partner Program* includes:

Project Implementation Fund: Provision of incentive funds to assist with the implementation of energy efficiency projects. The participant's project must be hardwired or permanent in nature, and have a simple payback of greater than two years before factoring in the incentive amount and save a minimum of 50,000 kWh/year by implementing a proven energy saving technology and where project performance is measurable and sustainable.

Power Smart Partner Express: An online portal for smaller, simpler implementation projects. Incentives are based on the project details.

Continuous Optimization Program for Commercial Buildings: A program that assists commercial building owners retro-commission their building, then helps maintain and continually improve the level of efficiency in the building operations (this program is discussed separately in this report)

Behavioural and organizational programs in the *Power Smart Partner Program* includes:

- **Workplace Conservation Awareness:** Sharing online tools to help build a Power Smart Employee Energy Awareness program.
- **Peer and public recognition** is also a strategy in the *Power Smart Partner Program* wherein customers are recognized for their energy conservation efforts.

Other initiatives in the *Power Smart Partner Program* includes:

Data Centre & Server Initiative: Providing methods, tools and funding to consolidate data servers, allowing fewer units to perform the functions of several including:

- Funding for data centre assessment studies to identify consolidation opportunities and the best approaches to improving the energy efficiency of the data centre.
- Project implementation incentives to install data centre and server consolidation and energy conservation measures. Projects that qualify for incentives must achieve a minimum energy savings of 100,000 kWh per year per project (equivalent to decommissioning approximately 50 219-watt servers) and have minimum payback of two years.

High-Bay Lighting Initiative: Provision of financial incentives to facilities with projects that would save at least 100,000 kWh to identify, design, and install more effective and energy-efficient lighting in high-bay facilities such as warehouses, athletic facilities and large retail stores. The incentives depend on the Power Smart lighting products installed and the amount of electricity saved. Funding up to a maximum of 60% of total project costs for new energy-efficient fluorescent lighting and controls is available.

The main goal of the *Power Smart Partner Program* is for the commercial sector to embed energy conservation into their business in the same manner as they treat quality assurance and safety. Ideally, a new standard position will be created in these companies: Chief Sustainability Officer. BC Hydro's Power Smart mandate is to make sure buildings are run with high energy efficiency. There are three key issues (barriers) this program addresses:

- **Business management:** BC Hydro wants to ensure organizations know where they are and where they want to go in energy conservation. To this end, the program provides energy studies, energy management tools, and audits

- Asset management: BC Hydro provides incentives towards retrofit projects
- Change management: This program includes recommissioning, recognition strategies, behavioural programs, etc. The energy management assessment and facility staff training are key factors in the success of energy efficiency projects.

The *Power Smart Partner Program* initially launched in 2002 with residential, commercial, and industrial streams in one program. In 2008 the industrial (transmission and distribution) program was launched separately.

BC Hydro programs are designed to address the traditional “five As”: awareness, availability, accessibility, affordability, and acceptability, plus a 6th A: advocacy.

Affordability is the biggest barrier BC Hydro is trying to address with this program. The payback is very long for most major energy conservation projects. Since energy costs are typically less than 2% of total operating costs, CEOs of companies will often not even consider such projects.

With respect to advocacy, BC Hydro uses a number of energy efficiency advocates to help promote the programs and the principles of conservation. Advocates include actors, athletes, politicians, and business leaders. These advocates are sometimes booked to speak at public events on behalf of BC Hydro.

This program is run solely by BC Hydro, however there are a number of partners and associates who help promote the program: the PowerSmart Alliance,⁴ industry associations, BOMA BC, Tourism Vancouver, Vancouver Aquarium, and the Royal BC Museum.

There are three main categories of customers for the program:

- Commercial: property management, retail, and hospitality
- Institutional: advanced education, school districts, hospitals and long-term care facilities
- Governmental: municipal, provincial, and federal government buildings

The institutional and municipal government customers tend to be geographically dispersed across the province, whereas the commercial and other government customers tend to be concentrated in the Vancouver area.

There have been a greater number of institutional projects than any other category of customer, however these projects tend to be smaller than the commercial projects.

This program has exceeded its annual targets every year since 2006. BC Hydro understands its offerings have to be flexible and it has to adapt to the market environment that is becoming more mature and sophisticated every year. Since many customers now know BC Hydro’s programs

⁴ The Alliance is a network of independent contractors and engineers that can help customers select, install and maintain the energy related systems of a facility. The Alliance contractors are registered with BC Hydro to perform installations of energy efficient equipment.

processes and systems, the utility has to be more aggressive to keep the customers interested. Among the 600 Tier 1 customers (those with an annual electricity costs >\$200,000), approximately 300 are PowerSmart Partners⁵ and 120-150 are completing energy efficiency projects with BC Hydro each year.

Program participation eligibility criteria

The *Power Smart Partner Program* is open to commercial, government and institutional facilities that spend at least \$200,000 annually on electricity.

Program funding

BC Hydro is the sole funder of this program. Costs are recovered through the rate base.

Program administration and support

Table 4 Program administration and support

Budget item	Cost (year)
Program administration costs including staff, marketing etc	\$5 million
Number of staff to support the program	~43 full-time equivalent (FTE)
Total	\$25 million/business case⁶

This program has approximately 43 full-time equivalent staff persons. This includes groups for marketing, engineering, monitoring and verification (M&V), quality assurance, operations, and key account managers.

Budgets and targets are set annually and are determined through the development of the 12-month business case.

Program design features

BC Hydro's approach to customer engagement is to treat commercial customers as individuals, not as businesses. BC Hydro held an IDEO

⁵ Those who have shown their commitment to energy conservation by signing a pledge and starting to integrate a sustainable energy conservation management approach into their business.

⁶ While a business case is for 12 months, BC Hydro may not necessarily spend all of the money in 12 months. For example, a project that is initiated during the 12 months may not be completed until after the 12-month period.

strategy session to help develop their approach; IDEO is a global design firm that takes a human-centered, design-based approach to helping organizations in the public and private sectors innovate and grow.

Over the past 2 years, BC Hydro has been working to profile their commercial customers and to understand what motivates them, what barriers they encounter, etc. The current approach is to 'bring the messages to where the customers are.' For example, BC Hydro has found that CEOs often work through their lunch breaks, so BC Hydro gave out lunch bags to promote energy efficiency programs. Another example is that CEOs often have children who play sports, so BC Hydro promoted energy efficiency through children's sports associations.

Another way BC Hydro engages with customers is through the PowerSmart Partner designation. Customers receive credits each time they do a project with BC Hydro (e.g. attend a workshop, etc.). Within a 2-year window, customers who receive at least three credits receive the designation and can then benefit from BC Hydro's recognition initiative. This has been a very successful initiative with excellent feedback from customers.

Program delivery

The program is available throughout the province and program delivery has no significant differences between rural and urban areas. Travel costs, for key account managers and Alliance members, are covered for all projects through the program. The online portal, Power Smart Partner Express, specifically serves rural customers.

Incentives design

Incentive calculations are on a per-project basis to allow consideration for different financial situations of smaller versus larger customers. For example, a larger school will likely get more competitive bids from contractors for project work than a smaller school (with smaller projects) would receive, thus the incentive may be increased for the smaller school.

Table 5 Incentives

Incentive type	Description	Value	Condition of payment	Timing of payment
Financial (rebate/incentive)	Energy study	Up to 100%	Sign an agreement; study must be completed by PowerSmart Alliance consultant	After work is completed and verified
	Energy management assessment	100% funded	Sign an agreement	After work is completed and verified

Incentive type	Description	Value	Condition of payment	Timing of payment
Project implementation fund	Up to 75% of incremental cost of lighting, mechanical, HVAC, and other energy efficiency projects	Project must be hardwired or permanent and have simple payback >2 years (before factoring in incentive) and save ≥50,000 kWh/year		After work is completed and verified
Power Smart Partner Express	Variable, dependant on project and customer	Sign an agreement		After work is completed and verified
Data centre and server initiative	Funding for data centre assessment study; funding to install consolidation and energy conservation measures in your data centre	Sign an agreement; projects must meet minimum requirements of 100,000 kWh per year in energy savings and a minimum payback period of two years		After work is completed and verified
High-bay lighting initiative	Up to 100% for lighting redesign study; up to 60% of total project costs to install new energy-efficient fluorescent lighting and controls	Sign an agreement; minimum project savings of 100,000 kWh	50% of Lighting Redesign Study costs will be funded once study is complete and the Lighting Redesign Study report has been approved by BC Hydro and an invoice with proof of payment has been received. An additional 50% of the Lighting Redesign Study cost will be funded by BC Hydro if	

Incentive type	Description	Value	Condition of payment	Timing of payment
			an incentive application to implement electrical energy saving measures is submitted within one year of BC Hydro's approval of the Lighting Redesign Study report.	

Monitoring and verification procedures

Project monitoring and verification consists of invoice reconciliation and proof of payment. For Power Smart Partner Express projects, which are simple and straightforward projects, BC Hydro will ask 20% of applicants for full documentation for invoice reconciliation. Projects with savings > 300,000 kWh are automatically flagged and the EM&V manager selects which projects will have on-site verifications.

For all other projects, of those that have savings between 300,000 and 500,000 kWh, 40% of applicants will be asked for full documentation for invoice reconciliation and BC Hydro will conduct site inspections.

Program evaluation is conducted by BC Hydro's EM&V group. A comprehensive evaluation is conducted which includes research on customers, customer surveys, freeridership⁷ and spillover analysis, etc. Such an evaluation typically costs \$3,000 to \$4000.

Strengths and weaknesses of program and advice to Newfoundland and Labrador

The program's strengths are its design—it contains both prescriptive and custom options and is flexible for a variety of customers within the eligible group. One weakness of the program is the marketplace confusion between the Product Incentive Program (discussed separately in this report) and the Power Smart Partner Express online portal option in this program. BC Hydro is currently working to clarify the differences

⁷ 'Freeriders' is a commonly used term when discussing the impacts of energy conservation programs. The term refers to those program participants who reap the benefits of the program when they would have made the energy efficiency retrofits in the absence of the program. This is in direct opposition to "spillover." Spillover refers to the impacts of individuals who receive the program messaging, do not participate in the program, but make energy efficiency retrofits.

between these two offerings.

When delivering a program to the commercial sector, it is often beneficial to tailor marketing (e.g. value propositions via brochures, cover letters, etc.) to particular sub-sectors. This program markets to eight different sub-sectors. To do this, the program design and implementation team must have a very good understanding of customers.

It is also important to have a thorough understanding of the different benefit-cost tests (i.e. Total Resource Cost test, Utility Cost or Program Administrator Cost test, Rate Impact Measure test, etc.) and how a small change in the test result can have significant impacts on the program and in the market.

Finally, when developing a program, ensure the information system being used is robust; often, program restrictions are due to IT restrictions.

Abbotsford School District 34: Power Smart Partner pilot project⁸ case study⁹

The Story

“Reducing energy waste in our PCs – now, that’s an idea that really computes.”

- Edwin Hood, Energy Coordinator, Abbotsford School District 34

“Our demonstration project shows that installing computer power management software delivers significant electricity savings, reducing our operating costs. That means that we have more money to spend where it really counts – on education and maintenance upgrades.”

- Dale Churchill, Director of Facilities, Abbotsford School District 34

The Situation

Abbotsford School District 34 serves 19,500 students in 49 schools. As with other school districts throughout the province, electricity costs represent a high percentage of Abbotsford’s overall energy costs, and the district has been very proactive in exploring and implementing measures to achieve energy savings.

Abbotsford has a working inventory of 6,000 computers, and these are a significant user of electricity. One of the problems involved in operating a large computer bank is the difficulty in getting users to turn the machines off at the end of the day. Leaving computers on results in a substantial waste of electricity and higher-than-necessary operating costs. In one typical secondary school, for example, 100 to 150 of the school’s 250 computers are left on 24 hours a day.

Abbotsford has made a strong attempt to change behaviour by working with school staff, but change has been slow. Indeed, the problem of computer energy waste is a wide spread one in society. An estimated 40 per cent to 50 per cent of the one million computers in the B.C. workplace, along with their monitors, are left on overnight, with no power-saving features activated. Even in computers that do have power-saving features, many control only the monitor, leaving the computer running, or users may de-activate the features. Network technicians are often reluctant to install energy conservation software that would automatically shut off computers. Reasons include the fear of problems with computer lock-ups and freezing, degradation of network performance, damage to hardware and security issues.

As a result of all these factors, about 170 gigawatt-hours of electricity are wasted each year in B.C. because workplace computers are left on at night and during inactive periods. This translates into approximately \$10 million in annual electricity costs. Dale Churchill, Abbotsford School District’s Director of Facilities, and Edwin Hood,

⁸ Note: There are no available case studies for the Power Smart Partner Commercial program.

⁹ Reference: BC Hydro, 2004. Available from: www.energystar.gov/ia/products/power.../BCHydroCaseStudyFeb2004.pdf. Accessed June 24, 2011.

Energy Coordinator, were aware of the computer energy waste problem and were seeking a practical solution.

The Solution

Edwin learned about a new energy management software tool called Surveyor Network Energy Manager, developed by Verdiem Corporation (formerly EZConserve). Surveyor allows for centralized power management of both monitors and computer units. It is designed to measure, monitor and manage computers individually and on networks. The development of Surveyor was partially funded by the Northwest Energy

Efficiency Alliance in the U.S. The software has been shown to significantly reduce electricity usage, and it has been approved as a conservation measure by the Bonneville Power Administration and other utilities.

A case study to test Surveyor in one of Abbotsford School District's secondary schools was put in place. As a Power Smart Partner, Abbotsford approached BC Hydro to see if Hydro was interested in participating in the pilot project through its Power Smart Partner Demonstration program. This program was developed by Hydro to encourage the development and market adoption of new energy-efficient technologies. Because Surveyor was a new energy technology with promising energy-saving potential, Hydro was interested, and together, Hydro, Verdiem Corporation and Abbotsford School District agreed to carry out a pilot project to test the software. Robert Batemen Secondary School was chosen as the test site. Of the school's 250 computers, 19 were to be tested. Surveyor allows district staff to control the shutdown of com-

The objectives of the demonstration project were to:

- Demonstrate and confirm the electricity savings achieved by installing energy conservation software in a network environment, and
- Ensure the compatibility of the product with the district's computers in a network infrastructure.

The scope of the project included:

- Collecting baseline energy measurements from the 19 test computers and forecasting obtainable savings;
- Programming shut-down times for the test computers using Surveyor;
- Measuring actual electricity savings from each computer and for the system as a whole; and
- Ensuring compatibility with Abbotsford's existing infrastructure.
- Projected electricity savings were estimated to be 253 kWh per computer per year, for cost savings of \$15.23 per computer per year. Once Surveyor was installed, the 19 test computers were monitored for a one-week period in April 2003.

