London Hydro Report EM-15-02, *Energy Conservation and Demand Management – Annual Report of London Hydro's 2014 Activities & Achievements*

September 2015

EXECUTIVE SUMMARY

The provincial *Green Energy and Green Economy Act, 2009* created the legislative framework for the Minister of Energy & Infrastructure to issue a series of directives. On March 31st, 2010, the Minister of Energy & Infrastructure issued a directive to the Ontario Energy Board to:

- establish CDM targets for each licensed distributor,
- make such targets a condition of a distributor's license, and
- develop a CDM Code that includes rules relating to the planning, design, approval, implementation evaluation, measurement and verification, reporting requirements and performance incentives associated with CDM programs and to such other matters as the Board considers appropriate.

Ontario Energy Board Decision and Order EB-2010-0215 / EB-2010-0216, *CDM Targets for Licensed Electricity Distributors*, dated November 12, 2010, defined the energy conservation and demand management (CDM) targets for all LDC's. London Hydro's CDM targets are as follows:

- 2014 Net Peak Demand Savings.....41.440 MW
- 2011 – 2014 Net Cumulative Energy Savings:.....156.640 GWh

The Ontario Power Authority (OPA) is a provincial agency established by Bill 100, *The Electricity Restructuring Act, 2004* which set out several objectives for the organization, including (but not limited to):

- To engage in activities that facilitates load management.
- To engage in activities that promotes electricity conservation and the efficient use of electricity.

In carrying out the "*conservation*" component of its mandate, the OPA is responsible for the design of a portfolio of provincial energy conservation and demand management programs that are referred to in the industry as Tier 1 CDM programs. Toward this goal, the OPA developed a number of provincial CDM initiatives geared to the following customer classifications:

- Residential Customers
- Commercial and Institutional (C&I) Customers
- Low-Income Customers
- Industrial Customers

The portfolio of provincial CDM programs targeted to residential customers fall under the umbrella saveONenergy™ FOR HOME brand illustrated below.

The saveONenergy FOR HOME portfolio includes the following elements:

- saveONenergy FRIDGE & FREEZER PICKUP program;
- saveONenergy HEATING & COOLING INCENTIVE program;
- saveONenergy *peaksaver* PLUS™ program;
- saveONenergy COUPON EVENT program; and
- saveONenergy EXCHANGE EVENT program.

The portfolio of provincial CDM programs targeted to commercial, industrial and institutional customers fall under the umbrella saveONenergy FOR BUSINESS brand illustrated below.

The saveONenergy FOR BUSINESS portfolio includes the following elements:

- saveONenergy DEMAND RESPONSE program;
- saveONenergy SMALL BUSINESS LIGHTING program;
- saveONenergy RETROFIT PROGRAM;
- saveONenergy AUDIT FUNDING program;
- saveONenergy EXISTING BUILDING COMMISSIONING program;
- saveONenergy HIGH PERFORMANCE NEW CONSTRUCTION program;
- saveONenergy PROCESS & SYSTEMS program; and
- saveONenergy NEW HOME CONSTRUCTION program.

The provincial CDM program that is targeted to social and assisted housing is branded saveONenergy HOME ASSISTANCE.

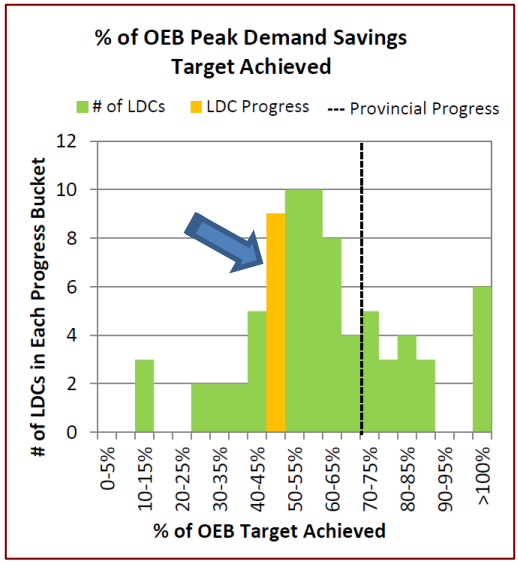
London Hydro's 2014 achievements on the energy conservation and demand management front can be looked at from two perspectives, namely (i) how did London Hydro fare in comparison to its CDM targets, and (ii) how did London Hydro fare in comparison to the community of other LDC's in the province?

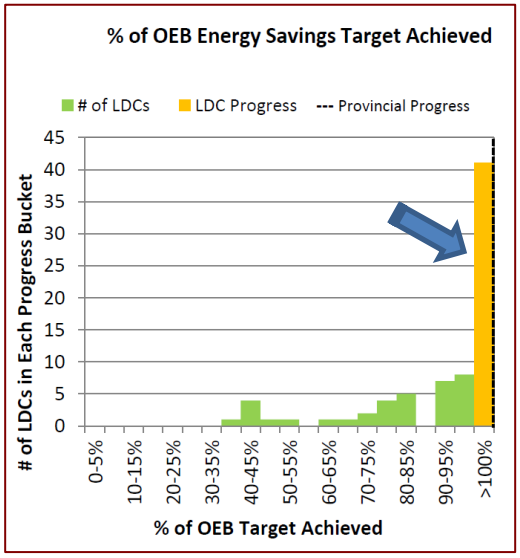
For 2014, London Hydro received credit for the following CDM achievements:

- 19.3 MW of peak demand reduction – this represents 46.6% of London Hydro's net peak demand reduction target; and

- 194.1 GWh of net accumulated energy savings – this represents 123.9% of London Hydro's four-year accumulated net energy savings target.

The two (2) charts below compare London Hydro's 2014 CDM performance against the 2014 achievements of the other LDC's in the province.





It will be seen that the 2014 achievement with respect to peak demand reduction is less than the provincial average progress, and is largely reflective of the difficulty that LDC's in discount zones face in enticing customers to participate in demand response programs, i.e. the incentive isn't sufficient to attract the interest of customers. With respect to energy savings, London Hydro actually achieved its four-year target by the end of the third year, i.e. 1 year ahead of schedule.

It is also noteworthy that more than $2.8 million in incentive payments was distributed throughout 2014. If one makes the general assumption that incentives represent 35% to 40% of the overall project cost, then London Hydro's CDM activities spurred some $7 to $8 million in local economic activity.

In its 2011, 2012 and 2013 submissions, London Hydro identified a number of early warning signs of more intractable issues (e.g. flaws with the underlying delivery model, needless program participation barriers, etc.) that were anticipated to become more significant in 2012 and beyond. These predictions came to be and as an unfortunate consequence, LDC's that wished to succeed with their CDM endeavors could not achieve their full potential.

In reporting these matters herein, London Hydro has adopted a "*warts and all*" reporting style. London Hydro is firmly committed to the success of CDM within its franchise service territory and it does not serve the industry well to "*sugar coat*" challenges that are ultimately barriers to London Hydro's customers actively participating in CDM programs.

London Hydro's version of the saveONenergy HOME ASSISTANCE program embraces innovation on several fronts. Recognizing that the low-income demographic is over-represented with respect to actual household fires, London Hydro teamed up with the London Fire Department to include a fire safety element into the design of the HOME ASSISTANCE program. For this, London Hydro was honored to receive the Ontario Fire Marshall's *2014 Fire Safety Award*, depicted to the right.

Finally, it will be seen that London Hydro is fully committed to working with the LDC community (via active participation on various joint Electricity Distributors Association / Ontario Power Authority working groups), the supply chain partners, and its customers to truly create the desired outcome of *a culture of conservation* in this province.

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1 INTRODUCTION

1.1 Background

The provincial *Green Energy and Green Economy Act, 2009* created the legislative framework for the Minister of Energy & Infrastructure to issue a series of directives. On March 31st, 2010, the Minister of Energy & Infrastructure issued a directive to the Ontario Energy Board to:

- establish CDM targets for each licensed distributor,
- make such targets a condition of a distributor's license, and
- develop a CDM Code that includes rules relating to the planning, design, approval, implementation evaluation, measurement and verification, reporting requirements and performance incentives associated with CDM programs and to such other matters as the Board considers appropriate.

Ontario Energy Board Decision and Order EB-2010-0215 / EB-2010-0216, *CDM Targets for Licensed Electricity Distributors*, dated November 12, 2010, defined the CDM targets for all LDC's. London Hydro's CDM targets are as follows:

- 2014 Net Peak Demand Savings.....41.440 MW
- 2011 – 2014 Net Cumulative Energy Savings:.....156.640 GWh

There are three types of CDM programs that LDC's can consider for meeting or exceeding their targets, namely:

- Tier 1 CDM programs – are turn-key province-wide programs, developed by the Ontario Power Authority (OPA), which are to be the foundation of each LDC's CDM strategy.
- Tier 2 CDM programs – are developed by groups of local distribution companies, also called multi-LDC programs.
- Tier 3 CDM programs – are unique programs designed by individual LDCs.

Note: The latter two classification of CDM program require specific approval by the Ontario Energy Board and are therefore often referred to as "Board-Approved CDM Programs".

LDC CDM portfolios can have a mix of the different types of conservation programs.

Section 2.1, *CDM Strategy Requirements*, of the OEB publication "*Conservation and Demand Management Code for Electricity Distributors*" [Ref 1], includes a regulatory requirement that licensed distributors file their respective CDM strategy with the Board by November 1, 2010.

London Hydro's CDM strategy document is entitled: *London Hydro's Energy Conservation and Demand-Side Management (CDM) Strategy, 2011 through to 2014*; dated October 29, 2010. [Ref 3]

1.2 Purpose

Section 2.2, *Annual Reports*, of the OEB publication entitled "*Conservation and Demand Management Code for Electricity Distributors*" [Ref 1], mandates that "*A distributor shall file an Annual Report with the Board by September 30 of each year. The Annual Report shall cover the period from January 1 to December 31 of the previous year.*" The CDM Code also stipulates the required format and content for such annual reports.

1.3 Scope

This document is London Hydro's fourth (and final) Annual CDM Report and covers the period from January 1, 2014 to December 31, 2014.

1.4 Program Naming Conventions

For the provincial Tier 1 CDM programs, there are differences in the program names used by the Ontario Power Authority in legal agreements with LDC's and program names used in the marketplace. For example, whereas the program name "Direct Install Lighting" is used in legal agreements between the OPA and the community of LDC's, the program is promoted in the marketplace under the name "saveONenergy SMALL BUSINESS LIGHTING". Similarly the "appliance retirement initiative" is known in the marketplace by the name "saveONenergy FRIDGE & FREEZER PICKUP".

Given that the intended audience for this report is primarily the Ontario Energy Board, London Hydro's customers, London Hydro's Board of Directors and Executive Management team, and the Mayor's Sustainable Energy Council, London Hydro has elected to identify programs herein by their respective marketplace names.

Note: A cross-reference between the customer-facing CDM program names and the program identifiers used on the various OPA-generated program schedules within the Master CDM Program Agreement is included as Appendix D in this Report.

1.5 References

[1] Ontario Energy Board publication: *Conservation and Demand Management Code for Electricity Distributors*; September 16, 2010.

[2] Ontario Energy Board Decision and Order EB-2010-0215 / EB-2010-0216, *CDM targets for licensed electricity distributors*; November 12, 2010.

[3] London Hydro report entitled: *London Hydro's Energy Conservation and Demand-Side Management (CDM) Strategy, 2011 through to 2014*; October 29, 2010.

[4] Addendum #1 to London Hydro Report EM-10-05, *Strategic Outlook for Energy Conservation and Demand-Side Management (CDM) Programs, 2011 through to 2014*; June 13, 2011.

[5] Ontario Energy Board publication EB-2012-003, *Guidelines for Electricity Distributor Conservation and Demand Management*; April 26, 2012.

1.6 Terminology

The definitions given below are not intended to embrace all legitimate meanings of the terms. They are applicable only to the subject matter treated in this Report.

Adjusted Gross Savings means the Gross Savings that are adjusted to include what can be physically counted and reliably measured, such as installation/in-service rates, breakage of equipment, data errors, hours of use, measure persistence rates, etc. Adjusted Gross Savings can also be calculated by applying a Realization Rate to Gross Savings estimates (see Realization Rate definition below).

Behavior-Based Programs are energy efficiency programs that utilize an understanding of how individuals interact with energy in order to decrease energy demand.