The Benefits

Electricity savings

Analysis of the data showed that the software was effective, reducing computer electricity use by 30 per cent. Actual electricity savings were 254 kWh per computer per year, or virtually the same as the estimate. (Compared to other powersaving applications that shut down only the monitor, this represents incremental savings of 54 kWh per unit.)

Abbotsford School District was so pleased with the results of the demonstration project that it has purchased licences to use Surveyor with 2,000 more computers district-wide. This will save the district an additional 508,000 kWh a year, equivalent to \$30,480 in annual cost savings.

Inventory management

Like other school districts in which computer use has grown rapidly, Abbotsford did not know the exact number or make of the computers within the district. Surveyor assists in building and managing the inventory of computers, which is a significant benefit for the IT department.

Control of computers

Surveyor allows district staff to control the shutdown of computers and monitor adherence, eliminating the need to continually remind users to shut off their machines. Edwin indicated that the district considered other software applications but rejected them because they would allow users to override the power-saving settings, thus defeating the energy savings potential. Surveyor ensures that computers are shut off and that the electricity savings are achieved.

Compatibility with the existing network

The pilot showed that Surveyor could successfully be implemented in a network environment without interfering with other applications.

Ease of use and technical support

School district staff found the software very easy to install and the support from Verdiem Corporation excellent.

Continuous Optimization Program for Commercial Buildings (BC Hydro)

Program description

The *Continuous Optimization Program for Commercial Buildings* assists commercial building owners in retrocommissioning their building, then helps maintain and continually improve the level of efficiency in their building operations. First, buildings are recommissioned to get them operating as intended. Then, an energy management and information system (EMIS) is set up to facilitate ongoing energy management practices. The program develops ongoing relationships with customers, and the customer remains in the program as long as they are getting value from it.

The program starts with a building audit with recommended energy efficiency measures, implementation costs, energy savings and paybacks. Implementation must include recommended measures that have a simple payback of two years or less, in order to maintain eligibility and retain the audit funding incentive. Because the recommended measures are typically low-cost or no-cost and have such short paybacks, no incentives are provided for implementation.

The program determines whether energy consumption is on or off target and finds and corrects operational issues when consumption is higher than expected. Customers sometimes refer to the program as “*The Real-Time Metering Program*.”

BC Hydro will assist by providing support through measurement and analysis, load profiling, benchmarking, quantified energy savings and other measurement and analysis methods. As well, the program includes building operator training funding to have a service provider conduct in-house training for building operations personnel in the use of the Enterprise Energy Management reports and the steps needed for continuous optimization.

There is also funding for the service provider to visit the building every three months for the first year, to ensure building operators continue to undertake recommended activities for ongoing energy savings.

The program objectives and targets are to obtain operational savings (primary focus is optimizing existing building systems) from commercial buildings, to achieve market transformation (to make continuous optimization part of every commercial business), and to establish owner and operator understanding of building performance. The *Continuous Optimization Program* is about continuous customer engagement, not a one-time incentive payment.

The program target market is existing large commercial buildings (>50,000 ft²) with a Building Automation System (BAS). The average building size is 153,000 ft², with heavy representation from the public sector (hospitals, university / colleges, high schools), but also from the larger property management firms.

The program was designed to address two main barriers:

- **The market's limited understanding of the value proposition of building re-commissioning (RCx).** The ramifications of this were as follows: 1) no customer was willing to invest in paying for an energy study with an uncertain outcome, and 2) there was no consultant experience base to draw on. This was exacerbated by the fact that there is no well-defined scope of work for RCx of buildings, even though anecdotal evidence abounds that buildings are poorly operated.
- **Optimize and forget it.** The program aims to improve persistence of operational savings measures, primarily through the provision of an Energy Management Information System (EMIS), but also by extending the scope of work for RCx consultants to include a post implementation “Coaching” component.

The program team works with two sets of trade allies:

- RCx consultants whose primary deliverable is the associated energy study.
- EMIS vendors who provide hardware, software, and training for the energy analysis and reporting software.

Program uptake to date has been quite good. There have been 115 customers enrolled in the program, representing 442 sites and 65.0 million ft². This includes:

- All BC Health Care Authorities
- The 3 large universities (UBC, UVic, SFU)
- Most of the large office buildings in downtown Vancouver
- Several of the leading municipalities (Vancouver, Victoria, Richmond)
- 13 school districts

In total there have been 193 signed agreements (standard offer) and 186 buildings under Multi Building agreements (Opportunity Assessments).

The program is very cost effective and has very good benefit/cost ratios. From the first business case:

Levelized Cost (including portfolio level overheads)

- 7.4 cents per kWh (2010 dollars): Utility
- 11.1 cents per kWh (2010 dollars): All Ratepayers (TRC)
- 19.1 cents per kWh (2010 dollars): Non-Participant (RIM) Test

Benefit/Cost Ratios (including portfolio level overheads)

- 1.9 Utility Test
- 2.9 All Ratepayers (TRC) Test
- 0.7 Non-Participant (RIM) Test

Customers see savings of about 7% electricity, and 11% natural gas. There has been about an 84 GWh/year total energy savings from this program. So far, there is no customer interest in picking up the incremental cost of looking at water conservation.

Program participation eligibility criteria

Eligible buildings include commercial buildings that:

- Are greater than 50,000 square feet;
- Have a Building Energy Management system in good working order;
- Provide documentation including mechanical and electrical schematics; control drawings; testing, adjusting and balancing reports; and operation and maintenance reports;
- Have well-maintained equipment and systems;
- Have no major retrofits or tenant improvements planned for the next one to two years;¹⁰
- Buildings must have nine months of baseline data collection for modelling purposes.

Program funding

Currently the program is funded solely by BC Hydro, although there are discussions with FortisBC to share program costs.

Program administration and support

Table 6 Program administration and support

Budget item	Cost (year)
Program administration costs including staff, marketing etc	Not available
Number of staff to support the program	~8 full-time equivalents (see below)
Incentives	Not available
Program evaluation	0.4 full-time equivalents

Internal program staff include:

- Program manager
- Meter support person to support EMIS deployment

¹⁰ During our interview, it was noted this eligibility criterion was a historical one and was not always followed when determining participant eligibility.

- M&V support
- Operations support to manage agreements, communications, etc.
- Engineering support to review proposals, energy studies.

Actual costs and savings are very consistent with the program estimates, however market uptake has consistently been higher than expected.

The program budgets and targets were determined based on the results of a BC Hydro pilot started in 2008.

Program design features

The program's admissible expenditures are consulting fees and EMIS costs.

The major program milestones are as follows:

- **Opportunity assessment.** The building eligibility is confirmed according to a checklist of criteria (based on a California model). Typical duration: 3-4 months.
- **Program application** (with RCx consultant proposal). The participant signs-on for the maximum amount they are able to spend.
- **EMIS installation.** The building meter is upgraded, hardware is installed and the data is employed. BC Hydro supports the EMIS for 9 years altogether. Typical duration: 3-4 months.
- **RCx – Investigation.** This is conducted in parallel with the EMIS baseline data collection. Typical duration: 9-12 months.
- **Implementation.** This takes place during the rest of the fiscal year from when the investigation phase was completed. Typical duration: 13-23 months. Average duration: 18 months.
- **RCx – Hand Off.** Typical duration: 1 month.
- **RCx – Coaching.** A service provider will visit the facility every three months to meet with the building operator. Duration: 12 months.

The program has been supported primarily by Key Account Managers and additional support has come from the trade allies. Program marketing is mostly word of mouth.

The program engages potential participants via a face-to-face meeting with the Key Account Manager and the program manager.

Project monitoring and verification is inherent in each project EMIS and the BC Hydro evaluation department conducts the program evaluation.

Program delivery

With respect to geographically dispersed participants in rural or remote areas, there are not a lot of large buildings in less populated

areas, so this issue is self-limiting. It's likely the only participants from rural areas will be hospitals and high schools, and only if they are larger buildings. The program covers trade allies' travel costs, so there is no limit on program participation in rural areas.

Incentives design

Primarily, incentives were structured to address the program objectives of minimizing risk and maintaining cost effectiveness.

BC Hydro funds the full cost of the audit which identifies energy-saving opportunities in the facility. The facility is to carry out all of the recommended measures that have a simple payback of two years or less, in order to maintain eligibility and retain the Investigation incentive. Because the recommended measures are typically low-cost or no-cost and have such short paybacks, no incentives are provided for implementation.

Table 7 Incentives

Incentive type	Description	Value	Condition of payment
Financial (rebate/incentive)	Audit	100% of cost	Approved program participant
	Utility meter upgrade to one that provides readings every 15 minutes	100% of cost	Approved program participant
	EMIS hardware and software license	100% of cost	Approved program participant
Technical expertise	Consultant fees (investigation, hand-off, coaching)	100% of cost	Approved program participant

Monitoring and verification procedures

Project monitoring and verification is inherent in the EMIS deployment. BC Hydro will continue to receive information for at least 9 years after installation.

The EM&V plan is based on the International Performance Measurement and Verification (IPMVP) protocol, Option C, via either monthly utility bills or 15 minute interval data. The IPMVP is owned by the Efficiency Valuation Organization (EVO), the only non-profit organization in the world solely dedicated to creating measurement

and verification tools for resource efficiency. These protocols are updated annually and can be accessed online.¹¹

Strengths and weaknesses of program and advice to NL

The market uptake has been higher than expected. This is likely due to two factors:

- **Program value proposition: access to an EMIS system.** There is a large appetite in the market to get more information on energy consumption than one bill per month, yet EMIS systems tend to be very expensive.
- **Risk management.** BC Hydro assumes 100% of the cost (of the consultant, and of the EMIS), thus managing the risk. The only responsibility of the customer is to implement those measures with less than a two-year payback.

Other strengths of the program include:

- Straightforward incentive structure (incentive \$ not tied to project outcome)
- M&V is inherent in program design
- Program is very cost effective

Program weaknesses include:

- The program manager needs support or background in building operations / re-commissioning, M&V (new methodology and reporting mechanism), and metering
- Support required from utility meter technicians to upgrade utility meters.

If BC Hydro were starting from scratch, they would ensure:

- meter technicians are on board and processes were in place to upgrade utility meters
- sufficient RCx consultants were in the area to handle the demand for the program
- all program players were ready for a quick start

The program requires a fairly experienced program manager with a good support team. Internally, this program is perceived as one of the more complicated and comprehensive programs at BC Hydro. The initial demand for the program was very high and at times, the program team could not keep up with the demand.

It was found that natural gas savings were often greater than electric savings. The major program draw is the EMIS; customers in BC, like many customers, want to move beyond once per month bills, and toward ongoing energy management.

¹¹ IPMVP is available online at <http://www.evo-world.org/>. Accessed June 21, 2011.

Capilano University: Continuous Optimization Program case study¹²

Capilano University has 14 buildings that total 517,000 ft². These buildings range in square footage from 50,000 to 130,000 ft². The electrical consumption for all of the buildings was monitored using Pulse, an energy management information system (EMIS) software. The primary functions of the EMIS are measurement and verification, but it also provides automated energy reporting and occupant education.

The electrical consumption for all of Capilano's buildings in 2009 was 6,937,000 kWh. The natural gas consumption for the same year was 39,700 GJ. Capilano University is also running a BC Hydro-funded Workplace Conservation Awareness campaign to help spread the message of conservation.

The results of the project have not yet been finalized. To date, the Pulse software, with its engaging and interactive dashboard, has received excellent feedback from students, employees, and janitorial staff. The visual reporting creates a lasting impact for users, and links wasted energy to building occupant behaviour. EMIS is offering the maintenance staff a new view of building energy consumption, and encourages conservation action by all building occupants.

The goal of this project is to reduce electrical consumption by 5%, or approximately \$20,600 annually, and to achieve community engagement of 20%.

¹² Reference: The role of EMIS in BC Hydro's Continuous Optimization Program and beyond. Available from: <http://www.slideshare.net/PulseEnergy/the-role-of-emis-in-bchydros-continuous-optimization-program>. Accessed June 24, 2011.

Small Business and Commercial Program (FortisBC)

Program Description

Every 5 years, FortisBC hires an external consultant to conduct research on the market potential for various energy efficiency options. For example, this research would identify the amount of kWh savings that could potentially be obtained from lighting upgrades, process redesigns, etc. Based on this report, FortisBC builds a conservation business plan and develops program budgets.

The Small Business & Commercial Program encourages customers to improve their energy efficiency by offering incentives for retrofits of lighting, heating, ventilation and air conditioning (HVAC), water heating, refrigeration equipment, digital controls, motors, building envelope, and any other measures with demonstrable electricity savings.

Lighting upgrades include:

- compact fluorescent light bulbs (CFLs)
- electronic ballasts
- reflectorized luminaries
- T8 fluorescents
- LED and CFL exit lights
- high intensity discharge lighting
- motion sensors and other lighting control systems

HVAC upgrades include:

- adjustable speed drives
- economizer controls
- heat recovery systems
- digital control systems
- geothermal and air source heat pumps

Water heating upgrades include:

- heat pumps
- solar heating
- heat recovery

Water conservation technologies such as low flow faucet aerators and shower heads are also included.

Refrigeration upgrades include:

- Ice rinks:
 - *installation of reflective ceiling curtain*
 - *brine pump control*
 - *desiccant dehumidification*
 - *reduced head pressure on ice plant*
 - *geo-exchange system*

- Grocery stores and other retail
 - *replacing open display cases with enclosed cases*
- Fruit Packing plants
 - *cold room evaporator fan control*
 - *quick open doors*
- All facilities
 - *Digital control systems*
 - *Replacing old refrigeration equipment – condensing units, compressors, etc, with new more energy efficient equipment*
 - *Condenser heat recovery*

Digital controls for equipment such as:

- lighting
- HVAC
- motors¹³
- mechanical and process equipment

Building envelope upgrades include:

- upgrading insulation in walls, ceilings, floors and foundation
- installing thermal doors
- applying caulking or weather-stripping around doors
- upgrading windows to thermal low E or heat mirror
- installing window shading systems.

The target market for this program is non-residential customers whose electrical demand is generally not more than 40 kW and can be supplied through one meter.

Customers can participate in a custom or prescriptive version of the program. There are different ways the rebate incentives are disbursed. The lighting rebate incentives are available at the point of sale (at wholesalers) of the energy efficient equipment, based upon a memorandum of understanding between the program and the wholesalers. The wholesalers apply a rebate of up to half of the cost of the eligible products to a maximum determined by FortisBC. For non-lighting projects, customers access the custom option of the program. FortisBC pays customers \$0.10/kWh based on one year of savings resulting from the project.

Qualified customers can also take advantage of a free walk-through energy audit conducted by one of the program's qualified technical advisors (employees of FortisBC) to identify where conservation opportunities exist. There is one qualified technical advisor in each of the three sections in Fortis BC's service territory. Each technical advisor has Certified Energy Manager (CEM), paid for by FortisBC. If required, FortisBC will also fund up to 50 percent, to a maximum of

¹³ Motor upgrades or new motors must exceed the BC Provincial Government Standards.