Demand Response is the reduction of customer energy usage at times of peak usage in order to help address system reliability, reflect market conditions and pricing, and support infrastructure optimization or deferral.

Effective Useful Life is the median number of years that an energy-efficiency measure is likely to remain in-place and operable, i.e. the number of years that a program's annual savings will last.

Energy Savings is the reduction in electricity use (kWh) or in fossil fuel use in thermal unit(s).

ENERGY STAR qualified refers to a program that was first developed in 1992 by the US Environmental Protection Agency (EPA) as a method to identify and promote products that are energy efficient. For example, appliances carrying the ENERGY STAR® label typically are 10 to 20% more energy efficient than non-rated models. Since its initial onset, the government has partnered with other industry members, to promote and expand the scope of this project to include, not only major appliances, but also new homes and buildings.

Ex-ante Estimate is a phrase used in conjunction with demand response programs meaning an engineering estimate "*before the event*" of the amount of load that will be curtailed. The opposite of ex-ante is ***ex-post*** (actual).

Free Rider is a CDM program evaluation term that describes energy efficiency program participants who would have taken the recommended actions on their own, even if the CDM program did not exist. Free riders can be 1) total, in which the participant's activity would have completely replicated the program measure; 2) partial, in which the participant's activity would have partially replicated the program measure; or 3) deferred, in which the participant's activity would have completely

replicated the program measure, but at a future time rather than the program's timeframe.

Free Ridership Rate is the percent of savings attributable to free riders.

Gross Savings is the change in energy consumption and/or demand that results directly from program-related actions taken by participants in an efficiency program, regardless of why they participated.

Interactive Effects is the impact of an energy efficient measure on the operation of other electrical or gas-fired equipment at the facility in which the measure is installed. For example, the installation of energy-efficient lighting systems in a retail store may measurably decrease the air conditioning load in the summer and the use of natural gas for space heating in the winter.

Measure Persistence Factor is the duration of an energy consuming measure, taking into account business turnover, early retirement of installed equipment, and other reasons measures might be removed or discontinued.

Net-to-gross ratio is a factor applied to gross CDM program savings to determine a particular CDM program's net impact. The net-to-gross ratio equals the net program load impact divided by the gross program load impact.

Net Savings is the total change in energy consumption or demand that is attributable to an energy efficiency program. This change in energy consumption and/or demand may include, implicitly or explicitly, the effects of free drivers, free riders, energy efficiency standards, changes in the level of energy service, and other causes of changes in energy consumption or demand.

Realization Rate is a comparison of observed or measured (or evaluated) information to original estimated savings. Evaluations may include multiple realization rates (e.g., energy realization rate, demand realization rate, etc…). A Realization Rate is typically used to adjust Gross Savings to Adjusted Gross Savings, and reflects adjustments such as: data errors, persistent factors, in-service rate, interactive effects, etc.

Retrofit Measure refers to the replacement of currently functioning equipment with a more energy-efficient technology before its end of economic life. In buildings, retrofits may involve either structural enhancements to increase strength, or replacing major equipment central to the building's functions, such as HVAC or water heating systems. In industrial applications, retrofits involve the replacement of functioning equipment with new equipment

Rebound Effect is a modern term for the Jevons Paradox, a theory developed in the 1860's in Britain by William Stanley Jevons, which says that as machines become more efficient and use less energy, society responds by growing and using even more energy. With reference to energy conservation, the rebound effect can occur when a consumer adopts an energy-efficient technology, such as compact fluorescent lamps or an ENERGY STAR qualified central air conditioner, but then elects to operate the CFLs for longer time periods or to reduce the thermostat setting on the air

conditioning system, both being behavioral changes that diminish the benefits of using those more energy-efficiency technologies.

Savings Persistence Factor is a factor that reflects changes in program impacts over time (e.g. retention and degradation of measures).

Spillover, also called "***free drivers***", is a CDM programs evaluation term that describes energy efficiency program participants who take the recommended actions, but never claim the incentives. There are two categories of spillover as identified following:

- ***Non-Participant Spillover***: Non-participant spillover refers to energy efficient measures installed by program non-participants due to the program's influence. The non-participant spillover rate is savings from spillover measures expressed as a percentage of savings installed by non-participants through an energy efficiency program.
- ***Participant Spillover***: The situation where a customer installed equipment through the program and then installed additional equipment of the same type due to program influences, but without any financial or technical assistance from the program. The participant spillover rate is savings from spillover measures expressed as a percentage of savings installed by participants through an energy efficiency program.

Third Party Review is a review of program savings by an independent third party.

1.7 Acronyms, Abbreviations and Symbols

1.7.1 Acronyms

Acronyms used within this report are presented following in alphabetic order:

CDM	=	Conservation and Demand Management
CFL	=	Compact Fluorescent Lamp
CSA	=	Canadian Standards Association
DR	=	Demand Response
EDA	=	Electricity Distributors Association
EM&V	=	Evaluation, Measurement and Verification
EUL	=	Effective Useful Life
IESO	=	Independent Electricity System Operator
IPSP	=	Integrated Power System Plan
LDC	=	Local Distribution Company
LED	=	Light-Emitting Diode
LICO	=	Low-Income Cut-Off
NTG	=	Net-to-Gross
OEB	=	Ontario Energy Board

OPA	=	Ontario Power Authority (now amalgamated with IESO pursuant to Schedule 7 of Ontario Bill 194)
RPP	=	Regulated Price Plan
TOU	=	Time of Use

1.7.2 Abbreviations

Abbreviations used in this report are presented following in alphabetic order:

GWh	=	gigawatt-hour
kW	=	kilowatt
kWh	=	kilowatt-hour
MW	=	megawatt
MWh	=	megawatt-hour

These abbreviations are consistent with CSA Standard Z85-1983, *Abbreviations for Scientific and Engineering Terms*.

2 BOARD-APPROVED CDM PROGRAMS

2.1 Time-of-Use Electricity Pricing

2.1.1 Background

Key excerpts from Section 3, *CDM Targets*, of the Ontario Energy Board publication EB-2012-003, *Guidelines for Electricity Distributor Conservation and Demand Management* [Ref 5] have been replicated below as a convenience of reference:

> *The Board recognizes the manner in which the CDM targets were developed and that a portion of the aggregate electricity demand target was intended to be attributable to savings achieved through the implementation of Time-of-Use ("TOU") prices.*
>
> **:**
>
> *… The Board has deemed the implementation of TOU pricing to be a Board-Approved CDM program for the purposes of achieving the CDM targets. …*
>
> **:**
>
> *In accordance with the Directive, for savings to be eligible to be counted towards the CDM targets, distributors must rely on the verified savings that are the result of using the OPA's Evaluation, Measurement and Verification ("EM&V") Protocols. The Board is of the view that any evaluations of savings from TOU pricing should be conducted by the OPA for the province, and then allocated to distributors. An approach that permitted distributors to conduct their own evaluations could result in aggregate savings in excess of the savings assessed for the province as a whole.*

In September 2015, the Ontario Power Authority (OPA) released its results of TOU savings to distributors. London Hydro was attributed a net demand savings of 1,707 kW.

2.1.2 TOU Program Description

The provincial time-of-use electricity pricing initiative is a behavioral CDM program that is targeted to residential and small business customers (i.e. customers in the "*residential*" and "*general service < 50 kW*" tariff classifications). The TOU initiative is designed to encourage the shifting of energy usage. Therefore peak demand reductions are expected, and energy conservation benefits may also be realized.

The TOU pricing program is offered year round.

Figure 2-1, Sensus iCon-A Smart-Meter

Figure 2-2 below illustrates the seasonally adjusted time periods for on-peak, mid-peak and off-peak electricity pricing.

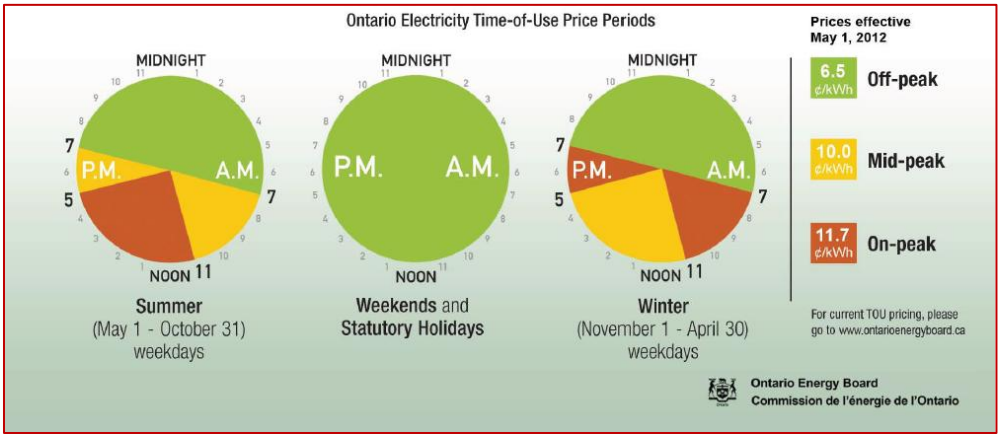

Figure 2-2, Regulated Time-of-Use Price Periods

It should be noted that, in the summer, the on-peak period extends from 11:00 am to 5:00 pm. In the winter, however, there are two distinct on-peak periods; the first extending from 7:00 am to 11:00 am, and the second extending from 5:00 pm to 7:00 pm. All weekends and statutory holidays have off-peak electricity pricing throughout the day.

The regulated time-of-use electricity price is adjusted twice annually by the Ontario Energy Board. A chronology of the Regulated Price Plan – Time-of-Use (RPP-TOU) electricity price schedules is provided below:

Table 2-1, Regulated Price Plan - Time-of-Use Electricity Prices

Effective Date	Electricity Rate (¢/ kWh)		
	On-Peak	Mid-Peak	Off-Peak
(Col 1)	(Col 2)	(Col 3)	(Col 4)
November 1, 2010	9.9	8.1	5.1
May 1, 2011	10.7	8.9	5.9
November 1, 2011	10.8	9.2	6.2
May 1, 2012	11.7	10.0	6.5
November 1, 2012	11.8	9.9	6.3
May 1, 2013	12.4	10.4	6.7
November 1, 2013	12.9	10.9	7.2
May 1, 2014	13.5	11.2	7.5
November 1, 2014	14.0	11.4	7.7

Customers with Smart-meters are able to view their hourly electricity consumption profiles via the Internet. Figure 2-3 below shows one view of the web presentment feature available to London Hydro's customers.

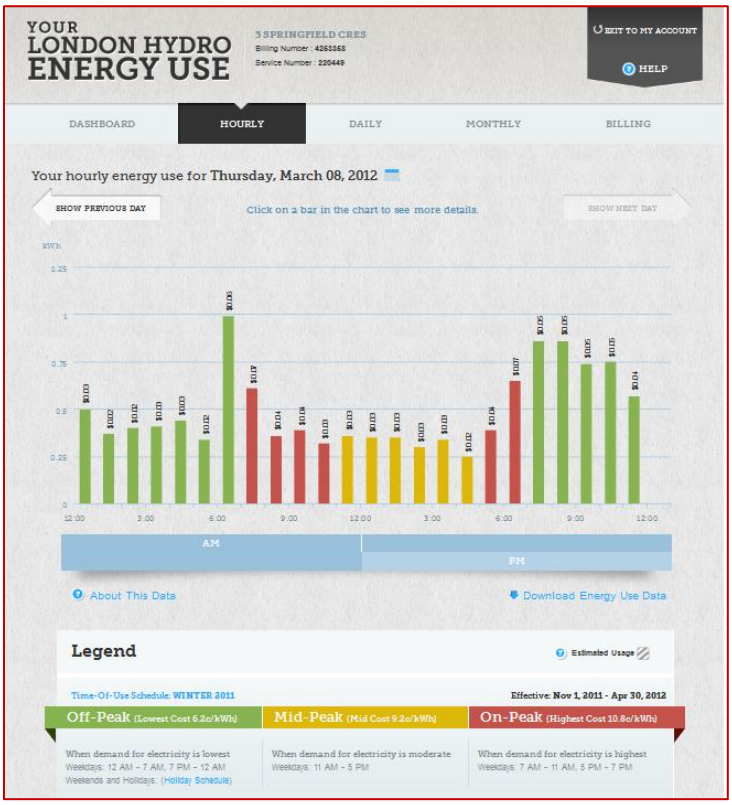

Figure 2-3, Web Presentment of Hourly Consumption Data

Beginning in December 2011, London Hydro commenced the transition process by moving 20 pilot group customers to TOU billing. Based on the positive feedback and no transition issues, customers were given the 30 days' notice in January. Migration of customers based on their billing period started in February and was substantially complete by mid-March 2012 as indicated in Table 2-2[1] below.