\$5,000, of an approved consultant's fee to conduct a comprehensive energy study.¹⁴

The main objectives of the Small Business & Commercial program are to improve energy efficiency in the small business and commercial sectors by raising awareness of energy efficiency, and providing incentives for these customers to replace old equipment with efficient equipment. Lack of awareness and / or lack of funds for upgrades were the main barriers the program was designed to address.

Program partners include local electrical wholesalers, consulting engineers, and suppliers of energy efficiency products. These groups are aware of FortisBC program offerings and use the program incentives to encourage customers to make upgrades.

This program has been in market since 1989 and is modeled after the Power Smart programs offered by BC Hydro. FortisBC has annual conservation targets for each customer class; the general service target for 2011 is 13,940,000 kWh and through all of FortisBC's programs for general service customers, 36% of this target has been met as of April 2011. The annual targets have been met or exceeded nearly every year since FortisBC began its conservation programs.¹⁵

Program participation eligibility criteria

The program eligibility criteria is straightforward. The program is open to non-residential customers with electrical demand generally not more than 40 kW supplied through one meter, and are interested in undertaking projects with demonstrable electricity savings. For custom projects, the project should have a payback of greater than two years.

Program funding

FortisBC files 5-year demand-side savings plans with annual updates, which are approved by the British Columbia Utilities Commission. FortisBC funds all of their conservation programs through the rate base.

¹⁴ There are a very small number of such studies completed—perhaps ten per year. These are reserved for facilities where the technical energy advisor deems that there will be great savings achieved from a custom project.

¹⁵ The disaggregated targets, that is, the targets for this particular program, were not readily accessible to the interviewee.

Program administration and support

Table 8 Program administration and support

Budget item	Cost (year)
Number of staff to support the program	4 FTE
Total	\$4M

This program is run with three technical energy advisors, each assigned to a section of a FortisBC service territory. The program also receives support from FortisBC communications staff.

The program technical energy advisors track all aspects of each project on a spreadsheet. Customers provide the technical energy advisors with a copy of their invoice and proof of verification that they completed the retrofit. The technical energy advisor reviews the invoice, submits an accounts payable voucher, receives a cheque from accounts payable, and mails the cheque to the customer.

Even after 22 years in the market, this program has not reached market saturation. This is because the program is continually modified to respond to changes in the marketplace. For example, the first version of the program did not include CFL light bulbs, and now the program encourages LED lighting.

The Small Business & Commercial Program will be expanding next year; the program conservation targets will increase, the program budget will increase (to ~\$9M), and the program will require more support staff.

Program design features

The projects conducted under this program represent a mix of simple and complicated retrofits, under both prescriptive and custom program options. Admissible projects for this program are essentially any upgrades that save electricity. The project cost has to be reasonable, meaning there is a cost-benefit ratio of at least 1, and ideally 1.5-2. Incentives are not provided for custom projects with less than a two-year payback; with this short of a payback, it is thought customers would be inclined to do these projects without financial incentives.

It is believed most customers become aware of the program from third parties such as consultants, vendors, and contractors who contact the customers directly. These third parties use the program incentives to encourage customers to buy their products or services to make the energy efficiency upgrades and access the program. Program marketing efforts from FortisBC include attending tradeshows and conducting traditional marketing activities (e.g. website is kept up-to-date, program brochures are made available to

customers). There are times when the technical energy advisors will make outbound calls to customers when there is perceived to be potential for significant energy savings for the customer.

Program delivery

The program is designed to achieve the most electricity savings while making the program simple for the customer (i.e. minimal paperwork). The program neither has an application form nor strict reporting requirements. Projects are screened based on the technical energy advisor's knowledge—that is, the efficiency to be achieved by particular upgrades and the associated payback time of the project.

The technical energy advisors are the main delivery agents for the program, and travel to facilities in their section of FortisBC service territory to conduct walk-through audits. FortisBC has vehicles that are shared among different energy efficiency program delivery staff and the travel costs for on-site visits are covered under the associated programs.

Incentives design

Incentives for the custom and prescriptive projects, \$0.10/kWh or a set amount per measure, were determined based on the long-term power purchase avoided costs.

Funding is available up to 50%, to a maximum of \$5,000, of an approved consultant's fee to conduct a comprehensive energy study. This is conducted if the technical energy advisor deems significant savings could be derived from a project at the facility. If the cost is greater than \$1500, the amount will be deducted from the final incentive provided to the participant.

Table 9 Incentives

Incentive type	Description	Value	Condition of payment	Timing of payment
Financial (rebate/incentive)	Prescriptive rebates for lighting products	Up to 50% of the product cost	Small business customer of FortisBC	At point of sale (participating wholesalers)
	Custom projects	\$0.10/kWh for total annual kWh saved by project	Customer provides invoice proving work was completed	After completion of project, unless project is >\$10,000 (then 50% provided upfront, 50% provided after one year of monitoring)

Incentive type	Description	Value	Condition of payment	Timing of payment
Technical expertise	Walk-through audit conducted by the program's technical energy advisor	100% funded	Customer expresses interest in payment and there are questions or concerns that a technical energy advisor cannot address over the phone.	Conducted based on technical energy advisor's availability
	Comprehensive energy study conducted by third-party consultant	50% of cost of energy study	Costs totalling more than \$1500 will be deducted from the customer's program incentive (i.e. if study costs \$5000, \$3500 will be deducted from the incentive paid to the customer).	Funds are available after study is completed

Monitoring and verification procedures

Program participants with custom project incentives greater than \$10,000 are provided with 50% of their incentive upfront. FortisBC monitors their savings for one year, and if the savings are reasonably sustained, the participant is given the remaining 50% of the incentive. For projects with incentives less than \$10,000, no monitoring is conducted and the incentives are paid with proof of installation.

FortisBC has one in-house program evaluation staff member. This person evaluates all FortisBC programs on a regular basis. Once every five years, a randomized sample of the projects is selected and a third-party evaluator conducts site visits to verify the projects were completed and the equipment is still installed.

Strengths and weaknesses of program and advice to Newfoundland and Labrador

One strength of the program is the technical energy advisors are “on the ground” and are highly skilled at delivering the program. Also, FortisBC wants to achieve results and help customers, and deems excessive paperwork does not assist with these goals, so the program does not require application forms and strict reporting.

The program has several weaknesses currently being addressed by the program team. Currently, the program lacks institutional memory, as

many of the program's processes are not formally documented. FortisBC is currently in the process of preparing a program manual that identifies all of the program steps. Also, the program needs a better way of tracking the projects than individual excel spreadsheets. For example, a customer relationship management (CRM) database would be an improvement; such a database would allow projects to be tracked from start to finish.

To launch a program such as this one, it is advised to identify the opportunities that exist (e.g. conduct a market assessment), create a plan of how these opportunities can be seized, and attempt to do so without excessive bureaucratic processes (e.g. minimize paperwork for the customers). A program such as this one would be best administered by knowledgeable staff who have received Certified Energy Manager (CEM) training and who can build relationships with key third parties and groups, such that these groups can act as part of the program sales force.

Accent Inns: Small Business and Commercial Program case study¹⁶

Imagine a hot, scorching summer day in the Okanagan. A vacationing family heads out of their hotel for an afternoon at the lake, while the air conditioner continues to push cold air into the empty room. Now multiply this scene by thousands of Okanagan guest rooms — that's a lot of electricity used to cool empty rooms at hoteliers' expense, with no value to guests.

And while keeping hotel guests comfortable is a priority for Kelowna Accent Inns, so is energy efficiency and keeping energy costs under control.

It's why the hotel installed occupancy sensors in each of its rooms to automatically adjust cooling or heating based on room occupancy, thus curbing energy use without impacting guests' comfort or privacy. "When guests are in the room, they can still control the heating or cooling. As long as they are in the room, the room is theirs," explains David Splawski, operations manager for Accent Inns. "When they leave, it goes back to pre-set limits, rather than heating or cooling a vacant room."

The work was also an easy retrofit—the whole system for the 116-room hotel was ready to go in less than two days. Essentially, it was just a matter of installing the room sensors and then relaying them to the HVAC system.

Hoteliers can choose between a basic system that automatically adjusts the temperature to preset settings, or more sophisticated wireless systems that are less visible to occupants and adjusts both temperature and lighting.

Splawski says guests' privacy was a primary concern. With a small sensor unit in one corner of the room connected directly to the heating and cooling unit, the room temperature adjusts automatically and staff need not enter the guest's room to control unnecessary energy use.

"You wouldn't even know it's there," he adds.

Installing occupancy sensors not only makes sense financially by reducing energy costs, but it's a benefit to the environment by reducing energy demand.

"This was a key motivator for us," says Splawski. "Not only did we do the right thing for us, but we're doing our part to conserve energy and reduce greenhouse gases overall."

With the help of FortisBC PowerSense, the system installed at Kelowna Accent Inns will pay for itself in less than three years. The sensors are expected to conserve 128,898 kWh annually — that's

¹⁶ Reference: Keeping cool under one roof. FortisBC website. Available from: <http://www.fortisbc.com/Electricity/PowerSense/InYourCommunity/PowerSenseSuccessStories/Pages/Keeping-cool-under-one-roof.aspx>. Accessed June 24, 2011.

equivalent to powering 10 average sized homes for a year. With nearly \$7,000 from FortisBC and expected annual savings of \$10,000, their initial investment of about \$28,000 is covered quickly plus they will benefit from long-term cost savings.

The technology is ideal for the Okanagan. Other Okanagan hotel properties with sensors already include the Holiday Inn Express in Kelowna and the Ramada Hotel in Penticton. It's also installed in the new student residences at UBC's Okanagan campus.

Ontario

Retrofit Program (Ontario Power Authority - OPA)

Program description

The *Retrofit Program* provides financial incentives to non-residential distribution customers to replace existing equipment with high efficiency equipment. It also includes installation of new control systems to improve the efficiency of operational procedures and processes.

The channel partners for this program are the electric utilities who deliver the program in their service territories across Ontario on behalf of the OPA. The OPA leads the province-wide sales and marketing efforts.

Businesses can choose from three program tracks based on their needs: prescriptive, engineered, or custom.

Prescriptive track. The prescriptive track provides a defined list of end-use measures that come with a corresponding per-unit incentive. Projects must generate a minimum \$100 incentive.

Engineered track. The engineered track consists of a series of preset calculation worksheets that help estimate reductions in peak demand and/or electricity consumption that apply to the installation of more energy-efficient equipment or solutions. Based on the reductions in peak demand and/or electricity consumption, the worksheet will calculate the incentive amount. The following engineered worksheets are available online or from the local electric utility¹⁷:

- Commercial Interior Lighting Engineering Worksheet
- Commercial High Bay Lighting Engineering Worksheet
- Commercial Directional Lighting Engineering Worksheet
- Unitary A/C Engineering Worksheet (i.e. rooftop units and split systems)
- Variable Speed Drive on Fan Engineering Worksheet
- Variable Speed Drive on Pump Engineering Worksheet
- Compressed Air Engineering Worksheet

For the engineered track, the project must have an estimated demand reduction of 1 kW or first-year annual energy savings of 2,000 kWh. Projects must deliver energy savings for at least 48 months.

Custom track. The custom track is available for more complex or innovative solutions not covered in the prescriptive or engineered track, and not on the pre-defined list. Technology, equipment and system improvements are evaluated on their demand and energy-

¹⁷ <https://saveonenergy.ca/Business/Program-Overviews/Retrofit-for-Commercial/Relevant-Documents.aspx>

performance. Incentives are paid after installation, and once the savings have been measured and verified. For the custom track, the project must have an estimated demand reduction of 1 kW or first-year annual energy savings of 2,000 kWh. Projects must deliver energy savings for at least 48 months. Individual measure worksheet and incentive values can be found online.¹⁸

The program includes additional participant incentives for assisted and social housing providers, as well as multi-family housing providers

The marketplace is broken up into definable sectors – agricultural, small business, institutional, etc. The program targets “low-hanging fruit” or the equipment with easily-improved energy efficiency in each sector.

The Retrofit Program addresses the traditional five “A” barriers: awareness, availability, accessibility, affordability, and acceptability.

As the program has only been in market for a couple of months, and many of the province’s electric utilities have not even begun to market the program to their customers, program uptake data is not available.

Program participation eligibility criteria

The *Retrofit Program* is open to owners or lessees¹⁹ of:

- Commercial spaces or buildings, such as offices, retail and grocery stores, restaurants, hotels and warehouses
- Institutional buildings, including hospitals, universities, municipal halls and arenas
- Multi-family buildings, such as apartments (including low income and social housing) or condominiums
- Agricultural facilities, including dairy, swine or poultry farms, greenhouses and nurseries

The assisted and social housing provider’s application must confirm the regular program eligibility criteria, that they are a social housing provider, that the proposed completion date of the proposed project is reasonable, and that the social housing provider will require the social housing adder (additional funding).

The multi-family housing provider’s application must confirm the regular program eligibility criteria; that they are a multi-family housing provider; and that the person submitting the application is the owner, manager, or authorized representative for the multi-family housing provider. The application must also contain a tenant education proposal that conforms to the program guidelines. The proposal must consist of one or more of the following 3 options:

- Option 1: a plan for developing information packages or letters to be distributed to all tenants of a facility and posters to be

¹⁸ <https://saveonenergy.ca/Business/Program-Overviews/Retrofit-for-Commercial/Relevant-Documents.aspx>

¹⁹ Lessees must have the owner’s consent or authorization

displayed in common areas of a facility prior to project commencement, during project implementation and within 30 days following project completion. In addition to the content for the above milestones, this plan must also include a budget and timeline.

- Option 2: a proposal for hosting at least one tenant engagement session held after project commencement but before 30 days following project completion offered to all tenants of the building. In addition, this plan must include a budget and timeline.
- Option 3: a plan to develop, deliver and provide specific content for the following three elements: a) provision of information, tenant survey, make available results of survey. In addition to the content for the survey, this plan must include a budget and timeline.

Program funding

All OPA expenditures including those for conservation and energy efficiency programming come from the Global Adjustment Mechanism (GAM). The GAM is also called the “Provincial Benefit” and appears as a line item on the electricity bills of utility customers and direct connect customers—sometimes it is a charge, sometimes it is a credit. The GAM is the difference between the rates paid by Ontario governmental authorities (the OPA and the IESO) to regulated and contracted electricity generators and the spot market prices for electricity consumed in Ontario. If the amount paid by Ontario governmental authorities for the generation is higher than the market price for the electricity, customers are charged a “Provincial Benefit.” If the amount paid by Ontario governmental authorities for the generation is lower than the market price for such electricity, customers are credited a “Provincial Benefit.”

The amounts paid by the Ontario governmental authorities that are factored into the GAM include:

- Nuclear generation and certain hydroelectric generation operated by Ontario Power Generation (OPG)
- Non-utility generation contracts administered by the Ontario Electricity Financing Corporation
- Generators and suppliers of conservation services contracted to the OPA,²⁰
- Board-Approved CDM programs approved by the Ontario Energy Board and delivered by electric utilities in their service territories²¹

The GAM reduces the volatility of electricity prices, thus enabling the Ontario government to offer price certainty to new generation projects and to demand management projects.

²⁰ Ontario Power Authority website. <http://www.powerauthority.on.ca/understanding-electricity-prices/opa-cash-flows-global-adjustment-mechanism-gam>
Accessed March 29, 2011.

²¹ Minister of Energy directive to the Ontario Energy Board. March 31, 2010.

Program administration and support

The program is delivered by the electric utilities. Each electric utility has been assigned a Program Administration Budget (funds also from the Global Adjustment Mechanism) based on the utility's service territory.

Budgets were set using the top-down (setting incentive to hit desired targets) and the bottom-up approach (setting incentives from a measure-by-measure basis). An avoided-cost analysis was used to set budgets and targets as well. The program had to have a Total Resource Cost (TRC) test result.

Targets were also set using a top-down and bottom-up approach. Program designers used the Integrated Power System Plan (IPSP), Ontario's long-term energy plan, for marketplace potential from regional (top-down) and end-use (bottom-up) viewpoints.

Program design features

This program has three separate options for participation (prescriptive, engineered and custom) and an applicant may apply for more than one track. These three options are described in the Program Description section above.

There are different project milestones, depending on the size of the project, for project approval and quality assurance/quality control (QA/QC) prior to a utility paying the incentive to the customer. The key milestones for the different project categories are outlined below.

Approval of small projects. Prior to approving an application, the electric utility must conduct a pre-project site visit to validate that the existing equipment at the facility is as listed in the application and if the project includes engineered or custom measures, confirm that the base case assumptions, operating hours of the facility and estimated eligible costs are reasonable in the context of the proposed project.

Approval of large projects with incentives from custom measures of \$10,000-25,000, or any large projects. Prior to approving an application, the electric utility must conduct a pre-project site visit to validate the existing equipment is as listed in the application and confirm the base case assumptions, operating hours of the facility and estimated eligible costs are reasonable in the context of the proposed project. The electric utility must also require the facility to provide a proposed project M&V plan. This plan needs to be reviewed and approved by a project evaluator (person employed by or under contract to the electric utility). The project evaluator must then prepare an advanced evaluation and incentive report to be provided to and accepted by the facility and the electric utility.

Once a project is approved, the electric utility determines the amount of incentive to be paid to the customer. The customer then installs the electricity-saving equipment. The incentives are paid after installation, once the savings have been measured and verified.

Project EM&V. For project EM&V, the project evaluator completes pre- and post-project evaluations. There are also quality assurance/quality control (QA/QC) requirements that must be met before the electric utility pays out an incentive to a customer.

QA/QC for small projects. The electric utility verifies the eligibility criteria was met, the work done was an eligible measure and was installed in accordance with the approved application; the equipment replaced was appropriately decommissioned and disposed of; the participant signed the participant agreement; the invoices submitted by the participant accurately set forth the model numbers or descriptions and quantities of purchased eligible measures; and the participant complied with all the other requirements of the participant agreement.

QA/QC for large projects. The electric utility conducts a post-project site visit in order to confirm the eligible measures were installed according to the invoices and documentation submitted by the participant; confirms the equipment replaced has been appropriately decommissioned and disposed of; and determines the extent of adjustments to the participant incentives, if any. If the large project involved custom measures, the electric utility must also have a project evaluator prepare a final evaluation and incentive report which the electric utility will review and approve.

All QA/QC requirements must follow a set sampling protocol. The sampling protocol must create a randomly selected sample of projects geographically spread over the electric utility's service area and the lesser of either i) the number of projects sampled in a calendar year (based on an estimate of the number of projects in a calendar year) is sufficient to provide a confidence level of at least 95% with a margin of error no greater than 5%, assuming a response of 3%, or ii) equal to 10% of all estimated projects.

Program EM&V is done internally at the OPA (using a third party). This EM&V process is already underway and occurs continuously throughout the program.

Program delivery

The OPA handles the province-wide mass marketing efforts. A portion of marketing money is set for radio ads, billboards, print material, and online presence. This large, centralized portion is managed by the OPA. Marketing dollars are provided by the OPA to LDCs as part of their Program Administration Budgets for marketing efforts, such as attending trade fairs and community events.

The actual program delivery is conducted by the electric utilities or their hired third parties.

Incentives design

Prescriptive track. Prescriptive measure worksheets and incentive values can be found on the saveONenergy website.²²

Engineered track. The incentives for the engineered track include:

- Lighting per unit incentives
- The greater of either, \$400/kW of demand savings or \$0.05/kWh of first year electricity savings (to a maximum of 50% of project costs)
- Non-lighting including lighting controls per unit incentive
- The greater of either, \$800/kW or \$0.10/kWh of first year electricity savings (to a maximum of 50% of project costs)

Custom track. The incentives are based on the information specific to the project, including:

- A description of the facility baseline electricity use
- A description of the equipment being replaced
- A description of the new equipment
- Disposal costs of old equipment
- The operating schedule (days per week, hours per day, time of day)
- The cost of the new equipment

The \$0.05/kW lighting incentive and the \$0.10/kW non-lighting incentives are calculated based on the participants' barriers and by using a market-based approach.

The social housing adder is calculated as the difference between 50% of the project costs and the total eligible financial incentives. Social housing providers are eligible to receive 50% of eligible financial incentive funding plus 50% of the social housing adder at the start of the project. The multi-family housing adder is calculated as \$200/kW of estimated demand savings, up to a maximum of 10% of the incentives paid for equipment replacement in a project. This is paid to the multi-family housing provider after equipment installation is complete and after the QA/QC protocol has been met.

Incentives are designed to help customers reach the tipping point in terms of reasonableness to proceed with a project. The lighting incentive is smaller since lighting generally needs less money per efficiency project (it is low-hanging fruit).

Table 10 Incentives

Incentive type	Description	Value	Condition of payment	Timing of payment

²² <https://saveonenergy.ca/Business/Program-Overviews/Retrofit-for-Commercial/Relevant-Documents.aspx>

Incentive type	Description	Value	Condition of payment	Timing of payment
Financial (rebate/incentive)	<p>Lighting incentives</p> <p>Prescriptive track: per unit incentives</p> <p>Engineered or Custom tracks: Greater of \$400/kW of demand savings OR \$0.05/kWh of first year electricity savings</p>		Pass QA/QC	After installation, after QA/QC protocol
	<p>Non-lighting incentives</p> <p>Prescriptive track: per unit incentives</p> <p>Engineered or Custom tracks: Greater of \$800/kW of demand savings OR \$0.10/kWh of first year electricity savings</p>		Pass QA/QC	After installation, after QA/QC protocol
Multi-family housing provider adder (with tenant education incentive)	<p>\$200/kW of estimated demand savings, up to a maximum of 10% of the incentives paid for equipment replacement project</p>		<p>Electric utility approval of Tenant Education Proposal</p> <p>Pass QA/QC</p>	After installation, after QA/QC protocol
Social housing incentive advance	<p>50% of eligible financial incentive funding</p> <p><i>plus</i></p> <p>50% of social housing adder (if applicable)</p>		Project approval	Advance, before project starts

Incentive type	Description	Value	Condition of payment	Timing of payment
Grants	Social housing adder—gap grant funding	Difference between 50% of the project costs and the total eligible financial incentives	Project approval	50% advance, before project starts

Monitoring and verification procedures

The electric utilities hire or contract with a project evaluator. This person is an engineer, a certified engineering technologist, a certified energy manager, or an engineer-in-training under the supervision of a professional engineer or certified engineering technologist.

The project evaluator completes both pre- and post-project evaluations. For large custom projects with incentives in the range of \$10,000-25,000, facilities must also have a project M&V plan. This plan needs to be reviewed and approved by the project evaluator. The project evaluator must then prepare an evaluation and incentive report to be provided to and accepted by the facility and the electric utility in advance of project commencement.

Electric utilities also hire project investigators for auditing the individual projects. Investigators are not supposed to be the same people as the evaluators.

Industrial Programs

British Columbia

Power Smart Partners Industrial Program (BC Hydro)

Program description

The *Power Smart Partners Industrial Program* has four components;²³ Plan, Discover, Upgrade and Support. Each one includes services and incentives to assist industrial customers to integrate energy efficiency into their facility operations.

The four program components are:

- **Plan** – integrates energy management and efficient design into facilities; this is a recommended starting point for companies looking to implement continuous energy improvement into facilities. This component of the industrial program provides funding and expert resources as detailed in Table 11.

Table 11 Plan component- incentives and expert resources

Initiative	What is it	Eligibility
Industrial Energy Manager (with Sustainable Energy Management Planning)	A full-time or part-time energy manager to spearhead efficiency efforts	Customers who use more than \$200,000 of electricity per year
Energy Manager for Associations	An energy expert to assess facility and management practices	Customers who use more than \$50,000 of electricity per year
Energy Management Assessment	An assessment of facility energy management practices	Customers who use more than \$50,000 of electricity per year and who can commit the appropriate staff to attend training, and can assign an energy champion to carry out the action plan
New Plant Design	An integrated stream of offers to explore and implement efficient facility design	New facilities or facilities expanding such that the power load will increase by at least 5%; facility has savings potential of more than \$9,000/year (as determined by fully-funded energy study)

²³ The Industrial program overview brochure is available at: http://www.bchydro.com/etc/medialib/internet/documents/psbusiness/pdf/ind_overview_brochure.Par.0001.File.industrial_overview.pdf

- **Discover** – identifies and assesses savings opportunities; this initiative offers funding to help build business cases for efficiency upgrades. The study and business case make it straightforward to get access to major upgrade funding.

Table 12 Discover - efficiency assessments

Initiative	What is it	Eligibility
Customer Site Investigation	A high-level assessment of an entire facility	Customers who use between \$50,000 and \$1 million of electricity per year
Plant-Wide Audit	A high-level assessment for larger plants	Customers who use more than \$1 million of electricity per year
End-Use Assessment	A high-level assessment of a specific system	Systems that use more than 1GWh per year.
Energy Efficiency Feasibility Study	An in-depth investigation of solutions in a single system	Systems that use more than 1GWh per year
Mechanical Pulping Optimization	A variety of offers for mechanical pulping mills	Pulp and paper customers
End-Use Bundles	An integrated stream of offers for the six most common industrial systems: pumps, compressed air, fans & blowers, lighting, refrigeration, process controls	Varies by system

- **Upgrade** – builds efficiency into existing facilities. This component offers funding options for upgrade projects.

Table 13 Upgrade - funding options for upgrades

Initiative	What is it	Eligibility
Project Incentives	Financial incentives for efficiency upgrades	Permanent upgrades that meet the minimum savings thresholds
Conservation Rates	Tiered rates that reward energy efficiency	Customers billed under the Transmission Service Rate or the Large General Service Rate who use more than 550,000 kWh per year

- **Support** – increases efficiency savings through smart monitoring and employee awareness.

Table 14 Support - employee awareness and smart monitoring

Initiative	What is it	Eligibility
Employee Energy Awareness	A campaign to raise awareness about efficiency in your organization	All industrial customers
Monitoring, Targeting & Reporting	A real-time energy monitoring system	Customers who use more than \$500,000 of electricity per year
Metering & Instrumentation Lending Library	Borrowing critical equipment	Customers who use more than \$200,000 of electricity per year.
Power Smart Partner Recognition	Showcasing commitment to energy efficiency	Customers who use more than \$50,000 of electricity per year

The program also includes an online portal that is a more streamlined approach for simple replacements; it does not include an energy study. At the online portal, applicants register, enter basic information about their facility, and indicate the equipment they currently have installed that they would like to replace, and the equipment they would like to install. This information is then sent to the BC Hydro engineering group for review. If the engineering group approves the application, the applicant is notified of the approval as well as the associated incentives. The applicant then conducts the retrofit, submits the documentation online, and BC Hydro sends the incentive cheque to the applicant.

BC Hydro has a 20-year demand side management plan and has set an ambitious target for 2020: for conservation to supply 50% of their base load, that is, the amount of power that BC Hydro must make available to its customers to meet minimum demands. The *Power Smart Partners Industrial Program* is designed to help meet that target, as the program is designed for the customers with the largest annual energy consumption. This program targets two types of industrial customers: transmission customers and the Tier 1 distribution customers (those with the largest annual usage: ≥ 4 GWh). The customers who are eligible for this program already have key account managers (KAMs) on staff. The KAMs are a key point of contact for energy efficiency matters at the facilities. Prior to the launch of the program in 2008, BC Hydro completed a market assessment and set program budget and targets based upon the results.

The *Power Smart Partners Industrial Program* addresses two key market barriers: awareness and energy conservation in projects. The program is designed to raise customer and vendor knowledge about

energy efficiency, and provide incentives for the incremental costs of efficient equipment.

The main program partners are members of the Power Smart Alliance. The Alliance is a network of independent contractors and engineers that can help customers select, install and maintain the energy related systems of a facility. The Alliance contractors are registered with BC Hydro to perform installations of energy efficient equipment.

The *Power Smart Partner Program* initially launched in 2002 with residential, commercial, and industrial streams in one program. In 2008 the industrial (transmission and distribution) program was launched separately. At that time a three-year business case for the program was developed. The program initially had slow uptake, but in the past several years it has been consistently high.

Participation from transmission customers has mainly been in the forestry sector, mining sector, and pulp and paper sectors and clustered in rural areas of the province. Participation from distribution customers has mainly been in the interior and lower mainland of BC. The energy savings per project vary significantly, between ≤ 1 MW to several GWs.

The program has been performing very well to date. BC Hydro pays less than \$45 per MWh saved, and the program has a benefit-cost ratio²⁴ between 5 and 8.

Program participation eligibility criteria

Eligible program participants are industrial customers of BC Hydro, including transmission customers and Tier 1 distribution customers (those who use ≥ 4 GWh of electricity per year). The individual program initiatives have specific eligibility criteria primarily related to the customers' annual electricity costs (outlined in the tables above. The online portal component of the program will be made available to all industrial customers in January 2012.

Program funding

BC Hydro is the sole funder of this program. Natural Resources Canada (NRCan) also offers incentives to industrial customers for energy efficiency retrofits under a different program, and customers are able to access incentives from both sources without restrictions.

²⁴A benefit-cost ratio is an indicator, used in cost-benefit analysis, which attempts to summarize the overall value for money of a project or proposal.

Program administration and support

Table 15 Program administration and support

Budget item	Cost (year)
Program administration costs including staff, marketing etc	\$3 million for distribution customers \$3.5 million for transmission customers
Number of staff to support the program	~50 FTE
Total	\$14 million budget for distribution customers (\$10M spent²⁵) \$25 million budget for transmission customers (\$7.5M spent)

There are approximately 50 full-time equivalent staff members at BC Hydro administering this program. They include engineering, operations, marketing, sales, technology and innovations, monitoring and verification (M&V), evaluation, and quality assurance. These groups work on all of BC Hydro's programs.