Table 2-2, Actual Customer Transition to TOU Electricity Rates

Weekend	Customer Accounts Cut-Over to TOU Rates	Cumulative Customers on TOU Electricity Rates
November 1, 2011	20	20
February 25, 2012	18,530	18,550
March 3, 2012	52,595	71,145
March 10, 2012	32,206	103,351
March 17, 2012	35,147	138,498
Poly-phase meters	6,597	145,095
New installs	55	**145,150**

[1] London Hydro Inc. filing ED-2002-0557, *Narrative for Smart Meter Cost Recovery Application* (Board File Number EB-2011-0181), Section 8.1, *Conversion of Customers to TOU Electricity Rates*; pg 55.

There were a small number of customers that were not transitioned to time-of-use electricity pricing for several months past mid-March for a variety of reasons, including customer refusals to have a Smart-meter installed, premise access issues, etc.

2.1.3 Preliminary Observations Concerning Energy Consumption Patterns

As previously noted in Section 2.1.1 herein, the OPA is responsible for quantifying the energy savings resulting from time-of-use electricity pricing. Nonetheless, certain preliminary observation can be made with respect to energy consumption trends amongst the population of residential customers.

2.1.3.1 Household Energy Consumption

The blue solid line in Figure 2-4 shows the average monthly billed energy consumption (in kWh) per residential customer over the timeframe from 2006 to 2014. It will be seen that in 2006 the average monthly billed energy consumption was 717 kWh and in 2014 the average monthly billed energy consumption declined to 659 kWh.

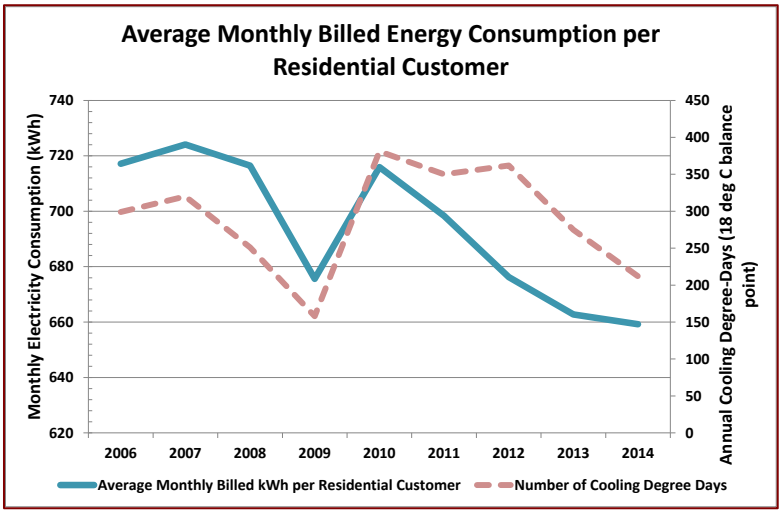

Figure 2-4, Trends in Residential Energy Consumption

As with most LDC's in southwestern Ontario, air conditioning has a significant impact on summer energy sales. The dotted red line in Figure 2-4 shows the number of cooling degree-days (using an 18°C balance point) for each of the years. It will be observed that 2009 was characterized by an unseasonably cool summer and hence energy sales were significantly lower than in other years.

It is interesting to note that 2010, 2011 and 2012 can be characterized as having hot summers with 350 or greater cooling degree-days, and yet the average monthly billed energy consumption throughout this period steadily decreased from 716 kWh per month in 2010 to 698 kWh per month in 2011 to 676 kWh per month in 2012.

Clearly energy-efficiency is occurring amongst the residential sector, but this downward trend clearly preceded the introduction of Smart meters and time-of-use electricity pricing. Some of this observed decrease is attributable to residential energy conservation programs (such as the saveONenergy HEATING & COOLING INCENTIVE program), but it is likely that a greater share was the result of natural events, e.g. the adoption of CFL's had reached the tipping point in the marketplace, customers were replacing their traditional cathode-ray tube television sets with large flat-panel liquid crystal display televisions due to plummeting prices, customers were replacing their first generation home computer systems (with CRT screens and power-hungry printers) with modern home computer systems (with flat screen monitors and more energy-efficient printers), various household appliances (e.g. refrigerators, dishwashers, etc.) that had reached end-of-life were being replaced with household appliances that are inherently more energy-efficient (due to more stringent energy performance standards for consumer appliances), etc.

2.1.3.2 The Shifting of Electricity Usage

The purpose of installing Smart-meters is given in the landmark ECSTF report *Tough Choices: Addressing Ontario's Power Needs*, and the appropriate passage is replicated below for convenience of reference:[2]

> 4. *Consumers should be encouraged to shift consumption from periods of high demand and high prices. In order to achieve this, they will need both the incentives in terms of differentiated prices and the technology in the form of smart meters.*

In the 3 years that London Hydro has offered time-of-use electricity pricing to its residential customers, the consumption pattern is illustrated in Figure 2-5 below.

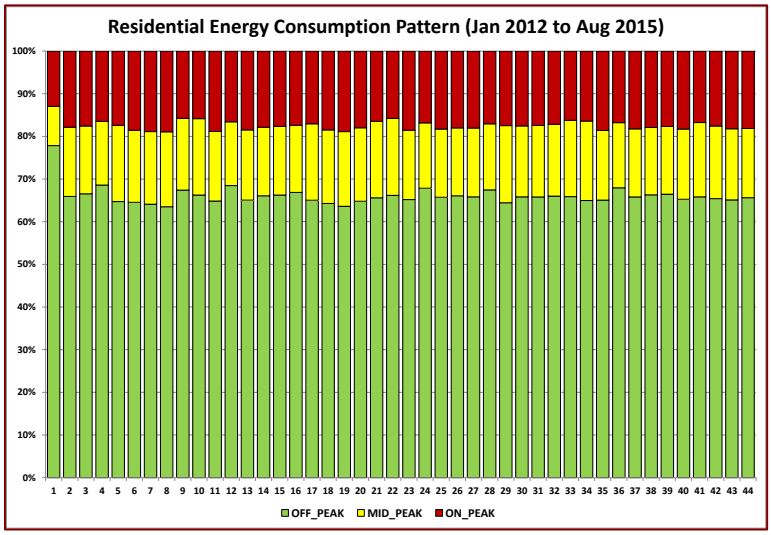

Figure 2-5, Residential Energy Consumption Pattern

[2] Electricity Conservation & Supply Task Force report: *Tough Choices: Addressing Ontario's Power Needs*; Final Report to the Minister; January 2004; page 45

It can be observed from Figure 2-5 that, for the residential sector, the proportion of on-peak consumption (as depicted by the "*red*" segment on the stacked bar graph) has remained relatively constant at about 17.7%.

While it appears (from Figure 2-5 above) that no discernable load shifting by residential customers is occurring, the program EM&V contractor has used advanced statistical techniques to ascertain residential load shifting activity amongst the four (4) LDCs (which collectively represent roughly half of the provincial population and 47 percent of the provincial electricity usage delivered by Ontario LDC's) that were used in the analysis as a proxy for provincial load shifting performance. Key findings from the program EM&V report[3] are replicated following for convenience of reference:

> In terms of the *residential class results*, there is significant evidence of load shifting across all LDCs:
>
> - There is reduction in usage in the peak and mid-peak periods (generally highest in the peak periods) and increase in usage in the off-peak periods;
> - Load shifting is higher in the summer rate periods than in the winter rate periods;
> - OPA peak demand impacts range from -1.3% to -5.6%, depending on the LDC;
> - Summer peak period impacts range from -2.6% to -5.7%, depending on the LDC;
> - Winter peak period impacts range from -1.6% to -3.2%, depending on the LDC;
> - Peak period substitution elasticities range from -0.12 to -0.27, depending on the LDC;
> - Evidence on energy conservation due to the TOU rates is limited, being very small or zero. …

In the 3 years that London Hydro has offered time-of-use electricity pricing to its small business customers, the consumption pattern is illustrated in Figure 2-6 below.

[3] *Impact Evaluation of Ontario's Time-of-Use Rates: First Year Analysis*; prepared for Ontario Power Authority by The Brattle Group; November 26, 2013; pg vi.

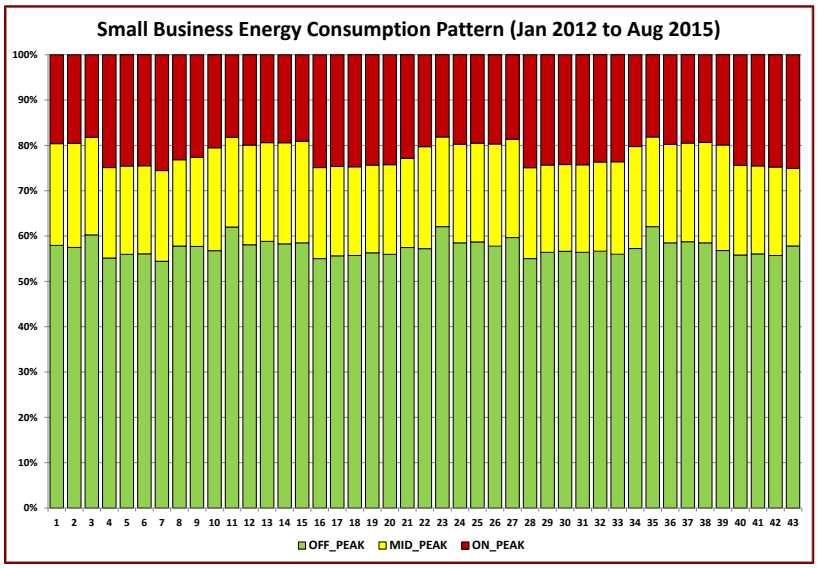

Figure 2-6, Small Business Energy Consumption Pattern

The small business sector (i.e. customers classified as "*General Service less than 50 kW*") is non-homogeneous ranging from an advertising billboard with photocell-controlled lighting loads to a neighbourhood convenience store with significant refrigeration load. One cannot make general statements about the prevailing opportunities for load shifting within this customer category.

While it again appears (from Figure 2-6 above) that no discernable load shifting by small business customers is occurring, the program EM&V contractor has used advanced statistical techniques to ascertain load shifting activity by small businesses customers amongst the four (4) LDCs that were used in the analysis as a proxy for provincial load shifting performance. Key findings from the program EM&V report[4] are replicated following for convenience of reference:

> In terms of the *general service class* results, there is some evidence of load shifting across all LDCs but it is not as statistically significant and pronounced as in the residential sector:
>
> - There is a small reduction in usage in the peak and mid-peak periods, generally higher in the peak periods. There is a small increase in usage in the off-peak periods;
> - There are a few odd results, most likely because of the heterogeneity in the types of businesses that are included in the general service class;
> - Impacts are far smaller for general service than residential class;
> - There is no clear pattern of winter versus summer load shifting impacts;
> - OPA peak demand impacts range from -0.7% to 0.0%, depending on the LDC;
> - Summer peak period impacts range from -0.6% to 0%, depending on the LDC;

[4] *Impact Evaluation of Ontario's Time-of-Use Rates: First Year Analysis*; prepared for Ontario Power Authority by The Brattle Group; November 26, 2013; pg vii.

- Winter peak period impacts range from -0.2% to -1%, depending on the LDC;
- Peak period substitution elasticity is -0.03 for LDC#1, and zero for LDC#3;
- Evidence on energy conservation due to the TOU rates is negligible and generally insignificant.

2.2 Other Board-Approved CDM Programs

In 2014, London Hydro neither made application for Board-approved CDM programs nor were any such programs executed in London Hydro's franchise service territory.

3 OPA-CONTRACTED PROVINCE-WIDE CDM PROGRAMS

3.1 General Overview

The Ontario Power Authority (OPA) is a provincial agency established by Bill 100, *The Electricity Restructuring Act, 2004* which set out several objectives for the organization, including (but not limited to):

- To engage in activities that facilitates load management.
- To engage in activities that promotes electricity conservation and the efficient use of electricity.