Prior to the launch of the program in 2008, BC Hydro completed a market assessment. Based on the results of this assessment, the program budget and targets were set.

Program design features

The program's admissible expenditures under the Plan component of the program are as follows:

- Industrial Energy Manager (with sustainable energy management plan (SEMP)) Option 1: Facility hires an energy manager to develop and implement SEMP
 - *100% of energy manager salary for first three months, 75% of salary for remaining time (up to 2 years total);*
 - *100% of training costs for new energy manager;*
 - *100% of cost to hold a workshop to assist with creating a SEMP;*
 - *100% of cost of an on-site energy management assessment;*
 - *60% of cost for up to six months for the services of an energy management coach to help facility establish the facility's project-based energy efficiency program;*

²⁵ The budgeted amounts were the planned spending for the year. Several large distribution and transmission projects were expected, but the projects were not completed during the year. The difference between the budgeted amounts and the spent amounts is reserved until the projects are completed.

- *Over \$50,000 to create a facility monitoring, targeting, and reporting program to measure progress and set future goals;*
 - *100% of costs to develop employee energy awareness (i.e. customized on-site workshop, campaign kick-off events).*
- Industrial Energy Manager (with sustainable energy management planning), Option 2: Facility hires on-site energy manager to build a project-based efficiency program
 - *60% of energy manager's salary, for up to 2 years;*
 - *100% of training costs for new energy manager;*
 - *100% of cost of an on-site energy management assessment;*
 - *60% of funding for up to six months for services of an energy management coach to help establish the program;*
 - *Over \$50,000 to create a facility monitoring, targeting, and reporting program to measure progress and set future goals.*
- Energy Manager for Associations (once association signs up, all BC Hydro customers in the industry sector are eligible to participate)
 - *100% of cost of customer site investigation (report includes no-cost and low-cost ways to begin saving electricity immediately);*
 - *100% of cost of energy management assessment (report includes facility performance, identifies critical areas for improvement, and compares site with others within the same industry, based on best-practice targets);*
 - *100% of cost of planning (following site visit, energy manager creates a customized SEMP);*
 - *75% of cost of upgrades.*
- Energy Management Assessment, Option 1: One-2-Five Energy
 - *100% funded two-hour onsite “full-featured” session to rate a facility’s energy management performance via an energy management scorecard, identify areas for improvement, develop an action plan, and compare a site’s energy usage to others within the same industry.*
- Energy Management Assessment, Option 2: Energy Achiever
 - *100% funded one-hour onsite “lighter-featured” session to rate a facility’s energy management performance via an energy management scorecard, and develop an action plan.*
- Energy Management Assessment, Option 3: Carbon Trust
 - *Free, self-directed assessment developed by Carbon Trust; free to download.²⁶*

²⁶ Carbon Trust Self-Directed Assessment is free to download from the BC Hydro website, under Self Assessment Tools. <http://www.bchydro.com/powersmart/industrial/download.html#tools>. Accessed June 22, 2011.

- New plant design
 - *100% funded energy efficiency feasibility study to explore options in-depth (includes determining plant's energy baseline, gives access to Power Smart engineering experts to provide recommendations on technical aspects of design);*
 - *75%-100% of incremental construction costs.*

The program's admissible expenditures under the Discover component of the program are as follows:

- Customer site investigation or plan-wide audit
 - *100% funding for site investigation and report (includes low-cost and no-cost measures, such as procedural changes, and will help prioritize steps for achieving larger, long-term savings).*
- End-use assessment
 - *100% of assessment and report costs, up to \$5000 (includes low-cost and no-cost measures, such as procedural changes, and will help prioritize steps for achieving larger, long-term savings—often means performing an Energy Efficiency Feasibility Study).*
- Energy Efficiency Feasibility Study
 - *75% of cost of study (includes information to build a strong business case for efficiency upgrades, including estimated savings and implementation costs);*
 - *Financing of remaining 25% of cost of study if participant completes upgrades within 18 months.*
- Mechanical pulping optimization
 - *Renewable 100% funding for two years of an on-site industrial energy manager who specializes in mechanical pulping;*
 - *100% funding for energy management assessment, SEMP planning, and employee energy awareness planning workshops.*
- End-use bundles
 - *Bundles of the above program initiatives, tailored for six most common industrial systems: pumps, compressed air, fans & blowers, lighting, refrigeration, and process controls.*

The program's admissible expenditures under the Upgrade component of the program are as follows:

- Project incentives: transmission
 - *100% of costs for projects > \$1M and 75% of costs for projects <\$1M;*
 - *Eligible costs include detailed engineering design, equipment acquisition, equipment installation, in-house labour, project management, disposal, and taxes.*
- Project incentives: distribution

- *The lesser of 75% of project cost, amount needed to reduce payback to one year, or total lifespan of electricity savings multiplied by eligible incentive rate (\$0.015- \$0.035/kWh determined after a financial evaluation by BC Hydro);*
- *Eligible costs include detailed engineering design, equipment acquisition, equipment installation, in-house labour, project management, disposal, and taxes.*

The program's admissible expenditures under the Support component of the program are as follows:

- Employee energy awareness
 - *100% of cost for a customized on-site planning workshop (for those participating in Industrial Energy Manager initiative), or subsidized workshop in central locations;*
 - *Funding for awareness events and energy-efficiency giveaways for employees;*
 - *100% of cost of 2-month rental of survey kiosk to determine energy efficiency knowledge levels of facility staff.*
- Monitoring, targeting, and reporting (MT&R)
 - *100% of cost (\$8,000 value) of workshop for project team (includes training on consumption data), assessment of installed metering, and preliminary review of facility's performance data;*
 - *100% of cost for study and planning process (up to \$20,000; includes implementation plan and cost-benefit analysis to help build strong business case);*
 - *Up to \$30,000 for metering equipment, statistical model development, software, employee training, and integration of MT&R into existing management systems.*

The general program process flow is as follows:

- Customer applies to the program,
- BC Hydro operations group reviews the application,
- Application is sent to engineering (if needed),
- Cost-effectiveness test, payback and total project cost assessments are used to screen potential projects,
- Operations group or engineering group approves the project,
- Agreement is sent to customer for customer's signature,
- Customer has 1.5 years to complete the project,
- Once project completed, customer notifies BC Hydro, and
- BC Hydro conducts a site inspection and provides incentive to the customer.

BC Hydro uses a variety of customer engagement activities, including:

- On-site customer awareness workshops;
- Training of vendors;
- Direct 1 on 1 meetings with key account managers;

- Discussions with customers on a daily basis.

The demand for energy efficiency studies is greater than the supply of consultants capable of conducting the studies. BC Hydro has been working with the Power Smart Alliance to come up with a solution. BC Hydro is considering providing more information in the online portal so that companies can conduct energy studies in-house.

Program delivery

For large customers such as those eligible for this program, there are no significant differences in program delivery in rural or urban areas. The program covers the travel costs for program delivery agents (e.g. marketing and sales staff) to visit sites in both rural and urban areas of the province. BC Hydro is committed to ensuring there is constant communication with customers, and part of this is on-site visits.

Incentives design

For transmission customers, the program has Conservation Rates that reward energy efficiency. A customer baseline is established using a minimum of 12 months historic annual energy consumption in kWh. This baseline defines the Tier 1 (90% of customer baseline) and Tier 2 (>90% of customer baseline) rates that apply to annual energy purchases. Tier 2 energy is charged at a higher rate than Tier 1 energy. As a result, the customer gets boosted long-term savings on the facility's energy bill when efficiency measures reduce or eliminate the more expensive Tier 2 electricity consumption. Each customer baseline is reviewed annually.

For distribution customers, the program has two-part billing or Large General Service Rates that rewards energy efficiency. A customer's monthly baseline consumption level is established from the facility billing history over a three-year period. This baseline will be used to determine the customer's monthly bill. Going forward, the old rate structure will be charged for the facility monthly energy consumption. There is an adjustment in the form of a credit or a charge for the difference between a facility actual kWh usage and the facility baseline for the particular month being billed. If a facility uses less than the baseline, the customer receives a credit. If a facility uses more than the baseline, the customer is charged. Adjustments are calculated at a significantly higher rate than the baseline or old rate structure.

Table 16 Incentives

Incentive type	Description	Value	Condition of payment	Timing of payment
Financial (rebate/incentive)	Industrial Energy Manager, with Sustainable Energy Management	100% of salary for 3 months, 75% for next 21 months; 100% of	Customers use >\$200,000/year of electricity; candidate's salary level and qualifications	Salary is paid quarterly after receipt of invoice; other incentives paid after work

Incentive type	Description	Value	Condition of payment	Timing of payment
	Plan (SEMP)	training costs; 100% for workshop to create SEMP; 60% for energy management coach; >\$50,000 for monitoring, targeting, reporting program; 100% of costs for employee energy awareness <i>OR</i> 60% of salary for 24 months; 100% of training costs; 100% for energy management assessment; 60% for energy management coach; >\$50,000 for MT&R program	meet certain criteria, subject to approval by BC Hydro; customer submits invoice and quarterly report	completed and verified
	Energy Manager for Industry Associations	100% for customer site investigation; 100% for energy management assessment; 100% for planning; 75% of cost of upgrades	Association must sign-up, then the BC Hydro customers in the industry sector are eligible; customers use >\$50,000/year of electricity	After work completed and verified
	Energy management assessment	100% for full-featured on-site	Sign agreement; customers use >\$50,000/year	After work completed and verified

Incentive type	Description	Value	Condition of payment	Timing of payment
	session <i>OR</i> 100% for lighter-featured on-site session <i>OR</i> Free, self-directed assessment		of electricity	
New plant design	100% for energy efficiency feasibility study; 75-100% of incremental construction costs	Sign agreement; new facilities or facilities expanding such that electricity costs increase by at least 5%	After work completed and verified	
Customer site investigation <i>OR</i> Plant-wide audit	100% for site investigation and report	Sign agreement; customers use \$50,000- \$1M/year of electricity	After work completed and verified	
End-use assessment	100% for assessment and report, up to \$5,000	Sign agreement; systems being assessed must use >1GWh/year	After work completed and verified	
Energy efficiency feasibility study	75% for study; remaining 25% if upgrades completed	Sign agreement; upgrades must be completed within 18 months; systems being assessed must use >1GWh/year	After work completed and verified	
Mechanical pulping optimization	100% salary for on-site industrial energy manager specialized in mechanical pulping (for two years, renewable);	Sign agreement; pulp and paper customer; candidate's salary level and qualifications meet certain criteria, subject to approval by	Salary is paid quarterly after receipt of invoice; other incentives paid after work completed and verified	

Incentive type	Description	Value	Condition of payment	Timing of payment
	100% for energy management assessment, SEMP planning, and employee energy awareness workshops		BC Hydro	
Project incentives: transmission	100% of costs for projects >\$1M OR 75% of costs for projects <\$1M	Sign agreement; permanent upgrades that meet minimum savings thresholds; site inspection	90% of incentive paid during implementation; 10% paid after verification of energy savings	
Project incentives: distribution	Lesser of: 75% project cost OR amount needed to reduce payback to one year OR total lifespan of electricity savings multiplied by eligible incentive rate	Sign agreement; permanent upgrades that meet minimum savings thresholds; BC Hydro conducts financial evaluation to determine eligible incentive rate (\$0.015-0.035); site inspection	100% of incentive paid after completion of project for projects that save <500,000 kWh/year and have incentives <\$100,000 OR 75% of incentive paid after completion of project and 25% after final project measurement for projects that save >500,000 kWh/year and have incentives >\$100,000	
Employee energy awareness	100% of customize on-site planning workshop; funding for awareness	Sign agreement	After work completed and verified	

Incentive type	Description	Value	Condition of payment	Timing of payment
	events and energy-efficiency giveaways; 100% for 2-month survey kiosk rental			
	Monitoring, targeting, and reporting (MT&R)	100% of workshop for project team, assessment of installed metering, and preliminary review of facility's performance data (\$8,000 value); 100% for study and planning process (up to \$20,000); up to \$30,000 for metering equipment, statistical model development, software, training, and integration of MT&R into existing systems	Sign agreement; customers use >\$500,000/year of electricity	After work completed and verified
In-kind contribution	Meter and instrumentation lending library	Free 3-month loan; equipment shipped directly to facility	Complete request form; customers use >\$200,000/year of electricity	N/A
	Power Smart Partner Recognition	Framed copy of pledge; name on PSP	Sign and return pledge form; customers use	N/A

Incentive type	Description	Value	Condition of payment	Timing of payment
		website and in annual print advertising campaign; free milestone plaques; consideration for Power Smart Excellence Awards	>\$50,000/year of electricity	
Other	Conservation Rates <i>OR</i> Large General Service Rates	Lower rate if use less than 90% of average monthly baseline <i>OR</i> Receive charge or credit if use more or less than baseline	Sign agreement; customers billed under Transmission Service Rate or Large General Service Rate and use >550,000 kWh/year	With electricity bills

Monitoring and verification procedures

For project monitoring and verification (M&V), BC Hydro performs a baseline analysis prior to the upgrade, conducts monitoring after the upgrade, then determines the amount of energy savings achieved. BC Hydro's M&V guidelines are based on the IPMVP protocols.

BC Hydro's program evaluation guidelines are based on the California Evaluation Framework, prepared for the California Public Utilities Commission, and includes conducting process and market evaluations every three years. The evaluation is received and approved by a committee at BC Hydro.

Strengths and weaknesses of program and advice to Newfoundland and Labrador

This program is well designed and the savings are verified. However, the program relies on the experience of a pool of energy consultants and there is currently a higher demand than there is supply of such consultants. Going forward, the program will include more

prescriptive options and will be more focused on monitoring, targeting, and reporting (MT&R).

This is a very mature program and is operating in a mature, energy-efficiency-minded market. It is not advised to start with such a complex program. It is advised to perhaps begin with an online portal, to focus the program offerings (e.g. for particular sectors or for particular end uses), and to create a streamlined process that drives customers from the beginning to the end of the program.

Howe Sound Pulp & Paper: Power Smart Partner Industrial Program case study²⁷

Thermo-mechanical pulping is the most energy-intensive process of any industry in B.C. That means improving efficiency can lead to huge energy savings – as Howe Sound Pulp and Paper has shown with a recent upgrade to its pulp screening process.

This one project alone will save a whopping 17.2 GWh of electricity per year – enough to power more than 1,500 B.C. homes.

But you don't find savings if you're not looking for them. That's where good energy management helped play a role.

One-year payback

"We use more than 1,000 GWh of electricity per year, which puts us in the top 10% of electricity consumers in the province," says Gary Fors, Energy Manager for Howe Sound Pulp and Paper (HSPP). "Of that, about 460 GWh goes to the TMP [thermo-mechanical pulping] process."

The TMP process uses large refiners to grind wood chips down to pulp. HSPP has seven refiners, each one driven by a 19,000 hp motor. (An average jet engine has 8,000 hp.) After grinding, the material is cleaned and refined in several stages, first in a screening process, then through centrifugal cleaners.

"Over the past few years, the technology for screening has been improving," says Fors. The newer screens yield very clean pulp, allowing HSPP to cut out the centrifugal cleaning step with no loss of quality – and cut energy use too.

"The big difference is in pumping," says Fors. "We had huge pumps to feed the centrifugal cleaners, and we've now been able to shut them all down. The more of those pumping loops we can get rid of, the more energy we can save."

Investment in the project was approximately \$500,000, with an expected payback of less than one year. "Even though we had to reinstall a lot of piping and invest in new screens, the payback on 17.2 GWh is worth it," says Fors.

The energy manager difference

HSPP had tested the new screening equipment before Gary Fors started with the company in June 2010, but the project had not moved ahead.

"The project stagnated without it being fully on anyone's desk," says Fors.

²⁷ Reference: BC Hydro website. April, 2011. Available from: http://www.bchydro.com/powersmart/success_stories/industrial_process_facilities/howe_sound_pulp_paper.html. Accessed June 24, 2011.

His role marks the first time HSPP has had a full-time energy manager – a position subsidized by BC Hydro under the **Industrial Energy Manager initiative**.

"The competence that an energy manager brings is to be the champion, to help out with all aspects of getting a project like this done, and do it full-time," he comments.

Fors credits the TMP operations group for taking on the challenge of implementing the new system. "They had to learn a new system, rebalance it and fine tune it, so this took a lot of effort," he says. "But when we all really know that it contributes to energy savings and greenhouse emissions reduction and sustainability, we all buy in."

Since Fors has arrived, HSPP has established a cross-functional energy management team with input from every area across the plant.

"Basically, we bring the talent to the table and talk about how we can reduce energy consumption and be more efficient," he says.

The company's work continues to pay off in terms of both technical upgrades and behavioural changes that support better energy efficiency. That means Howe Sound will likely have more energy-saving news in the future.

"This project is a great energy success story," says Fors. "We're going to look at every energy opportunity we can, as long as we can maintain quality for our customers."

Ontario

Process and Systems Program (Ontario Power Authority)

Program description

The *Process and Systems Program* provides funding and technical expertise to help industries investigate and assess energy saving opportunities and modernize key systems not only for energy efficiency but also for enhanced productivity, product quality, and reliability. This program is for industrial customers who are customers of an electric utility in Ontario. ‘Industrial customers’ are defined by the size of their load and their use of industrial processes. The program’s intent is to promote a continual evolution of energy managers until they take full systems approaches to energy management at their facilities.

The program contains the following initiatives:

- Energy Efficiency Upgrades including:
 - *Preliminary Engineering Study*
 - *Detailed Engineering Study*
 - *Project Incentives*
- Energy Management and Monitoring including:
 - *Services of an Energy Manager and/or a Key Account Manager*
 - *Monitoring and Targeting*
 - *Metering and Instrumentation Library*

Energy Efficiency Upgrades

A *Preliminary engineering study* is a general assessment of a key process or single system comparing the cost-effectiveness of various upgrades. Funding of up to \$10,000 per study is available.

Detailed engineering studies provide in-depth technical and financial information needed to build a solid business case for the energy efficiency project. Funding of up to \$50,000 per study is available.

The program allows capital incentives for projects that are designed to improve the payback rate of efficiency projects, making them competitive with other capital projects that will yield greater than 100 MWh in annual savings. The incentive is based on forecasted electricity savings as well as capital project costs, using the lowest of:

- \$200 per MWh for annualized electricity savings, or
- 70% of the eligible project costs, or
- Achieving a one-year simple payback

Participants can apply using one of two approaches to receiving incentives:

- Advanced incentive payment option: payments are made during construction and must be supported by a letter of credit from the participant
- Deferred incentive payment option: payments are made after measurement and verification tests have proven the existence of forecasted energy savings.

Energy Management and Monitoring

Energy Manager. An embedded energy manager is able to take control of energy costs by monitoring energy usage and expenditures, leading employee awareness programs, and by leading large energy efficiency upgrade projects.

An embedded Energy Manager can be funded based upon the following criteria:

- The Energy Manager must be:
 - *hired by the company;*
 - *enrol in energy management-related training programs;*
 - *develop an energy management plan and provide quarterly reporting;*
 - *commit to implementing projects with a less than one year payback.*
- Funding up to 80% of the Energy Manager's actual annual salary to a maximum amount plus up to 80% of actual reasonable expenses to a maximum amount per year;
- Must implement 0.3 MW of peak demand savings and 0.3 MW x Facility Load Factor x 8,760 hours in energy savings each year. Of this, 33% of savings must be achieved without third party incentives, that is, paid for by the customer;

If a full time Energy Manager is not required, the program can provide short term energy management expertise at a customer facility. These short term energy managers may be employed by a local electric utility and are available for *Process and Systems Program* potential participants for a defined period of time. Their tasks are to start identifying opportunities, develop energy-management plans and completing incentive applications. They are known as "Roving Energy Managers."

Key Account Manager. The role of the Key Account Manager (KAM) is to support the electric utility in fulfilling their obligations related to all of the industrial program initiatives.

The KAM is considered to be a key element in assisting industrial customers in overcoming traditional barriers related to energy management and help achieve savings, since the KAM can build relationships and become a significant resource of knowledge for customers.

A KAM may be part-time—has at least five but less than ten distribution customers each having at least 5 MW of annual peak

demand, or full-time—has ten distribution customers each having at least 5 MW of annual peak demand.

KAMs are funded by the OPA. The OPA will pay an electric utility up to \$150,000 (inclusive of salary, wages and benefits, etc) for a full-time KAM. If the KAM is part-time, the funding payment will be based on the number of distribution customers the KAM is serving (i.e. if serving 6—that is, 60% of 10, utility will receive 60% of \$150,000, or \$90,000). KAMs can work on behalf of one or more electric utilities. KAMs are required to participate in mandatory training programs including:

- Dollars to Sense program, an energy management workshop run by Natural Resources Canada;
- Detailed end-use program;
- Basic Energy Manager program (unless the KAM can provide evidence a similar program has been completed or has equivalent experience);
- Certified Energy Manager Program (unless the KAM is already designated as a Certified Energy Manager by the Association of Energy Engineers).

Monitoring and Targeting. Industries applying for capital incentives are also required to develop a measurement and verification (M&V) plan for assessing performance of the project.

The local electric utility will provide funding toward 80% of actual eligible costs (less any third party contributions), of up to \$75,000 per site to purchase, and install and make operational a monitoring and targeting system. The facility must contribute a minimum 20% of the actual project cost.

To be eligible for this program the facility must:

- Have a resident Energy Manager to ensure the monitoring and targeting system is managed
- Have a minimum annual electricity consumption of 15,000 MWh from the previous calendar year
- Demonstrate by the end of the second year of operation, 0.2 MW in peak demand savings and 0.2 MW x Facility Load Factor x 8,760 hours in energy savings
- Commit to implementing projects with less than a one-year payback period
- Agree to provide annual reports of opportunities implemented as a result of the monitoring and targeting system, for a period of five years

Metering and Instrumentation Library. The *Metering and Instrumentation library* is available for local electric utilities to assist companies in developing energy efficiency opportunities . The Meter Lending library will initially consist of the following instrumentation:

- Data Loggers
- Electrical meters
- Infrared thermometers & thermal camera

- Process flow meters
- Pressure transmitters
- Stroboscopes and
- Ultrasonic detectors for air leaks

The program objectives and targets were developed through talking to key players across North America. The goal was to move from a program that focused on specific measures to a program that focused on a systems approach. Another goal was to ensure efficiency is understood at all levels of an organization.

The program target was based on a percentage of the total industrial energy load within the province, and constitutes a portion of the Ontario Power Authority's greater energy reduction targets for all sectors—6000 GWh between 2011 and 2014.

In 2006-2007, the OPA commissioned two reports on barriers to participation in conservation programs, one for customers with ≥ 5 MW load and the second for customers with ≤ 5 MW load. This research was supplemented by a series of focus groups to further identify barriers which were found to be money, people, information, and competition for other capital.

Access to Upfront Money. Access to upfront cash is a barrier to implementing energy conservation measures. Many companies need upfront money (i.e. incentives during the construction phase) to fund energy efficiency projects.

To receive upfront incentives, companies need to provide upfront security. Often it is the companies in poor financial shape that need upfront money and, because of their financial status, have the most difficulty putting in place the securities before they can receive incentives upfront.

Access to People & Information. Industries do not tend to employ energy efficiency experts. This means many facilities do not know which of their processes are using the most energy, nor what could be done to reduce their energy demand. Energy efficiency experts must be retained when needed (i.e. for studies and project implementation), which is an additional cost to the industry.

Competition for capital. Many energy efficiency projects have longer payback periods and do not meet the internal spending restrictions of facilities. For instance, many projects have 1.5 year paybacks, but industry often looks for paybacks of under 1 year. Also, many industries are being faced with increasing environmental and regulatory burdens so capital expenditures are often directed at updating environmental reporting and monitoring.

The OPA found additional barriers included getting approval to do an initial study, and encouraging those who completed the initial study to implement the results.

Based upon this research and understanding of barriers, the OPA designed a suite of electricity conservation programs with stakeholder input. All of the electric utilities who have industrial customers in their service territory will deliver the program on behalf of the OPA while the OPA leads the province-wide sales and marketing efforts.

A key program partner is the team of third party technical reviewers hired by the OPA. The technical reviewers are responsible for the engineering reviews of the projects.

As the program has only been in the market for a couple of months, and many of the province's electric utilities have not even begun to market the program to their customers, program uptake data is not yet available.

Program participation eligibility criteria

The program eligibility criteria are based on the project to be completed—that is, whether electricity savings will be realized and maintained through the project. The project must:

- deliver a minimum of 350 MWh of annualized electricity savings
- the project must have >10 year life
- the project must involve the installation of a measure
- a Technical Reviewer must review and approve the project

The applicant must be an industrial customer of an electricity distributor in Ontario. Companies that are insolvent are ineligible to participate in the program.

Program funding

The program is solely funded by the Global Adjustment Mechanism. Costs are recovered across the entire provincial industrial rate base.

Program administration and support

The program is administered by the electric utilities, so the OPA is not able to speak to this aspect of the program.

Program budgets were provided to each electric utility based on their service territory. Each electric utility has overall energy reduction targets that must be met between 2011-2014 through the suite of OPA programs available for all customer types and *Process and Systems Program* is one such program.

Program design features

Eligible projects are screened based on energy savings expected, and the meeting of technical requirements and eligibility. A project would not likely be turned down because it had a negative Total Resource Cost test result. The minimum size of savings is 100 MW.

Admissible expenditures are as follows:

- Engineering Studies
- Equipment
- Metering

- Permits
- Environmental Assessments
- Materials
- Professional Services
- Internal Staff

Ineligible projects include coal-fired generation, lighting projects, voltage-reduction, any projects completed so the company can participate in demand-response programs, and projects involving generation that would be supplied to the grid (unless specifically approved by the electric utility and the OPA).

The OPA will provide funding for electric utilities to have site visits with large customers, for application help, etc. The onus is really on the electric utilities to engage customers.

Recognizing and addressing gaps in support services, such as auditing services, is the responsibility of each electric utility. Hydro One Networks Inc., the province's main electricity transmission company, is also an electricity distributor in many rural areas; Hydro One will be offering this program. This is how the province's rural areas will be served by the program.

Project EM&V. Each project has an EM&V plan written by a certified technical reviewer. The EM&V plan is based on International Performance Measurement and Verification (IPMVP) protocol. The plan is developed prior to project approval. The plan also specifies reporting requirements (e.g. annual reporting). There is a commitment to deliver savings for a 10-year period (evaluation, monitoring, and verification (EM&V) reporting is required), and the project must achieve 80% of the savings expected. All projects must be in service before December 31, 2014.

Program EM&V. An external evaluator does program EM&V. Evaluation starts early in program operation. The EM&V process will be continual and will produce an annual report.

Savings are verified through EM&V on a project-by-project basis. Savings are reported on a program scale.

Program delivery

The program is delivered by the electric utilities.

Incentives design

The incentive offered is the lesser of \$200/MW, 70% of eligible costs, or the money required to reach a one-year payback. Incentive sizes were determined through specific research (e.g. incentives for air compressors, etc). The program designers talked to suppliers for install costs for equipment included in the program. This translated into the \$200/MW incentive. The \$200/MW number was also an average incentive rate calculated for small, medium and large systems to get 80% of measures down to a one-year payback. There are two

payment options for program incentives: advanced or deferred (see below).

Table 17 Incentives

Incentive type	Description	Value	Condition of payment	Timing of payment
Financial (rebate/incentive)	The lesser of 3 options	\$200/MW, 70% of eligible costs, or the money required to reach a one-year payback	M&V for 10 years, 80% of expected electricity savings realized	Advanced or deferred
Technical expertise	Embedded Energy Managers, employee of industrial customer	80% of annual salary, up to \$100,000 per 12-month period <i>plus</i> 80% of annual travel and appropriate related expenses up to \$8,000 per 12-month period	<ul style="list-style-type: none"> Must be an employee of the customer Must deliver annual target of 300 kW of peak demand reduction and (0.3*FLF*8760) MWh of energy savings Must deliver 30% of savings target from non incented projects Must prepare energy management plan within first 6 months 	Upfront payment
Roving Energy Managers, employee of electric utility	\$120,000 for salary, wages, and benefits for 12-month period <i>plus</i> \$8,000 for travel and appropriate related expenses for 12-month period	\$120,000 for salary, wages, and benefits for 12-month period <i>plus</i> \$8,000 for travel and appropriate related expenses for 12-month period	<ul style="list-style-type: none"> Employed by electric utility to support a group of customers Must deliver annual target of 300 kW of peak demand reduction and (0.3*FLF*8760) MWh of energy savings 	Upfront payment

Incentive type	Description	Value	Condition of payment	Timing of payment
	plus Tuition expenses for Energy Manager Training		<ul style="list-style-type: none"> • Must develop Energy Management Plan for each customer • Must deliver 30% of savings from non-incented projects 	
Key Account Managers, employee of electric utility	<p>\$150,000 per 12-month period</p> <p><i>plus</i></p> <p>Tuition costs for training will be funded separately by the OPA</p>		<ul style="list-style-type: none"> • Funding to electric utility to hire Account Manager to deal with large customers • Allocated based on number of customers over 5MW annual peak load • Electric utility must apply for funding in writing to OPA • Groups of electric utilities may apply together to put together critical mass of customers 	Upfront payment

Evaluation, monitoring and verification procedures

Each project has an EM&V plan prepared by a Technical Reviewer. The EM&V plan must be submitted as part of the project application. Project EM&V costs are covered by the OPA, and these costs are not passed down to the participant.

The Technical Reviewers follow the IPMVP – International Performance Measurement and Verification Protocol.