In carrying out the "*conservation*" component of its mandate, the OPA is responsible for the design of a portfolio of provincial energy conservation and demand management programs that are referred to in the industry as Tier 1 CDM programs. Toward this goal, the OPA has developed a number of provincial CDM initiatives geared to the following customer classifications:

- Residential Customers
- Commercial and Institutional (C&I) Customers
- Low-Income Customers
- Industrial Customers

From an LDC perspective, customers are classified somewhat differently. For 2014, the customer classifications and the number of London Hydro customers in each tariff classification are shown in Table 3-1 below.[5]

Table 3-1, London Hydro's 2014 Customer Profile

Tariff Classification	Customer Count
Residential	138,568
General Service < 50 kW	12,368
General Service > 50 kW	1,605
Large User > 5,000 kW	3

Customers in the "*general service < 50 kW*" tariff classification would generally be considered "*small business*" customers, e.g. clothing stores, independent restaurants, dry cleaners, medical offices, beauty salons, convenience stores, gas stations and repair garages, and other small retailers. It will be seen that there are special provincial CDM programs (such as saveONenergy SMALL BUSINESS LIGHTING) within the OPA's "*commercial and institutional*" portfolio that are specifically directed to these customers.

[5] Ontario Energy Board publication: *2014 Yearbook of Electricity Distributors*; July 31, 2015; page 61

Customers in the "*general service > 50 kW*" and "*large user > 5,000 kW*" tariff classifications would generally be eligible for multiple CDM programs within the OPA's "*commercial and institutional*" and "*industrial*" portfolios of CDM programs.

The contractual relationship between the OPA and the community of LDC's that operate as delivery agents within their respective franchise service territories is governed by a so-called *Master CDM Program Agreement*. The various provincial CDM programs are included as "*Schedules*" to the Master CDM Program Agreement.

The CDM program name identified on the various schedules often bears little resemblance to the marketing (or customer-facing) name of the program. As such, Appendix D herein provides a cross-reference between the marketing name for each Tier 1 CDM program and the program name that is used on the Schedules for the *Master CDM Program Agreement*. Also included in this cross-reference table is the date that the various Schedules were posted to the LDC community and the date that London Hydro formally registered as the delivery agent for each program.

For residential customers, London Hydro operates the saveONenergy FOR HOME suite of CDM programs that are individually described in Section 3.2.1 (starting on page 16 herein).

For commercial, institutional and industrial customers, London Hydro operates the saveONenergy FOR BUSINESS suite of CDM programs that are individually described in Section 3.2.2 (starting on page 20 herein).

For those residential customers that fulfill the eligibility criteria for "*low income*", London Hydro also operates the saveONenergy HOME ASSISTANCE program that is described in Section 3.2.3 (starting on page 28 herein).

3.2 Program Descriptions

3.2.1 Residential CDM Programs

The portfolio of residential CDM programs fall under the umbrella saveONenergy™ FOR HOME brand as illustrated in Figure 3-1 below.

Figure 3-1, saveONenergy FOR HOME Branding

The saveONenergy FOR HOME portfolio includes the following elements:

- saveONenergy FRIDGE & FREEZER PICKUP program;
- saveONenergy HEATING & COOLING INCENTIVE program;

- saveONenergy *peaksaver* PLUS™ program;
- saveONenergy COUPON EVENT program; and
- saveONenergy EXCHANGE EVENT program.

The individual residential programs are outlined in the subsections below. Complete descriptions of the various residential consumer initiatives can be found on the saveONenergy website at URL:: https://saveonenergy.ca/Consumer.aspx

3.2.1.1 saveONenergy FRIDGE & FREEZER PICKUP –

Residential customers with a fridge or freezer that is 20 years or older can have the OPA's provincial contractor pick the unit up for free from the customer's home and recycle the unit in an environmentally-friendly manner. Window air conditioners and dehumidifiers will also be picked up by the contractor if a refrigerator or freezer is being picked up.

Note: This initiative is essentially a continuation and re-branding of the Ontario Power Authority's Great Refrigerator Round-Up program.

Note: Commencing in January 2013 there was a change in the eligibility criteria whereby appliances needed to be 20 years or older (as opposed to the 15 year criterion that was in effect for 2011 and 2012).

Figure 3-2, saveONenergy FRIDGE & FREEZER PICKUP Branding

The saveONenergy FRIDGE & FREEZER PICKUP program operates year round.

For this program, the OPA centrally contracts for province-wide marketing, a call center, appliance pickup, and appliance decommissioning.

London Hydro's involvement is limited to active program promotion within its franchise service territory. Examples of program promotional material are included as Appendix A herein.

3.2.1.2 saveONenergy HEATING & COOLING INCENTIVE –

Residential and small business customers are eligible for a rebate if they purchase and arrange for a participating HVAC contractor to replace central heating or cooling equipment with premium-efficiency units. A premium-efficiency unit would be a natural gas furnace with a high-efficiency blower motor (often referred to as an electronically-commutated motor or ECM blower motor) or a central air conditioner unit that is ENERGY STAR qualified.

Figure 3-3, saveONenergy HEATING & COOLING INCENTIVE Branding

The saveONenergy HEATING & COOLING INCENTIVE program operates year round.

Note: This initiative is essentially a continuation and re-branding of the Ontario Power Authority's *Cool Savings Rebate* program

For this program, the OPA centrally contracts for province-wide marketing, and the registration of HVAC contractors that meet the OPA's eligibility requirements.

For this program, London Hydro's involvement is limited to active program promotion within its franchise service territory.

3.2.1.3 saveONenergy *peaksaver* PLUS™ -

The *peaksaver* initiative involves the installation of a remotely-activated load control switch (by London Hydro's contractor) to control the operation of central air conditioners for short periods of time when there is a generation shortfall or constraint on the provincial transmission grid.

Participants in the program receive an in-home electricity monitor that provides near real-time feedback on the amount of electricity the participant is consuming at any particular time, and the amount of money the participant is spending on electricity consumption, based on the prevailing electricity rates.

Figure 3-4, saveONenergy peaksaver PLUS Branding

Given that this initiative is primarily for the cycling control of central air conditioning during summer heat waves, from a practical and effectiveness perspective, program promotion and installation of control equipment would generally be limited to late spring and early summer.

For this program, the Ontario Power Authority contracts with a central demand response aggregator to initiate a demand response event via wireless paging signals. Alternatively, the LDC can assume responsibility for dispatching signals within its franchise service territory.

London Hydro's role includes promotion of the *peaksaver* PLUS initiative, enrollment of customers, and the procurement and installation of control technology for the cycling control of central air conditioner systems.

While London Hydro has enrolled to deliver the *peaksaver* PLUS program within its franchise service territory, there were technology issues associated with the requisite in-home display that precluded London Hydro from offering this program in 2013 and early 2014. The challenges are fully described in London Hydro Report EM-12-01, *Strategy for Supplying In-Home Displays for the peaksaver-PLUS® Residential CDM Program*. Courtesy copies of this document were provided to both the Ontario Power Authority and Ministry of Energy.

3.2.1.4 saveONenergy COUPON EVENT –

Coupon events are held in both the Spring and Fall each year. Coupons provide discounts for the purchase of a variety of energy-efficient products (e.g. compact fluorescent lamps, weather stripping, hot water pipe wrap, timers, programmable thermostats for baseboard heaters, etc.) from participating retailers.

Figure 3-5, saveONenergy COUPON EVENT Branding

For this program, the OPA centrally contracted for the printing and distribution of coupon booklets across Ontario, and entered into agreements with retailers to honor the coupons. The coupons in these booklets could be used throughout the year.

London Hydro's involvement was limited to distribution of additional coupon booklets at local events within its franchise service territory. There was also provision whereby customers could electronically download coupon booklets from an LDC's website.

Note: This initiative is essentially a continuation and re-branding of the Ontario Power Authority's *Every Kilowatt Counts* power savings coupons program

London Hydro distributed coupon booklets at numerous events during promotion or recognition of conservation initiatives. London Hydro sponsors many local community groups, environmental initiatives and employer-hosted events. Such events are natural places to promote the coupon booklets. In recognition of the participation in our commercial retrofit programs, London Hydro often prepares information for employees of such companies to participate at home in the available residential programs.

3.2.1.5 saveONenergy EXCHANGE EVENT –

Customers with dehumidifiers that are at least 10 years old and in working condition can drop off their old units at participating retailers (on defined dates each Spring) and receive a $50 coupon towards the purchase of a new ENERGY STAR® qualified dehumidifier.

Figure 3-6, saveONenergy EXCHANGE EVENT Branding

Note: When this program was initially introduced in 2011, it covered both room air conditioners and dehumidifiers. In 2012 there was an appreciable decrease in the number of room air conditioners being received through the program. A subsequent review showed the greatly diminished quantities of room air conditioners had a negative impact on the overall cost effectiveness of the program, and hence room air conditioners was removed for the 2013 (and beyond) program offering.

For this program, the Ontario Power Authority contracts with participating retailers for the collection of eligible units and redemption of discount coupons.

London Hydro's involvement is limited to supporting participating retailers that request a London Hydro presence at their events.

3.2.2 Commercial, Industrial and Institutional CDM Programs

The portfolio of commercial, industrial and institutional CDM programs fall under the umbrella saveONenergy FOR BUSINESS brand as illustrated in Figure 3-7 below.

Figure 3-7, saveONenergy FOR BUSINESS Brand

The saveONenergy FOR BUSINESS portfolio includes the following elements:

- saveONenergy DEMAND RESPONSE program;
- saveONenergy SMALL BUSINESS LIGHTING program;
- saveONenergy RETROFIT PROGRAM;
- saveONenergy AUDIT FUNDING program;
- saveONenergy EXISTING BUILDING COMMISSIONING program;
- saveONenergy HIGH PERFORMANCE NEW CONSTRUCTION program;

- saveONenergy PROCESS & SYSTEMS program; and
- saveONenergy NEW HOME CONSTRUCTION program.

The individual residential programs are outlined in the subsections below. Complete descriptions of the various residential consumer initiatives can be found on the saveONenergy website at URL:: https://saveonenergy.ca/business.aspx

3.2.2.1 saveONenergy DEMAND RESPONSE –

Demand response programs compensate participating commercial, industrial or institutional customers for curtailing their plant load or activating standby emergency generators at times when wholesale market prices for electricity are high or there is a greater risk to the reliability of the electricity grid due to a generation shortfall or transmission line constraint. At the outset (in 2011), there were two distinct participation streams, namely:

- DEMAND RESPONSE VOLUNTARY DR1 - This voluntary initiative is a flexible way for the participant to earn monthly payments only when the participant chooses to take part in activation notices.
- DEMAND RESPONSE CONTRACTUAL DR3 - This contractual initiative offers higher incentive rates in return for a firm commitment to take part in activation notices.

Figure 3-8, saveONenergy DEMAND RESPONSE Branding

Note: The VOLUNTARY DR1 offering was formally withdrawn from the provincial marketplace on December 4, 2012 due to lack of participation and interest.

The OPA initially qualified five (5) private companies (Direct Energy, Energy Curtailment Specialists Inc., EnerNOC Inc., Constellation Energy Resources, and Rodan Energy) to serve as demand response aggregators in the marketplace. However, two (2) of these companies (Direct Energy and Constellation Energy Resources) ceased offering demand response aggregation services in the Ontario marketplace effective May 1, 2012.[6] London Hydro is not privy to the reasons that these two companies suspended DR aggregation operations in Ontario.

These demand response aggregators usually approach the customers directly. London Hydro's role is simply one of supporting the program, i.e. reassuring eligible customers of the legitimacy of the demand response program, and informing them of the program parameters and the potential opportunity for their organization.

[6] E-mail of September 26, 2013 to Mike Isber (London Hydro) from Amy Snook (OPA); re: *DR*.

3.2.2.2 saveONenergy SMALL BUSINESS LIGHTING –

Under this program, London Hydro's electrical contractors will provide turn-key lighting upgrades worth up to $1,000 in qualifying small businesses (i.e. those with an electricity demand of less than 50 kW such as clothing stores, independent restaurants, dry cleaners, medical offices, beauty salons, convenience stores, garages and other small retailers) at no cost to the small business customer.

Note: This program is essentially a continuation and rebranding of the Power Savings Blitz initiative.

Figure 3-9, saveONenergy SMALL BUSINESS LIGHTING Branding

The saveONenergy DIRECT INSTALL LIGHTING program operates year round.

London Hydro's involvement includes engaging local electrical contractors to carry out the turnkey energy efficiency measures, approving SMALL BUSINESS LIGHTING applications, carrying out field verification activities (to ensure consistency between the installed energy-efficiency measures and the application), and active program promotion within its franchise service territory.

3.2.2.3 saveONenergy RETROFIT PROGRAM –

This initiative provides substantial financial incentives to commercial, industrial and institutional customers for replacing existing equipment with high efficiency equipment and for installing new control systems that will improve the efficiency of operational procedures and processes. Eligible energy-efficiency measures include, but are not necessarily limited to, the following:

- Lighting retrofits
- Lighting controls
- HVAC re-design
- Chiller replacement
- Variable frequency drives

Note: This program is essentially a continuation and rebranding of the Electricity Retrofit Incentive Program (ERIP).

Figure 3-10, saveONenergy RETROFIT PROGRAM Branding

There are three (3) distinct participation tracks in the RETROFIT PROGRAM, namely:

- Prescriptive projects – The "*prescriptive*" track provides a defined list of end-use energy-efficiency measures and a corresponding per-unit incentive. Examples include upgrades to lighting, motors, unitary A/C, etc.
- Engineered projects – The "*engineered*" track consists of a series of preset calculation worksheets (i.e. spreadsheets) that estimate reductions in peak demand and/or electricity consumption associated with the installation of more energy-efficient equipment or solutions. Electronic worksheets are available for the energy-efficiency measures listed below:
  - 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
- Custom projects - The "*custom*" track is available for more complex or innovative solutions not covered in the "*prescriptive*" or "*engineered*" track. Technology, equipment and system improvements are evaluated on their demand and energy-performance. Incentives are paid after installation, and once the savings have been measured and verified.

The saveONenergy RETROFIT PROGRAM operates year round.

London Hydro's involvement includes approving RETROFIT PROGRAM applications, carrying out field verification activities (to ensure consistency between the installed energy-efficiency measures and the application), and active program promotion within its franchise service territory.

Another role that London Hydro takes on is the celebration of successful CDM projects via such avenues as nominating selected energy-efficiency projects as contenders for the Mayor's Sustainable Energy Council's (MSEC)[7] annual *Outstanding EnergySaver Business* recognition initiative.

Note: For reasons unknown, there was no solicitation for nominations in late 2014 for the annual *Outstanding EnergySaver Business* award, and hence no submissions by London Hydro to outline successful energy-efficiency projects.

London Hydro promotes the saveONenergy RETROFIT PROGRAM heavily by participating in most meetings and local events hosted by the London Economic Development Corporation (LEDC), the London Property Management Association (LPMA), the Chamber of Commerce, Southwestern Ontario Chapter of the Canadian Manufacturers and Exporters, and similar events where potential participants are likely to attend.

[7] See URL: http://www.msec.london.ca/d.aspx?s=/Main/Business.htm

3.2.2.4 saveONenergy AUDIT FUNDING –

Business customers are eligible for an incentive (up to 50% of the cost of an energy audit, based on requirements that take into account the size and complexity of the buildings) to complete energy audits assessing the potential for energy savings to be achieved through equipment replacement, operational practices, or participation in Demand Response initiatives and other building systems and envelopes projects.

Figure 3-11, saveONenergy AUDIT FUNDING Branding

The saveONenergy AUDIT FUNDING program operates year round.

London Hydro's involvement includes approving AUDIT FUNDING applications and active program promotion to building owners, property managers, and consulting firms within its franchise service territory.

3.2.2.5 saveONenergy EXISTING BUILDING COMMISSIONING –

This initiative applies to commercial and institutional buildings that use chilled water systems for space cooling. Funding is available for hiring an expert to analyze the chilled water system and make recommendations for increasing its energy efficiency and for subsequently implementing the recommended upgrades.

Figure 3-12, saveONenergy EXISTING BUILDING COMMISSIONING Branding

The saveONenergy EXISTING BUILDING COMMISSIONING program operates year round.

London Hydro's involvement includes approving EXISTING BUILDING COMMISSIONING applications and active program promotion to building owners, and HVAC consultants and contractors within its franchise service territory.

3.2.2.6 saveONenergy HIGH PERFORMANCE NEW CONSTRUCTION –

This initiative targets new construction and major renovations in the planning stages by financially rewarding builders and their project decision-makers that exceed the electricity efficiency standards specified in the Ontario Building Code.

Note: This program is essentially a continuation and rebranding of the High Performance New Construction (HPNC) program that was initially launched on March 26, 2008 and was

delivered by Enbridge Gas Distribution Inc. for customers outside the 416 area code, and by Toronto's Better Buildings Partnership for projects within the City of Toronto.

Figure 3-13, saveONenergy HIGH PERFORMANCE NEW CONSTRUCTION Branding

The saveONenergy HIGH PERFORMANCE NEW CONSTRUCTION program operates year round.

London Hydro's involvement includes approving HIGH PERFORMANCE NEW CONSTRUCTION applications and active program promotion to developers, architects and consultants within its franchise service territory.

3.2.2.7 saveONenergy PROCESS & SYSTEMS –

This initiative targets industrial and large commercial, institutional and agricultural customers with (non-lighting) energy-efficiency projects or portfolios that are expected to generate at least 100 MWh of annualized electricity savings. The objectives of this initiative are to:

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

Figure 3-14, saveONenergy PROCESS & SYSTEMS Branding

The saveONenergy PROCESS & SYSTEMS initiative is a comprehensive program made up of two complementary streams, namely:

- Energy Efficiency Upgrades -

  This participation stream helps eligible customers to find, to study, and to act on energy-efficiency opportunities via:

  - Funding for Engineering Studies – Usually, applications for capital funding must be supported by a PRELIMINARY or DETAILED engineering study (or both) wherein the umbrella PROCESS & SYSTEMS initiative provides the following funding:

- PRELIMINARY Engineering Study Funding - This is a general assessment of a key process or single system, comparing the cost-effectiveness of the various upgrades available to the customer. Funding of up to $10,000 per study is available.
- DETAILED Engineering Study Funding - Building on the preliminary recommendations, this study provides the customer with all of the 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.

- Capital Incentives - The capital incentive for participants that elect to deploy an energy-efficiency technology is very attractive and is calculated as the lowest of:
  - $200/MWh of annualized electricity savings;
  - 70% of projects costs; and
  - A one year payback.

- Energy Management and Monitoring

  This participation stream provides a variety of support functions for identifying potential energy efficiency opportunities. The specific sub-initiatives are highlighted following:

  - Funding for an Embedded Energy Manager – Eligible customers can hire an on-site full-time energy manager as a dedicated resource to identify energy-efficiency opportunities. The funding parameters and requisite minimum performance requirements for an Embedded Energy Manager are summarized below:
    - Funding up to 80% of the Embedded Energy Manager's actual annual salary to a maximum amount plus up to 80% of actual reasonable expenses to a maximum amount per year; and
    - Embedded Energy Manager must achieve a minimum of 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, 30% of savings must be achieved without third party incentives.

    Note: There is also a variant Roving Energy Manager program for instances where hiring an Embedded Energy Manager full time by customer is not warranted, or there is simply not enough potential for energy savings. Roving Energy Managers may be employed by an LDC and are available for potential participants for a defined period of time to start identifying opportunities, develop energy-management plans and completing incentive applications.

  - Monitoring and Targeting – For facilities with a minimum annual electricity consumption of 15,000 MWh and a staff member designated as a resident energy manager, the PROCESS & SYSTEMS initiative provides funding, toward 80% of actual eligible costs (less any third party contributions), of up to $75,000 per site to purchase, install and make operational a monitoring and targeting system. The participating customer must contribute a minimum 20%

of the actual project cost. In turn, the facility must 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.

- Meter Lending Library – The central meter lending library allows LDC's and eligible customers to borrow, for short periods of time, portable measurement instruments that will allow customers to directly measure the load profile for a fan, pump, chiller or an entire industrial system and hence to better quantify the opportunities for energy management and energy efficiency.

The saveONenergy PROCESS & SYSTEMS initiative operates year round.

For this program, the OPA centrally contracts for a Technical Reviewer, an independent third-party engineering firm that reviews the applications, engineering studies, and post-project measurement & verification plans for conformance to engineering principles and compliance with the established program parameters.

London Hydro's role includes active program promotion within its franchise service territory, the development and execution of a variety of legal agreements with the participating customer (covering embedded energy managers, funding of engineering studies, incentives for energy-efficiency projects, etc.), and otherwise providing various types of support to participating customers in the PROCESS & SYSTEMS initiative.

London Hydro's approach to program promotion is based on tried and true one-on-one engagement strategies. Specifically:

- London Hydro has initially targeted all customers with a peak demand that is greater than 200 kW and its Manager of Industrial CDM Programs calls on the customer, disseminates information about the opportunity, presents value propositions, and solicits customer interest in moving forward with energy-efficiency opportunities; and
- London Hydro shows up at venues where potential program participants are likely to also be present, such as the London Economic Development Corporation's annual "*For Manufacturers Only*" conference, the London Chamber of Commerce's annual *Business Achievement Awards* event, the Canadian Manufacturers and Exporters annual *Innovation in Manufacturing* event, etc.

Once potential energy-efficiency opportunities have been identified, London Hydro further removes program participation barriers by deploying its expertise to the customer's facility to carry out pre-project and post-project measurements of energy consumption using its roster of calibrated power measurement instruments.

3.2.2.8 saveONenergy NEW HOME CONSTRUCTION –

This initiative is designed to encourage home builders and renovators to construct energy-efficient homes in Ontario by incorporating energy-efficiency into their construction or any extensive renovation.

Figure 3-15, saveONenergy NEW HOME CONSTRUCTION Branding

The saveONenergy NEW HOME CONSTRUCTION program operates year round.

London Hydro's involvement includes approving NEW HOME CONSTRUCTION applications and active program promotion within its franchise service territory.

Consistent with its sales-based approach of "*showing up where its customers are*", London Hydro applied for a membership within London Home Builders Association (LHBA) with the intention of engaging London's new home builders both at monthly association meetings and within the membership publication *Bang On*.

Conceptually, London Hydro was interested in using the NEW HOME CONSTRUCTION initiative to both leverage and add value to the London Energy-Efficiency Partnership (LEEP), an existing joint undertaking sponsored by London Home Builders Association and the City of London, and their *LEEP Innovator Initiative*.[8]

Several local builders are active participants in the ENERGY STAR® for New Homes program as well as the local LEEP initiative. Generally builders are very keen to participate in valuable and well organized programs in order to make their homes more marketable.

3.2.3 Low-Income CDM Programs

In Ontario, approximately 16 per cent of households are low-income, and they often occupy older, less energy efficient homes with older appliances. While financial assistance programs are important for helping with energy bills in the short term, providing Conservation and Demand Management (CDM) initiatives targeted at low-income households can have a greater impact by reducing energy bills on a sustained basis.[9] On July 5, 2010, the Minister directed the OPA to develop province-wide CDM programs targeted specifically at low-income consumers as part of its suite of province-wide CDM programs.

The low-income CDM programs are targeted to homeowners and tenants that meet the Low-Income Cut-Off (LICO) criteria and reside in one of the following dwelling types:

- Housing co-operatives;

[8] Publication: *LEEP Innovator Tool-kit – Working together to create a Sustainable Future for the Residents of London*; London Home Builders Association and City of London; January 2008.

[9] Environmental Commissioner of Ontario publication: *Annual Energy Conservation Progress Report, 2010 (Volume One): Managing a Complex Energy System*; pg. 36.

- Social housing buildings and complexes that in London would be under the governance of London Middlesex Housing Corporation;
- Rental apartments wherein the occupant receives some type of social benefit (e.g. the Ontario Ministry of Community and Social Services' "*Ontario Works*" or "*Ontario Disability Support Program*" financial assistance program, the Canadian *Guaranteed Income Supplement*, etc.); and
- Private dwellings wherein the owner-occupant meets pre-defined income eligibility criteria (e.g. recipient of the Ontario *Low-Income Energy Assistance Program* emergency financial assistance program, etc.).

All social and assisted housing may participate in one of the opportunity streams identified following:

- saveONenergy AUDIT FUNDING as previously described in Section 3.2.2.4 (starting on page 24 herein) and saveONenergy RETROFIT PROGRAM as previously described in Section 3.2.2.3 (starting on page 22 herein); or
- saveONenergy HOME ASSISTANCE as described in Section 3.2.3.1 below.