Strengths and weaknesses of program and advice to NL

The program has only been in market several months, so it is difficult to judge the strengths and weaknesses of the program. However, the incentive amount and the credibility of electricity savings due to the EM&V plan are both strong aspects of the program. The option for upfront payment of incentives is also a strength; 90% of the incentive gets paid up front, during the construction phase.

The program needs to find a way to simplify contracts and to simplify the application process. For some small projects, the companies are foregoing participation, as the effort required to complete the application process is deemed more significant than the incentive payments.

The OPA is currently considering coupling more expensive projects with less expensive projects so that on average, the \$200/MW incentive level would allow each of these projects to reach the one-year payback threshold. This 'portfolio' approach would allow a company to offset the longer-term payback projects with shorter-term payback projects, thus allowing the company to have the longer-term projects funded.

The OPA suggested that any program in NL should allow for access to technical resources on an on-going basis – for instance, use a 'help desk' approach that is an inexpensive source of tech help (i.e. having a compressed air expert available to answer questions from the customers).

They also recommended using a whole package approach that would include undertaking pre-studies, metering, and having key account managers at the electric utility contact facilities managers or those staff that have authority and influence to make decisions. Whatever the program, it should be more than just an incentive program; enabling initiatives, such as the Energy Managers, are needed. Also, make the program easy for industrial customers to participate.

Québec

Support for the Manufacturing Sector Program (Agence de l'efficacité énergétique)

Program description

The goal of the energy strategy launched in 2006 by the government of Québec is to develop the full energy potential of the province and use energy more efficiently from a sustainable development perspective. Since energy efficiency is at the heart of this strategy, ongoing financial assistance for related initiatives has been forthcoming.

With the roll-out of the Action Plan to Support the Manufacturing Sector in 2007 by the Ministère du Développement économique, de l'innovation et de l'exportation, the Québec government is providing additional support to help manufacturing businesses.

The Action Plan has two main goals: (1) invest to counter the negative effects of the rising dollar and re-launch job creation and exports, and (2) invest to help the manufacturing sector ensure a stronger future.

The Agence de l'efficacité énergétique (the Agency)'s program helps manufacturers move toward sustainable development and improve their competitiveness by reducing their consumption of certain target fuels (light fuel oil, propane and butane). Financial assistance is available for conducting analyses and for implementing energy efficiency measures for these target fuels.

There are two components to the program: analysis and implementation.

Analysis. The Agency provides financial assistance to conduct energy analyses, feasibility studies and analyses of effective integration of better fuel consumption practices.

The financial assistance provided by the Agency can also be combined with aid from complementary programs offered by partner organizations. However, the accumulation of financial contributions may not exceed 75% of the eligible costs of analysis or of the implementation project, and the applicant must always contribute a minimum of 25% of total costs.

Implementation. Once the analysis is complete, facilities implement energy efficiency measures for target fuels that are measurable, long lasting, and whose implementation was planned using appropriate equipment at a specified cost for a predetermined period. Eligible projects have as their focus to:

- Replace equipment with more efficient models in their consumption of target fuels;
- Modify existing equipment to reduce consumption of target fuels;

- Install new equipment for existing procedures that lead to a reduction in consumption of target fuels.

The program aims at supporting the movement of modernization and transformation of the Québécois manufacturing sector. The program was designed to address two barriers:

- **Lack of Knowledge.** The program improves knowledge about energy efficiency and greenhouse gases through feasibility studies and training in process integration.
- **Access to Capital.** The program reduces the upfront capital costs to implement new measures by providing incentives.

This program does not have any specific delivery agents, rather consultants and equipment manufacturers are using the program to promote their services. Some program marketing is conducted via industrial associations.

Table 18 Program uptake

Participant type	Energy savings by participant type
Registered	44,594 GJ/year
In-progress	178,052 GJ/year
Finished	91,933 GJ/year

Program participation eligibility criteria

The program is open to any business in the manufacturing sector with premises in Québec that consume targeted fuel sources (oil, propane, butane) for its heating and manufacturing requirements.

Program funding

Program funding comes from Measure 1 of the government's 2006-2012 Climate Change Action Plan (CCAP), whose goal is to establish energy efficiency assistance programs using royalties paid into the Green Fund. This program is equipped with an envelope of \$15 million and will end on March 31, 2013. The adopted projects must consequently aim at decreasing greenhouse gas emissions. The program goal is to reduce greenhouse gas emissions by 50 kilotonnes (kt).

Program administration and support

Table 19 Program administration and support

Budget item	Cost (year)
Program administration costs including staff, marketing etc	\$470,598
Number of staff to support the program	1.5 persons/year
Incentives	\$33,365,103
Program evaluation	Approximately \$33,793
Total	\$33,869,494

The administration cost of the program is approximately 1.5% of the total program costs, which is significantly lower than the administration cost of conventional programs delivered by utilities—typically about 15%.

The internal program staff needed to support the program are as follows:

- Part-time program manager (used for two programs);
- Part-time administration technician (used for six programs);
- Part-time secretary (used for six programs);
- General director (part-time to approve contracts).

Prior to the launch of the program, the CCAP group determined the portion of the \$1.5 billion to be allocated to programs. Based on this, the CCAP group estimated the targets by assuming the average payback period would be 2 years. The actual average payback is closer to 8 years, so the target set for the program will not be met with the initial budget.

Program design features

There are eligible and ineligible costs for analyses and for implementations. These costs are outlined below.

Eligible analyses costs:

- external consultations
- in-house employees directly involved in the analysis, up to a maximum ceiling pre-approved by the Agency at the agreement preparation step; and
- leasing measurement equipment and devices.

Ineligible analyses costs:

- production losses, waste, and other losses caused by activities related to the analysis;
- work performed before the effective date of the agreement with the Agency.

Eligible implementation costs:

Eligible costs for implementation under the program are those solely related to the implementation of the project and are directly related to the target fuels. They must also be reasonable, justifiable and verifiable using generally accepted accounting principles. They include the following costs:

- purchasing and upgrading equipment, including equipment required for measuring energy use;
- engineering, installation, start-up, and in-house measurement work, including the remuneration of operating employees up to a maximum ceiling pre-approved by the Agency at the agreement preparation step;
- external engineering work;
- cost of installing and starting up required equipment when contracted out to a third party;
- cost of measurements, quantifications, and verifications performed by an external firm;
- incremental acquisition, installation, and supplementary engineering costs of equipment that is more energy efficient than conventional equipment

Ineligible implementation costs:

- production losses, waste, and other losses caused by the implementation of energy saving measures; operating, repair, and maintenance costs; and current business expenditures;
- purchasing equipment from a subsidiary, division, or manufacturing plant of a same enterprise, excluding transfer costs (which are eligible);
- work performed before the effective date of the agreement with the Agency as well as the cost of equipment for which purchase orders were issued before this date.

Program applications can be submitted continuously. The Agency allows 4-6 weeks for a program application to be approved.

There are typically two payments made to program participants for feasibility studies and four payments for implementation. These are described in the incentives table below.

There is a three-year follow-up for each project wherein the participant must submit a yearly report to the Agency. This report is to contain: a description of the benchmark scenario (including adjustments made during the period covered); a description of the method used to quantify target fuel consumption and the resulting GHG emissions for the benchmark scenario and the project;

demonstration of the reduction in target fuel consumption, and the resulting reduction in GHG emissions in addition to those that would have occurred had the project not been implemented; confirmation that the proposed monitoring plan has been implemented; a statement of GHG emissions by source; and the main conclusions.

The program marketing consists primarily of communications and interactions with potential program participants via industrial associations.

The budget does not allow for program sales activities to sign up customers. Potential participants are also informed of the program and engaged via consultants and equipment manufacturers. The Agency is considering hiring someone to promote the program and provide support to program participants. The Agency is considering hiring a “coach” for some sectors, particularly the agriculture sector.

Project evaluation will be completed using International Performance Measurement Verification Protocol (IPMVP) and ISO 14064, an integrated set of tools for programs aimed at measuring, quantifying and reducing greenhouse gas emissions. There are no mandatory third party verifications for this program. Consultants and equipment manufacturers are doing the project monitoring in most cases.

Program evaluation and verification is conducted in-house with the assistance of external consultants.²⁸

Program delivery

For geographically dispersed program participants, the program deals with the large users in a case-by-case manner and with smaller enterprises with the help of consultants and equipment manufacturers.

As mentioned above, the Agency is considering hiring a “coach” to provide additional assistance to key sectors.

Incentives design

To determine the financial incentives for the program, a public consultation was held. In addition, the Agency evaluated incentives in existing programs in Québec. The goal was a progressive scale for the incentives in order to minimize “free riders”. Financial help is now \$250,000 per project up to a cumulative of \$1.5M per site, and the applicant has property of all reduced greenhouse gas emissions (i.e. for carbon credits).

²⁸ There has been a recent staff change and the responsibility of program evaluation has not yet been re-assigned. The program manager noted that a standard evaluation framework will be used.

Table 20 Incentives

Incentive type	Description	Value	Condition of payment	Timing of payment
Financial (rebate/incentive)	Energy analyses, value analyses, and feasibility studies	50% of eligible cost of analysis related to target fuels up to a cumulative maximum of \$25,000 per facility for the duration of the program	May be combined with assistance from complementary programs offered by energy distributors or other government agencies, however, the cumulative financial assistance cannot exceed 75% of eligible costs—the applicant must always contribute at least 25% of these costs. Analysis report and all documents must be submitted within 6 months of signing contract.	50% with signing of contract, 50% when feasibility study report accepted by the Agency Applicant must provide an invoice indicating name of business, file number of project, date of invoice, and description and total amount of financial assistance
Process integration analysis		50% of eligible costs of analysis up to a cumulative maximum of \$100,000 per facility for the duration of the program	May be combined with assistance from complementary programs offered by energy distributors or other government agencies, except for the Heavy Oil Consumption Reduction Program offered by the Agency. The cumulative financial assistance cannot exceed 75% of eligible costs—the applicant must always contribute at least 25% of these costs.	Applicant must provide description of the analysis document, an application form, and this must be reviewed and accepted by the Agency. The applicant must sign an agreement with the Agency. 50% of eligible costs are paid with signed agreement. After applicant submits analysis report,

Incentive type	Description	Value	Condition of payment	Timing of payment
		at least 25% of these costs.		detailed costing report, and measure implementation plan, applicant receives second payment.
Implementation	The lesser of: amount necessary to reduce the ROI to one year, a maximum of 75% of eligible implementation costs, \$250,000 per project up to a cumulative maximum of \$1.5M per site, or the original amount requested by the applicant	Analyses and all required documents must be submitted within 24 months of signing contract.	May be combined with assistance from complementary programs offered by energy distributors or other government agencies. The cumulative financial assistance cannot exceed 75% of eligible costs—the applicant must always contribute at least 25% of these costs.	25% at start of project on receipt of copies of first purchase orders for equipment or services required for the project; 50% following start-up of the equipment; 25% based on results obtained on completion of the project. For each payment, applicant must first provide an invoice indicating: business name, file number, date of invoice, description of total amount of equipment or service.

Monitoring and verification procedures

The Agency has designed a simplified project planning and implementation process that applicants must use based on the international ISO 14064-2 standard. All project results must be

quantified respecting either ISO 14064-2 or IPMVP. Costs of monitoring and verification are considered eligible costs under this program; the monitoring and verification are conducted by a consultant, equipment manufacturer, or by an employee of the Agency. Third-party verifications are not mandatory.

Strengths and weaknesses of program and advice to NL

The program is strong in its design: the program is simple to understand, simple to operate, and there are few freeriders.

One perceived weakness of the program is the verification. The verification could be more formal; however this would come at a high cost.

Another weakness is that some sectors are not covered by the program. The program could be improved by broadening the admissibility, such that the program can reach other sectors beyond manufacturing. It might be better to use an umbrella program with program initiatives for different sectors.

Also, having standardized tools to calculate and report with would be beneficial to the participants.

Alcoa Canada's Deschambault: Support for the Manufacturing Sector Program case study^{29³⁰}

Alcoa Canada's Deschambault aluminum smelter cut back its energy consumption by 22.6 GW/h by reducing compressed air loss by means of simple measures. These were the result of a diagnosis made possible through a pilot project financed in part by the Agency.

Abitibi-Consolidated of Canada: Support for the Manufacturing Sector Program case study³¹

The Abitibi-Consolidated of Canada plant, Belgo division, in conjunction with the firm Opron, implemented an energy optimization program for its machines and equipment, particularly its paper machines and boilers used in the production of newsprint.

Alouette Aluminum Smelter: Support for the Manufacturing Sector Program case study³²

This project was carried out by the Alouette Aluminum Smelter in Sept-Îles. It demonstrated that chemical treatment of cathode bars reduced to 0% the air space ratio that results from the reaction between oxidation and the carbon in the cast aluminum. Untreated bars had an air space ratio of 3.5%, which limited transmission of current.

²⁹ The full case study is only available in French.

Reference: The Agency website. Full case studies are available for download:
<http://www.aee.gouv.qc.ca/en/business-clientele/industries/case-studies/>. Accessed June 24, 2011.

³¹ The full case study is only available in French.

³² The full case study is only available in French.

Transportation Programs

Alberta

Trucks of Tomorrow Program (Climate Change Central)

Program description

In Canada, transportation accounts for 30 per cent of total greenhouse gas (GHG) emissions. In Alberta, commercial freight accounts for about half of road transportation emissions and diesel fuel use accounts for over 80 per cent of freight-related GHG emissions in the province. In total, freight transport in Alberta accounts for 16.6 megatonnes (Mt) of GHG emissions each year. By reducing aerodynamic drag, rolling friction and/or unproductive use of the engine (idling), less fuel can be used to do the same work.

Every litre of diesel fuel saved reduces 2.7 kg of CO₂ and saves \$1. Class 8 tractors use about 4 litres/hour at idle and can idle for hundreds of hours per year. Transport trucks can travel over 100,000 km/year and use 30-50,000 litres of diesel annually. The Trucks of Tomorrow program helps the fleet or private vehicle owner save up to \$30,000 off the purchase price of equipment and reduce fuel costs for the life of the trucks and trailers.

The Trucks of Tomorrow program is a Government of Alberta program; there is a memorandum of understanding between the two provincial transport departments for how the program is delivered by Climate Change Central (C3), an Alberta-based, not-for-profit organization. The program was designed based on input from trucking associations and other stakeholders for preferred technology types to include in the program. The equipment on the list is based on the US EPA's SmartWay program's list of verified equipment. There are six categories of equipment available under this program.

Hybrid. Hybrid drive trains are now available for heavy-duty vehicles whose duty cycles involve a repeated stop-and-go pattern. The electric motor is more efficient than gas or diesel, and regenerative braking helps to capture energy when slowing the vehicle.

Auxiliary power units. Rather than idling a 400 hp engine just for lights or cab heat, auxiliary power units (APUs) provide all of the same conveniences without the wasted fuel costs. APUs are diesel-powered generator sets that produce 12 or 120 volt electricity for cab conveniences, refrigeration units, heat for cab comfort and engine warming and sometimes other functions like air conditioning or running hydraulic pumps.