The participation stream is dictated by the defined eligibility parameters for the saveONenergy HOME ASSISTANCE program.

3.2.3.1 saveONenergy HOME ASSISTANCE

The CDM program that is targeted to social and assisted housing is branded saveONenergy HOME ASSISTANCE.

Figure 3-16, saveONenergy HOME ASSISTANCE Brand

The objective of this turnkey initiative is to offer the free installation of energy efficiency measures to income-qualified households for the purpose of achieving electricity and peak demand savings. All eligible customers receive a *Basic* and *Extended Measures Audit*, while customers with electric heat also receive a *Weatherization Audit*. The initiative is designed to coordinate efforts with gas utilities.

The saveONenergy HOME ASSISTANCE program operates year round.

Complete descriptions of this low-income initiative can be found on the saveONenergy website at URL:: https://saveonenergy.ca/homeassistance

London Hydro's involvement includes qualifying eligible customers, supplying and installing energy-efficiency measures (usually via a third-party contractor), and active program promotion within its franchise service territory.

3.3 Participation

3.3.1 Participation in saveONenergy FOR HOME Programs

3.3.1.1 Participation Synopsis

The participation level in the saveONenergy FOR HOME portfolio of CDM programs by customers within London Hydro's franchise service territory is given in Table 3-2 below.

Table 3-2, Participation in saveONenergy FOR HOME Programs

Marketplace Name of CDM Initiative	Program Description	Activity Unit	Program Uptake / Participation Units
FRIDGE & FREEZER PICKUP	Page 17	Appliances	2,267
HEATING & COOLING INCENTIVE	Page 17	Equipment	3,675
peaksaver PLUS™	Page 18	Devices	0 ✪
COUPON EVENT	Page 19	Coupons	159,959
EXCHANGE EVENT	Page 20	Appliances	120

Note: The entry for "COUPON EVENT" includes redemptions for the "*instant coupons booklet*" and the in-store coupons available at bi-annual retailer events.

Note: Although participation in the *peaksaver* PLUS program is shown in Table 3-2 as being zero (0), this is incorrect for reasons outlined in Section 3.6.3 herein.

The foregoing information was provided to London Hydro by the Ontario Power Authority pursuant to their obligations under Clause 8.2, *Reporting Requirements*, of the *Master CDM Program Agreement*. With the exception of the *peaksaver* PLUS program, there is no mechanism for London Hydro to verify the forgoing results.

3.3.1.2 saveONenergy FRIDGE & FREEZER PICKUP Participation Insight

Throughout 2006 and partway into 2007, London Hydro ran its comprehensive and highly successful *Chill Out – London* residential appliance recycling program wherein 14,463 refrigerators, freezers and room air conditioners were harvested. Given London Hydro's residential customer base at the time of 127,000 accounts, this represented an uptake in excess of 11%.

Throughout the duration of the Ontario Power Authority's successor *Great Refrigerator Round-Up* appliance retirement program, as anticipated, there wasn't a significant volume of refrigerators and freezers available for retirement, and the volumes decreased over time.

With the introduction of the Ontario Power Authority's saveONenergy FRIDGE & FREEZER PICKUP program, London Hydro sought unique methods of increasing the accessibility of the program and thereby hopefully maximizing the volume of retired refrigerated appliances. The City of London's Environmental & Engineering Services division operates three (3) drop-off stations (referred to as "*Community EnviroDepots*") for waste and material recycling that collectively attracts 100,000 drop-off visits by London residents each year.

London Hydro sought and received permission from the OPA to host a drop-off program for fridges and freezers for London residents.[10] [11] By leveraging the City's existing marketing and awareness campaigns, London Hydro has been able to sustain satisfactory annual volumes.

Note: Previously, the municipal EnviroDepots would not accept refrigerated appliances. The onus was on the London residents to arrange for appliance disposal via one of several local contractors certified for the removal and recycling of Freon™ refrigerant and incur the contractor's prevailing service fee.

Figure 3-17 below shows the distribution of appliance pickup locations throughout 2014. It can be seen that 69% of the total number of appliances were picked up from the three (3) community EnviroDepots (labeled as "*municipality*" on the chart). It isn't clear why customers would choose dropping an appliance off at a municipal EnviroDepot over the convenience of a contractor coming directly to the customer's home, but nonetheless this expanded option proved successful.

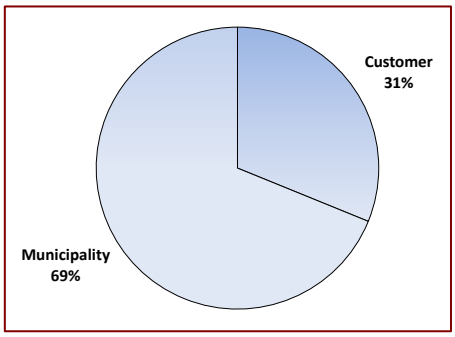

Figure 3-17, Appliance Pickup Locations for 2014

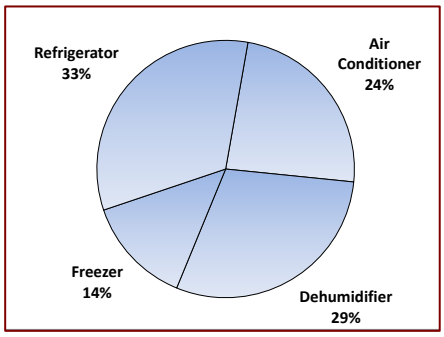

Figure 3-18, Appliances Dropped-Off at Municipal EnviroDepots

Note: While the number of refrigerated appliances has been diminishing over time (with 2,458 in 2011, 2,370 in 2012, 1,970 in 2013, but 2,267 in 2014), the popularity of the community EnviroDepots has steadily increased from 17% in 2011 to 69% in 2014. The reason for these trends isn't apparent.

Figure 3-18 above shows the distribution of retired appliances that customer's dropped off at the EnviroDepots. It was originally thought that customers would be most likely to take the smaller appliances (e.g. room air conditioners and

[10] E-mail dated June 3, 2011 to Mayuran Srikantha (Ontario Power Authority) from Hans Schreff (London Hydro); re: *London Hydro's Fridge Municipality Plan*.

[11] E-mail dated July 6, 2011 to Hans Schreff (London Hydro) from Katherine Sparkes (Ontario Power Authority); re: *London Hydro's Fridge Municipality Plan*.

dehumidifiers) to the EnviroDepots and arrange for the provincial contractor to pick up the larger appliances (e.g. fridges and freezers) at the home. This is evidently not the case as there are almost as many big refrigerated appliances being dropped off at the community EnviroDepots as small appliances.

Finally, Figure 3-19 shows the month over month distribution of appliance pickups. The pattern does change every year, but the underlying reasons for these changes aren't apparent.

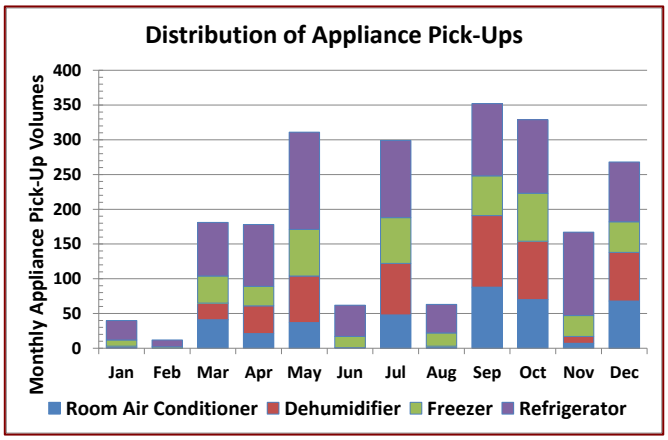

Figure 3-19, Monthly Appliance Pickup Volumes

3.3.1.3 saveONenergy HEATING & COOLING INCENTIVE Participation Insight

The overall participation in the saveONenergy HEATING & COOLING INCENTIVE program (as previously listed in Table 3-2) has been subdivided into customers that elected to install an energy-efficient ECM blower motor in their new furnace, and customers that elected to upgrade their central air conditioning system to an ENERGY STAR qualified unit.

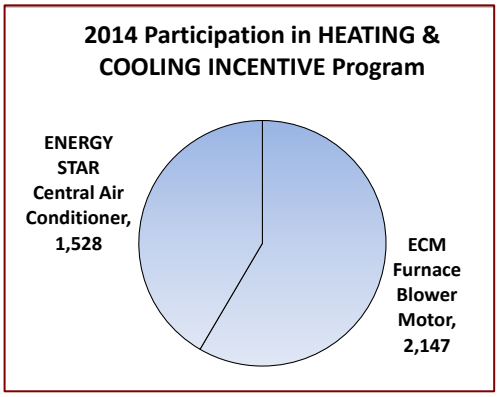

Figure 3-20, 2014 Participation in HEATING & COOLING INCENTIVE Program

Note: The central air conditioner category labeled "ENERGY STAR" includes both central air conditioner units with a minimum 14.5 SEER rating and the higher-efficiency CEE Tier 2 units with an associated minimum 15 SEER rating.

This information is depicted in Figure 3-20. It will be observed that the customer uptake for energy-efficient furnace blower motors is 40% greater than the number of customers that elected an ENERGY STAR qualified central air conditioner.

The month by month participation levels for each type of energy-efficiency upgrade is depicted in Figure 3-21.

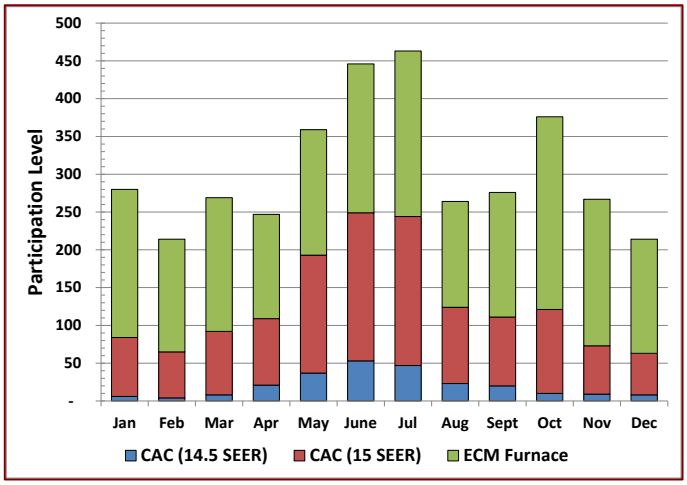

Figure 3-21, Month by Month Participation Levels

Even though the chart reflects the HVAC contractor's submission approval date (as opposed to the date of installation), the furnace upgrades (with energy-efficient integral ECM blower motors) are relatively constant throughout the year. As might be expected the volume of HVAC upgrades peaks throughout the summer cooling months of May, June, and July. The fact that central air conditioners are being upgraded throughout the year suggests that significant numbers of participants are having their central air conditioner upgraded at the same time that they are replacing their forced air furnace.

And finally, the net annual energy savings and demand reduction attributable to participation in this program is illustrated in Figure 3-22 and Figure 3-23 respectively.

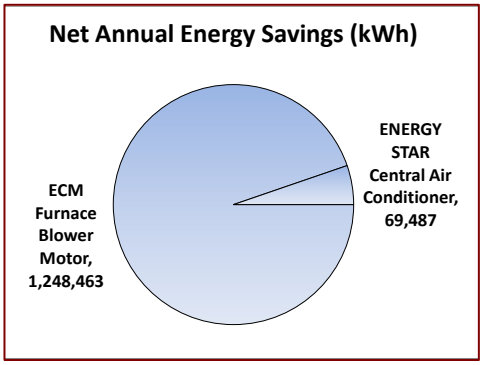

Figure 3-22, Net 2013 Annual Energy Savings Attributable to Program

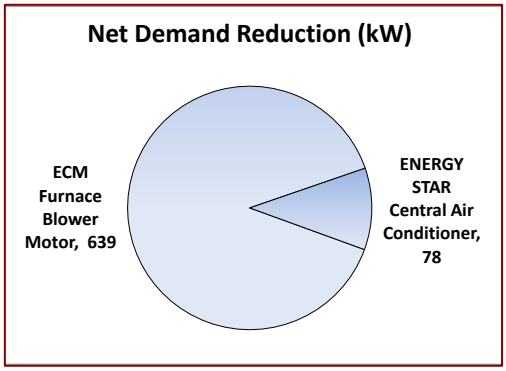

Figure 3-23, Net Demand Reduction Attributable to Program

As noted in a published Natural Resources Canada study on the subject,[12] electricity consumption by a furnace blower is significant, and is comparable to the annual electricity consumption of a major appliance. Since the same blower unit is also used during the summer to circulate cooled air in centrally air conditioned homes, electricity savings occur year round.