Cab heaters/coolers. Typically, when drivers are in need of a rest they are forced to idle their 400 hp engine to maintain comfortable conditions in the cab. Diesel-fired cab heaters avoid this while using 8 to 10 times less fuel, often while pre-heating the engine. The same

fuel reductions can be experienced with battery operated air conditioners which use electric fans and cooling systems to cool the cab while the engine is off, avoiding the need to idle. Running a 400 hp engine for extended periods leads to carbon build-up, blowby and oil degradation. To be eligible for the rebate, the cab heater needs to be installed in such a way that the truck's heater core and fan (or an auxiliary heater core and fan) can be operated while the engine is off.

Gap fairings. Between the truck's cab and the front of the trailer lies a gap that attracts turbulence and decreases fuel economy. Gap fairings fill this space (aerodynamically or physically) making the vehicle more stable in crosswinds and therefore more fuel-efficient.

Skirts. Trailer skirts reduce drag by keeping turbulence away from the undercarriage of a trailer thereby smoothing airflow around the trailer. They are available in a variety of configurations, including flat beds and sliding bogeys (moveable rear wheels).

End fairings. Trailer end fairings (also known as boat tails or base flaps) reduce drag up to 10% at highway speed. This technology reshapes the rear of the trailer reducing the pocket of negative pressure behind the moving vehicle.

The three main focuses of the program are idle reduction, improving aerodynamics and adding hybrid technology for fleets. The program objectives are GHG reductions, fleet efficiency, market transformation, and encouraging the market to understand the new technologies. The program is for any owner/operator or manager of a fleet.

There are no delivery agents, per se, as the program is primarily run from the website.³³ C3 works with trucking associations, the Alberta Motor Transport Association (AMTA) and other industry groups that discuss transport issues.

As of June 2011 approximately \$500,000 has been paid-out in rebates and about \$400,000 more is currently being held for customers.³⁴ The participants have been a mix of large and small companies. The larger companies see the value of the program and their program participation has been near the per company limit of \$30,000 in rebates. There have also been a number of participants with just one truck in their fleet—these participants have typically been installing cab heaters and trailer skirts.

This program is an 18-month pilot program and it is on-track with respect to the program budget. Getting to know the market takes some time. There is great potential to build on this pilot program and include more technologies. The program has received excellent anecdotal feedback from participants and there is a visible difference in the number of trucks on the road with trailer skirts since this program started.

³³ Program website: <http://trucksoftomorrow.com/pages/trucking/index.php>

³⁴ As participants register for the program, they select which technologies they will install and their rebate amount is calculated and “reserved” until the technologies are installed.

Program participation eligibility criteria

The program is available to private sector commercial heavy duty vehicles that are privately owned or part of a company's fleet of commercial heavy duty vehicles. The owner of the vehicle(s) must:

- Have legal authority to modify the vehicle;
- Must operate a vehicle with Alberta based plates with a gross vehicle weight rating of 7,258 kg (16,000 pounds or Class 5 or 8) in Alberta;
- Purchase and install fuel efficiency equipment between June 1, 2010 and December 31, 2011;
- Be plated in Alberta with a registration that is valid as of the date of application; and
- Have coolant heaters (hydronic heaters) installed that they can heat the cab while the engine is off.

Program funding

Program funding is currently from the Government of Alberta. In the future, the program funding could be matched by other sources.

Program administration and support

Table 21 Program administration and support

Budget item	Cost (18 months)
Program administration costs including staff, marketing etc	Not available
Number of staff to support the program	1 Program Manager 6 program staff (processing rebates)
Incentives	\$1,380,000 for incentives \$70,000 for hybrids
Program evaluation	Not available (negligible)
Total	\$2,000,000

Internally, the program has one program manager and six support staff who mostly deal with processing rebates. Externally, C3 is present at industry association meetings, regularly communicates with industry partners and associations, and contributes to trade publications.

Budgets and target levels were developed by balancing funder interests with program need/design. The program budget is \$2M for the pilot's duration. The rebate component is \$1.38M, plus \$70k for

the hybrid component. There is also funding for subsidies, outreach managers, and program managers, who handle rebates from all C3 programs, not just the truck program.

Program design features

There are six categories of equipment available under the program: hybrid, auxiliary power units, cab heaters/coolers, gap fairings, skirts, and end fairings. For each category there is a maximum incentive rebate value. The program has three basic steps: First, the applicant must select the equipment they will install and “reserve” their funds online. Second, the applicant installs the equipment. Finally, the applicant signs in online to claim their reserved funds.

Program participants must agree to the program terms and conditions. There is a ‘policing’ function where there is a possibility of auditing participants. C3 scrutinizes all receipts submitted for the program. Receipts must show purchase and installation on a specific truck. A rigorous EM&V process would be hard for this program since the trucks are mobile.

To market the program, C3 runs radio ads and attends industry meetings. Program staff reach out to manufacturers to help boost program uptake and sales. Rural areas are dealt with in the same manner as elsewhere in the province. The program is primarily run via the program website.

Program evaluation and verification are done in-house. For cost-effectiveness, the program looks at success in market transformation (not just GHG tonnes). Some EM&V reporting criteria exist: C3 reports to the province and to industry partners on uptake, GHG reductions and reaching program objectives. The program will run for up to 18 months, and there are 3 months afterwards dedicated to reporting and analysis.

Program delivery

Rural areas of the province have the same access and service under the program as urban areas. The program is primarily run via the program website.

Incentives design

The *Trucks of Tomorrow* program was designed by listening to input from trucking associations and other stakeholders for preferred technology types to include in the program. The incentives were determined by looking at specific program barriers, equipment costs, and input from focus groups and other trucking associations. The equipment on the list is based on the US EPA's SmartWay program's list of verified equipment.

Incentives are available for: heavy-duty hybrid vehicle - \$7000, available to ten companies; auxiliary power units - \$1500, one per truck; cab heater/cooler - \$400 one per truck; gap fairings - \$300,

one per trailer; skirts - \$500, one pair per trailer; end fairings - \$400, one per trailer;

Incentives are flexible so a participant can pick and chose eligible equipment up to a corporate maximum of \$30,000.

There is a 'technical expertise' incentive in the form of a fleet analysis. \$200 is offered up front for fleet analysis. A report is returned to the participant with suggested rebates. There is also a website that shows suggested rebates from anticipated savings. To date, there have been many program participants who have not availed of the technical expertise option.

Table 22 Incentives

Incentive type	Description	Value	Condition of payment	Timing of payment
Financial (rebate/incentive)	Hybrid heavy-duty vehicles incentive	\$7000	Available to 10 companies	After proof of purchase submitted
	Auxiliary power unit incentive	\$15000	One per truck	After proof of purchase submitted
	Cab heater/cooler incentive	\$400	One per truck	After proof of purchase submitted
	Gap fairings incentive	\$300	One per trailer	After proof of purchase submitted
	Skirts incentive	\$500	One pair per trailer	After proof of purchase submitted
	End fairings	\$400	One per trailer	After proof of purchase submitted
Technical expertise	Fleet analysis	\$200	Report is presented to applicant	Upfront

Strengths and weaknesses of program and advice to NL

The program designers looked at other countries and other Canadian provinces for similar programs and product testing. The program was developed in consultation with industry. The trucking community is

very cautious, so having visibility as a government program is a strength.

The short timeframe of the program is a weakness. If the program continues after the 18-month pilot, there will have to be a way to ensure that the program offerings are still supported by the industry.

Suggested program changes, based on the experience of the pilot include:

- Improve rebates for hybrid measures.
- Include natural gas vehicles.
- Offer program services and rebates to other jurisdictions, in partnerships with others.
- Tailor the program to other transportation types (in-city trucks, etc).
- Offer super single tires as a measure (note: current regulations are a barrier to using super single tires instead of the traditional double-tire design).

Transportation is often overlooked but it has good potential for GHG reductions. A lot of transportation improvements are low-hanging fruit.

Triple Decker: Trucks of Tomorrow case study

Greg Decker can tell you precisely the mileage he's received from every tank of diesel he's filled his truck with over the past eight years. So it's no surprise he can instantly rattle off the fuel savings he's realized since installing side skirts on the trailer of his rig - 8.94 per cent, to be exact.

"A very small percentage of truck owners track their fuel use this closely," says Decker, whose Airdrie-based Triple Decker Transport consists of a single truck and trailer. "But because I do, I know these fuel-efficiency measures do pay off."

Decker and his partner and wife, Dannelle, are big believers in lightening their truck's impact on the environment... and their wallet. "Five dollar (a gallon) diesel does wonders to get your attention," says Decker, whose fuel bill reached \$100,000 in 2007, when prices soared.

Triple Decker has since invested some \$50,000 in improvements such as side skirts, low-rolling-resistance tires, Airtab vortex generators (reducing wind resistance and aerodynamic drag) and fuel-saving Eco mud flaps. It all adds up to a nearly 13-per-cent improvement in fuel economy since the Deckers bought their current Volvo truck in 2008.

Last year, they spent some \$5,000 installing Windyne side skirts on their trailer. With the savings to date, Greg figures the purchase price will be recouped in 13 months, with some \$39,000 in total fuel savings over the 10-year life of the skirts.

Triple Decker hauls freight for Calgary-based Caneda Transport from western Canada to the midwest, southern and eastern United States, travelling at highway speeds of predominantly 100 km/h. The company is a U.S. Environmental Protection Agency SmartWay partner (<http://www.epa.gov/smartwaylogistics/index.htm>), with a top fuel efficiency/environmental performance score of 1.25.

While Decker believes "one in a million" truck operators currently takes fuel economy as seriously as he does, he thinks it makes too much economic and environmental sense for small operators and large fleets not to.

"The North American fleet is four million trucks, 25 per cent of which are long-haul operators," he says. "That fleet could save two billion gallons of fuel a year by increasing its fuel mileage by eight to nine per cent."

Fuel Efficiency

- Four-month period before installing trailer side skirts:
37.6 litres/100 km.
- Four-month period after installing side skirts:
34.5 litres/100 km.

Reference: Trucks of Tomorrow website. Available from:
<http://trucksoftomorrow.com/pages/trucking/cases-decker.php>.
Accessed June 24, 2011.

Conclusions

Themes

The following is an overview of the common approaches and themes regarding program design, incentives, delivery, evaluation, monitoring and verification that emerged from the in-depth review of the nine programs covered in this report. These approaches and themes are listed according to program aspects.

Program design

- Conduct a market assessment study to understand where there is potential for energy conservation—in market segments, and in end uses.
- Develop a program with a prescriptive and custom stream. This design allows simple projects to be implemented quickly, with minimal paperwork, and allows for more complex as well as unique projects to also be eligible under the program.
- Adjust the program's marketing according to market segments (e.g. hospitality, manufacturing, etc.). End uses eligible for incentives and other program offerings can be bundled for each market segment.
- There is interest among businesses and industries to get more information about their energy consumption than just monthly energy bills. This could mean an appetite in the marketplace for interval metering.
- Make the program application and reporting requirements as simple for the customer as possible.

Program incentives

- Provide funds for energy studies, as well as incentives for equipment purchase and installation.
- Provide ongoing energy efficiency support for the customers, such as with regular site visits by an energy coach.
- Provide funding for facilities to hire and train energy managers. This will help ensure that energy savings from projects are sustained, and will build up energy management capability in the marketplace.
- Provide meter lending for industrial customers.
- Provide funds for employee energy awareness workshops and training, as behavioural changes have a significant impact on the overall energy savings derived from a retrofit project.

Program delivery

- Cover the travel costs for program partners to conduct on-site visits with customers.
- Ensure the program delivery team is highly skilled and knowledgeable on energy efficiency. Consider providing formal training for the staff and program partners.

- Use a robust information system for the program to ensure that it does not impose restrictions on desired program modifications.

Program marketing

- Divide the target market into segments³⁵ (e.g. commercial becomes hospitality, long-term care, etc.), and adjust marketing messages and materials for each target market; consider a program design that includes end-use bundles,³⁶ as in BC Hydro's *Power Smart Partner Industrial Program*.
- Maintain an informative, up-to-date program website; include program information, applications, etc.³⁷
- Make the program application and reporting requirements as simple for the customer as possible to help increase participation.
- Conduct one-on-one meetings with the key decision makers of industries and businesses to help drive customer uptake. Following this, word of mouth often helps promote the program.
- Encourage partnerships with consultants, contractors, product vendors, industry associations, etc. These individuals and groups may become a (formal or informal) part of the program sales force.

Evaluation, monitoring, and verification

- Conduct pre- and post-project on-site verifications; these visits may be conducted by an internal or external program delivery agent.
- Provide incentives after the work has been completed and verified.
- The International Performance Measurement and Verification Protocol (IPMVP) is a preferred evaluation protocol.

Next steps

The Newfoundland and Labrador project team will use the findings of this research project as they develop the provincial conservation and demand management portfolio of programs for business and industrial customers.

³⁵ For example, BC Hydro's Product Incentive Program markets to 8 distinct market segments.

³⁶ 'End-use bundles' are offers for the six most common industrial systems: pumps, compressed air, fans & blowers, lighting, refrigeration, process controls; bundles are different for different systems and customer-types

³⁷ Use a robust information system for the program to ensure that it does not impose restrictions on desired program modifications.

Appendix A. Program Manager contacts

Program type	Program name	Program Manager	Contacts
Commercial	Product Incentive Program (BC Hydro)	Ms. Christy Inthihar	christy.intihar@bchydro.com 604.453.6524
	Power Smart Partner Commercial Program (BC Hydro)	Mr. Paul Seo	paul.seo@bchydro.com 604.453.6473
	Continuous Optimization Program for Commercial Buildings (BC Hydro)	Mr. Graham Henderson	graham.henderson@bchydro.com 604.453.6471
Industrial	Small Business and Commercial Program (FortisBC)	Mr. Keith Veerman, Program Manager	keith.veerman@fortisbc.com 250.469.8072
		Mr. Perry Feser, ³⁸ Technical Energy Advisor for South Okanagan and Similkameen	perry.feser@fortisbc.com 250.770.4607
	Retrofit Program (Ontario Power Authority)	Mr. Kyle O'Hearn	kyle.ohearn@powerauthority.on.ca 416.969.6208
Industrial	Power Smart	Mr. Chris Caryula	chris.caryula@bchydro.com

³⁸ Interview was conducted with Perry Fesner

Program type	Program name	Program Manager	Contacts
Partner Industrial Program (BC Hydro)	Caryula		604-453-9236
Process and Systems Program (Ontario Power Authority)	Ms. Evelyn Lundhild		evelyn.lundhild@powerauthority.on.ca 416.969.6009
Support for the Manufacturing Sector Program (Agence de l'efficacité énergétique)	Benoit Legare		benoit.legare@aee.gouv.qc.ca 418.627.6379, x 8040
Transportation	Trucks of Tomorrow Program (Climate Change Central, Alberta)	Adam Gagnon	agagnon@climatechangecentral.com 403.517.2703

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