[12] Natural Resources Canada report: *Final Report on the Effects of ECM Furnace Motors on Electricity and Gas Use: Results from the CCHT Research Facility and Projections*; John Gustorf, Skip Hayden, Evgueniy Enchev, Mike Swinton, Craig Simpson and Bill Castellan; August 2003.

Whereas there are 104 listings for HVAC contractors found in the local Yellow Pages, the Ontario Power Authority's on-line listing of participating contractors[13] has 52 entries for London. Although this appears as only a 50% HVAC contractor participation rate, this number may not relate to the overall percentage of sales offerings as all of the larger more well established HVAC contractors are participants. A more useful parameter would be insight into program uptake (i.e. the number of consumers that participate in the HEATING & COOLING INCENTIVE program) in comparison to the overall number of purchased furnaces and central air conditioning systems. Unfortunately the manufacturers tend to consider local sales information confidential in nature.

3.3.2 Participation in saveONenergy FOR BUSINESS Programs

3.3.2.1 Participation Synopsis

The participation level in the saveONenergy FOR BUSINESS portfolio of CDM programs by customers within London Hydro's franchise service territory is given in Table 3-3 below.

Table 3-3, Participation in saveONenergy FOR BUSINESS Programs

Marketplace Name of CDM Initiative	Program Description	Activity Unit	Program Uptake / Participation Units
DEMAND RESPONSE -	Page 21		
• DEMAND RESPONSE CONTRACTUAL DR3	"	Facilities	13
SMALL BUSINESS LIGHTING	Page 22	Projects	371
RETROFIT PROGRAM	Page 22	Projects	347
AUDIT FUNDING	Page 24	Audits	6
EXISTING BUILDING COMMISSIONING	Page 24	Buildings	0
HIGH PERFORMANCE NEW CONSTRUCTION	Page 24	Buildings	0
PROCESS & SYSTEMS	Page 25		
• Preliminary Eng. Study	"		0
• Detailed Engineering Study	"		3
• Project Incentive	"	Projects	0
• Monitoring & Targeting	"	Projects	4
• Embedded Energy Manager	"	Projects	13
NEW HOME CONSTRUCTION	Page 27	Homes	28

[13] See URL:: http://www.hraiheatingcoolingincentive.ca/pages/search.php?act=post

The DEMAND RESPONSE information was provided to London Hydro by the Ontario Power Authority. There is no mechanism for London Hydro to verify these participation numbers.

3.3.2.2 saveONenergy SMALL BUSINESS LIGHTING Participation Insight

The saveONenergy SMALL BUSINESS LIGHTING program is essentially a re-branded version of the former *Power Savings Blitz* initiative. London Hydro was very aggressive with the *Power Savings Blitz* program and, with the exception of the small businesses with certain types of lighting, program uptake was significant, meaning that the residual opportunity for the saveONenergy SMALL BUSINESS LIGHTING program is very limited.

One of London Hydro's earlier CDM reports[14] spoke of the reactive approach that London Hydro took throughout 2011 and 2012 primarily due to:

- The lack of appropriate and affordable lighting solutions in the marketplace for specific retail applications; and
- The confusion caused by the OPA's re-interpretation of their eligibility rules, and the subsequent delay in getting the needed program changes finally implemented.

The advent of LED lighting now provides a solution for small business customers that were skipped with the Power Savings Blitz program.

London Hydro achieved moderate success with this program in late 2013 and throughout 2014 primarily due to extensive mining of LDC data and combining this data with other sources of data. It is not likely that an independent contractor without access to such data sources could be as effective in seeking out potential program participants.

3.3.2.3 saveONenergy RETROFIT PROGRAM Participation Insight

The overall number of saveONenergy RETROFIT PROGRAM projects carried out in 2014, as identified in Table 3-3 above, can be divided into lighting upgrades and non-lighting upgrades (e.g. upgrades to HVAC systems, compressed air systems, motors, fan and pump, variable frequency drives, and other energy-efficient non-lighting technologies). This distribution is illustrated in

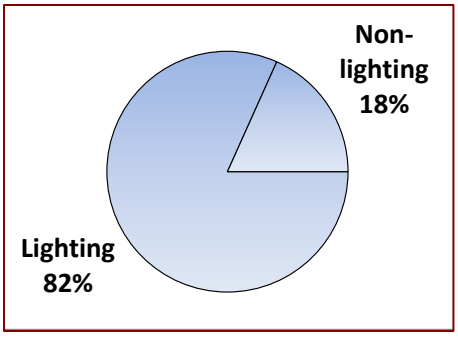

Figure 3-24, Classifications of 2014 Retrofit Projects

[14] London Hydro Report EM-13-04, *Energy Conservation and Demand Management – Annual Report of London Hydro's 2012 Activities and Achievements*; September 2013; Section 3.3.2.2, *saveONenergy SMALL BUSINESS LIGHTING Participation Insight*; pg 33 – 36.

Figure 3-24 where it is seen that currently lighting retrofits represent about 82% of the energy-efficiency projects. It can be shown that lighting retrofit projects represents 85% of the net demand reduction and 85% of the net energy savings associated with the saveONenergy RETROFIT PROGRAM.

Note: In London Hydro's annual report of 2011 CDM activities and achievements, "*lighting*" projects provided 98% of the gross demand reduction associated with the saveONenergy RETROFIT PROGRAM within London Hydro's franchise service territory. The shift to a greater attribution from "*non-lighting*" projects is reflective both of lighting projects being smaller scale than previously combined with greater success with HVAC and VFD projects.

It should not be inferred from Figure 3-24 that lighting retrofits are more valuable than the implementation of other types of energy-efficiency technologies. Rather, in London Hydro's franchise service territory, the lighting supply chain has been trained and effectively uses the RETROFIT PROGRAM as an integral part of its sales strategy. More effort needs to be expended to expand participation amongst the supply chain for other energy-efficiency technologies such as HVAC systems, VFD technology, etc.

It should be noted that in the near future, the most common types of lighting retrofits (e.g. conversion of T12 fluorescent lamps with magnetic ballasts to T8 fluorescent fixtures with electronic ballasts, and replacement of incandescent bulbs with compact fluorescent lamps) will become less and less valuable within a CDM portfolio on account of impending changes to Canadian energy efficiency regulations covering fluorescent and incandescent lighting.

Note: Since early 2007 almost all governments that hold membership in Organization for Economic Co-operation and Development (30 countries that are high-income, and considered developed) have announced policies aimed at phasing-out incandescent lighting within their jurisdictions. The intention of the regulations already adopted or under preparation is to encourage the usage of higher efficiency lamps and most notably CFLs in place of standard incandescent lamps and thereby eliminate a major source of energy waste.[15]

Amendment 12 to Canada's Energy Efficiency Regulations was published on November 9, 2011 in the Canada Gazette, Part II. The minimum energy efficiency performance standard (i.e. the effective phase-out) for 100 and 75 watt light bulbs will apply as of January 1, 2014 and for 60 and 40 watt light bulbs on December 31, 2014.

Under the same energy efficiency regulations, magnetic ballasts for T12 linear fluorescent fixtures were no longer available as replacement ballasts as of April 1, 2010.

As the phase-out date for the older inefficiency lighting technologies approaches, LDC's should anticipate that the free-ridership rates (arising from the program EM&V exercise) will skyrocket, i.e. participants no longer need an incentive to encourage such lighting retrofits – replacement lamps and ballasts will no longer be readily available in the marketplace, and customers will have little choice but to retrofit their installed base of lighting fixtures.

[15] International Energy Agency publication: *Phase out of incandescent lamps - Implications for international supply and demand for regulatory compliant lamps*; Paul Waide; April 2010.

3.3.2.4 saveONenergy AUDIT FUNDING Participation Insight

With the aim of protecting the customer's interest, London Hydro thoroughly reviews the audit reports for accuracy and completeness. The quality of the submitted audits is highly variable and it isn't unusual for an audit report to be returned to the audit firm for rework and resubmission at least once.

Note: The most common problem encountered is the lack of specific information regarding the projected demand reductions and energy savings. Once this information is provided, it is frequently found that the applicable incentive is incorrectly calculated. An incentive that is under-stated may prevent the energy-efficiency project from proceeding, and an over-stated incentive results in a disappointed customer when an incentive application is later submitted.

Presently, by the time the audit report is submitted to the LDC, the audit firm has been paid in full by the customer and the customer is seeking reimbursement from the OPA via the LDC. If this trend of deficient or marginal-quality audit reports continues, London Hydro may start advising applicants to only pay their audit firm an initial 50% with the final 50% payable when London Hydro has deemed the audit report to be complete and accurate.

3.3.2.5 saveONenergy EXISTING BUILDING COMMISSIONING Participation Insight

London Hydro uses a classical sales approach in all its CDM endeavors. This process consists of four steps, namely:

- Prospecting – the development of leads and beginning relationships that lead to uptake in CDM initiatives;
- Qualifying prospective participants – determining the interest and viability of a CDM initiative;
- Presenting – pitching a CDM initiative in a way that meets a participant's needs or adds value; and
- The Close – initiating the application process for a CDM initiative.

Participation throughout 2014 in this initiative in London parallels the provincial uptake throughout 2014 – (zero in London, five across the province) – because it is not readily possible to get to even the first step in the sales model.

The saveONenergy EXISTING BUILDING COMMISSIONING program is by definition limited to *commercial and institutional buildings that use chilled water systems for space cooling*. One of the challenges that London Hydro has discovered with this initiative is at the initial "*prospecting*" step. To date, no convenient method has been found to identify buildings that meet the eligibility requirements, and in the limited conversations at various local venues (e.g. LEDC trade shows), the decision-makers for various commercial and institutional buildings don't seem to know exactly what technology is used for space cooling in their respective buildings.

Clearly the LDC community needs to find an effective method of targeting prospective customers with this energy-efficiency opportunity.

In November 2012, London Hydro commenced discussions with CEM Engineering concerning methods that could be used to target prospective buildings. This led to a formal engagement in March 2013 and the delivery of their final report[16] in August 2013.

Note: Within its vision for the 2015 – 2020 CDM delivery framework,[17] London Hydro envisions re-designing and expanding the scope of this building retro-commissioning program, initially as a local or regional offering. Based on its success, the IESO may elect to expand (or adapt successful portions of) this re-designed offering into the provincial program.

3.3.2.6 HIGH PERFORMANCE NEW CONSTRUCTION Participation Insight

Throughout 2014, there was no uptake within London for the saveONenergy HIGH PERFORMANCE NEW CONSTRUCTION program, whereas the entire provincial uptake was only two-hundred and twenty-six (226) buildings.

Note: Given that London's population is roughly 3% of the provincial population,[18] the local program uptake is somewhat below the provincial uptake rate (even though there is significantly more new building construction occurring in the Greater Toronto Area (GTA) and Ottawa.

In London Hydro's annual report of 2011 CDM activities and achievements,[19] it was noted that Supplementary Standard SB-10, *Energy Efficiency Supplement*, that amends the Ontario Building Code, came into effect for all buildings constructed after December 31, 2011. In essence, the energy-efficiency performance that was formerly associated with an ENERGY STAR qualified building or dwelling unit has become the baseline requirement of the Ontario Building Code.

The limited feedback that London Hydro has received is that the program is considered unduly administratively cumbersome and the available incentives are considered insufficient to greatly exceed the newer more stringent building code requirements.

3.3.2.7 saveONenergy PROCESS & SYSTEMS Participation Insight

Recall from the program description in Section 3.2.2.7 (starting on page 25 herein) that the saveONenergy PROCESS & SYSTEMS initiative is an umbrella program that encompasses a number of sub-programs, namely funding (or partially funding) Preliminary Engineering Studies, Detailed Engineering Studies, and Embedded

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[16] CEM Engineering Report #2337-RPT-01, *Prequalifying Buildings in Downtown London for HVAC Recommissioning Potential*; August 21, 2013.

[17] London Hydro Report EM-14-03, *Integrated Resource Planning: Forecasts of Energy Efficiency Program Outcomes as a Demand-Side Resource (Volume 1 – Articulation of the Vision)*; April 2015; Section 8.5.1, *Opportunities for New Institutional Sector CDM Offerings*; pg 68 – 69.

[18] Source: Ontario Ministry of Finance publication: *Ontario Fact Sheet September 2013*. See URL:: http://www.fin.gov.on.ca/en/economy/ecupdates/factsheet.html

[19] London Hydro Report EM-12-04, *Energy Conservation and Demand Management – Annual Report of London Hydro's 2011 Activities and Achievements*; September 2012; Section 3.6.7, *Energy Efficiency Supplement to the Ontario Building Code*; pg 52 – 53.

Energy Managers. It also provides incentives for energy-efficiency projects and the installation of Monitoring & Targeting systems.

London Hydro's commentary is therefore divided into several topic areas as follows:

- Embedded Energy Managers –

  In 2014, four (4) of London Hydro's customers (1 industrial and 3 institutional customers) had funded Embedded Energy Managers in place.

- Monitoring & Targeting Systems –

  In-plant Monitoring & Targeting Systems (also referred to in the literature as "*Energy Management Information Systems*") are not well understood by decision-makers and represent a significant investment. The fact that the provincial uptake has been a mere five projects is perhaps not surprising.

  In the Fall of 2012, London Hydro prepared a business case[20] for presentation to the joint EDA/OPA Industrial CDM Working Group suggesting a variant of the present M&T program whereby the OPA would mitigate perceived risk to potential participants by advancing a portion of the overall incentive funding threshold for preparation of a value proposition for M&T Systems. Unfortunately, London Hydro was not able to obtain any traction from the OPA for this suggested program improvement.

  Nonetheless, London Hydro understands that CDM is largely a sales exercise and success comes from eliminating participation barriers. As a consequence, London Hydro proceeded with a scheme whereby it would risk its own money to finance the preparation of M&T System Feasibility Studies (with predefined content requirements) by consultants. The participant would then reimburse London Hydro from the first incentive payment associated with their M&T System.[21]

  It would appear that this approach is removing a very real participation barrier in the marketplace as London Hydro now has two (2) manufacturing sector customers that are deploying in-plant M&T Systems with in-service dates in 2013. In 2014, four (4) energy-efficiency projects were undertaken at these sites that are directly attributable to the in-plant M&T Systems; more projects and results will arise in 2015.

- Providing Incentives for Energy-Efficiency Projects –

  As noted in London Hydro's annual report of 2011 CDM activities and achievements,[22] several industrial customers that initially expressed great interest in the PROCESS & SYSTEMS abandoned further pursuit of the opportunities due

[20] London Hydro document: *saveONenergy PROCESS & SYSTEMS: Business Case to Adjust the Monitoring & Targeting Initiative*; 5 pages.

[21] Memorandum of August 30, 2012 to Vinay Sharma from Gary Rains, re: *saveONenergy PROCESS & SYSTEMS – Monitoring & Targeting Sub-Program; Advanced Funding of M&T Feasibility Study*.

[22] London Hydro Report EM-12-04, *Energy Conservation and Demand Management – Annual Report of London Hydro's 2011 Activities and Achievements*; September 2012; Section 3.3.2.7, *saveONenergy PROCESS & SYSTEMS Participation Insight*; pg 34 - 35.

to a variety of documented (and totally unnecessary) program barriers, e.g. solvency certificate, term of agreement, etc.

Although Table 3-3 indicates no capital incentive projects underway for 2014, there were two projects underway (both for waste-water treatment plants) with declared in-service dates of late 2014. The results for these projects aren't reported until after the first quarterly report has been submitted and approved. As such, energy savings for these projects won't appear until early 2015.

3.3.2.8 saveONenergy NEW HOME CONSTRUCTION Participation Insight

There was virtually no uptake on this program throughout the province during 2011, 2012 and 2013 (i.e. 26 homes province-wide in 2011, 19 homes province-wide in 2012 and 86 homes province-wide in 2013) for a number of reasons as identified several years ago in London Hydro's annual report of 2011 CDM activities and achievements.[23]

The OPA's flawed and cumbersome web-based user interface (where applications are entered by the homebuilder) was eventually replaced by a couple of Excel spreadsheets (i.e. New Home Construction *Preliminary Application* and *Final Application* Worksheets). Whereas it was understood by the LDC community in the Fall of 2011 that the requisite improvements to the participant interface would be implemented summarily, the replacement worksheets weren't introduced to the LDC community until March 2013! [24] This is but one factor that stifled program participation in 2013. With this program change, province-wide uptake in 2014 increased substantially to 2,367 homes.

In London Hydro's annual report of 2011 CDM activities and achievements,[25] it was noted that Supplementary Standard SB-10, *Energy Efficiency Supplement*, that amends the Ontario Building Code, came into effect for all buildings constructed after December 31, 2011. In essence, the energy-efficiency performance that was formerly associated with an ENERGY STAR qualified building or dwelling unit has become the baseline requirement of the Ontario Building Code.

The limited feedback that London Hydro has received is that the available incentives are considered insufficient to greatly exceed the newer more stringent provincial building code requirements. Given that London's population is roughly 3% of the provincial population, the 2014 uptake in London at 28 homes is only 1% of the provincial uptake rate for 2014 (but there is far more new building construction occurring in the Greater Toronto Area and Ottawa than in London).

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[23] London Hydro Report EM-12-04, *Energy Conservation and Demand Management – Annual Report of London Hydro's 2011 Activities and Achievements*; September 2012; Section 3.3.2.8, *saveONenergy NEW HOME CONSTRUCTION Participation Insight*; pg 35.

[24] OPA saveONenergy LDC E-BLAST of March 11, 2013; re *Program News - New Home Construction Applications — Easier Than Ever*.

[25] London Hydro Report EM-12-04, *Energy Conservation and Demand Management – Annual Report of London Hydro's 2011 Activities and Achievements*; September 2012; Section 3.6.7, *Energy Efficiency Supplement to the Ontario Building Code*; pg 52 – 53.

3.3.3 Participation in Low-Income Programs

3.3.3.1 Participation Synopsis

The participation level in the saveONenergy HOME ASSISTANCE program by customers within London Hydro's franchise service territory is given in Table 3-4 below.

Table 3-4, Participation in saveONenergy HOME ASSISTANCE Program

Marketplace Name of CDM Initiative	Program Description	Activity Unit	Program Uptake / Participation Units
HOME ASSISTANCE	Page 29	Units	701

As earlier noted in Section 3.2.3 (starting on page 28 herein), not all social and assisted housing meets the eligibility requirements for the saveONenergy HOME ASSISTANCE program, but instead can realize energy-efficiency opportunities under the saveONenergy RETROFIT PROGRAM.

Although the saveONenergy HOME ASSISTANCE program was theoretically available to LDCs in Q2 of 2011, London Hydro couldn't see how the program could be executed with any degree of effectiveness, didn't subscribe to the program until August, and didn't roll out the program to eligible customers during the remaining months of the year. In hindsight, this was a wise choice as a core element of the program (i.e. the Ontario Power Authority's *Field Audit Support Tool*) was flawed and wasn't properly corrected until late summer 2012.[26] Furthermore, there was no payment process in place for LDC's to recoup their incurred costs for installation contractors and energy-efficient product again until late summer of 2012.

London Hydro has a philosophy of in-house program management for all CDM programs. This allows the utility to maintain a high quality and superior engagement with its customer base.

Note: London Hydro has partnered with Parachute Software to develop iPad-based work management software that will revolutionize the execution effectiveness of this CDM program by all parties (by significantly overcoming the administrative overhead that the OPA incorporated into the design of the initiative).

Roll-out of the saveONenergy HOME ASSISTANCE program within London Hydro's service territory was delayed until the Fall 2012 (for reasons stated above), starting off slowly with "*friendly*" customers to field test and validate the complete end-to-end work management software, procedures, contractor knowledge, and any other glitches before program ramp up.

[26] Ontario Power Authority E-Blast dated August 24, 2012.

3.3.3.2 saveONenergy HOME ASSISTANCE Participation Insight

To overcome many of the numerous program design shortcomings of the saveONenergy HOME ASSISTANCE program that were identified in London Hydro's annual report of 2011 CDM activities and achievements,[27] and to execute the program in an effective manner, London Hydro partnered with Parachute Software to develop iPad-based work management software (with the working title "DRAGON") that revolutionizes the execution effectiveness of this CDM program by all parties (by significantly overcoming the administrative overhead that the OPA incorporated into the design of the initiative).

To maximize the value to participating customers, London Hydro partnered with:

- London Fire Department – to replace expired or faulty smoke detectors, replace the batteries in units with depleted batteries, and to provide fire safety information; and

  Note: The data collected to date shows that about 70% of low-income dwellings are under-protected from a fire safety perspective.

- City of London – to install water conservation measures (e.g. low-flow toilets, faucet aerators, etc.) and carry out minor plumbing repairs (e.g. fixing leaking toilets and faucets)

London Hydro's contractor also performs a basic electrical safety check of the premise and repairs broken lighting fixtures, replaces broken covers on receptacles and switches, etc.

London Hydro has also engaged a number of social agencies (e.g. Salvation Army, Ontario Works, etc.) to identify eligible customers.

Program execution throughout 2013 and 2014 was very smooth and validated London Hydro's strategic approach of deploying technology and maximizing participant value. In 2014, London Hydro received awards and other accolades for its version of the HOME ASSISTANCE program – see Appendix B, *Recognition of Excellence in the Delivery of the HOME ASSISTANCE Program*, herein.

3.4 Spending

There are various funding streams available to support the provincial Tier 1 CDM programs. Some monies are available to London Hydro to support its administrative and marketing efforts, some monies are channeled through London Hydro to its designated contractors that provide for example direct install services, and finally significant monies are routed through London Hydro to customers as incentive payments for deploying energy-efficient technologies.

[27] London Hydro Report EM-12-04, *Energy Conservation and Demand Management – Annual Report of London Hydro's 2011 Activities and Achievements*; September 2012; Section 3.3.4.2, *saveONenergy HOME ASSISTANCE Participation Insight*; pg 37 – 38.

The various funding / spending streams are individually described in the following subsections.

3.4.1 Program Administration Budget (PAB) Spending

LDC's such as London Hydro receive annual funding from the Ontario Power Authority for the administration of the various provincial CDM programs in accordance with a formula that considers the numbers of customers within each tariff classification within the LDC's service territory. This funding is to cover LDC expenses directly related to the execution of the various provincial CDM programs, e.g. program management labour costs, marketing and promotion, legal, procurement, reporting and information technology costs, etc.

Table 3-5 below shows London Hydro's expenditures incurred throughout 2011, 2012, 2013 and 2014 to operate the provincial CDM programs. Column 2 shows the available funding threshold and Column 6 shows London Hydro's actual 2014 expenditures.

Table 3-5, CDM Program Expenditures

Target Customer Sector	Available 2014 PAB Funding	Annual Expenditures				Cumul've Spending
		2011	2012	2013	2014	
(Col 1)	(Col 2)	(Col 3)	(Col 4)	(Col 5)	(Col 6)	(Col 7)
Residential	$657,088	$140,841	$227,380	$312,391	$290,578	$971,190
Commercial	$719,860	$797,212	$810,444	$788,196	$1,293,165	$3,688,967
Industrial	$104,266	$60,294	$141,159	$343,307	$291,000	$835,760
Low-Income	$105,710	$37,652	$184,368	$165,799	$178,384	$566,203
Total:	$1,586,924	$1,035,999	$1,363,351	$1,609,643	$2,053,127	$6,062,120

In Column 2 of Table 3-5 is perhaps somewhat confusing. Historically, London Hydro's PAB allocation has been greater than necessary for London Hydro to operate the provincial CDM programs within its service territory. As such, the PAB allocation for 2014 (as tabulated in Column 2) was deliberately reduced so that this amount combined with surplus PAB funding from previous years would more closely match the predicted 2014 PAB expenditures.

A more comprehensive tabulation of expenses was provided to the Ontario Power Authority pursuant to Article 8.1, *LDC Reporting Requirements*, of the *2011 – 2014 Master CDM Program Agreement*.

PAB is based on actual expenditures, rather than approved budget. As such, any unspent budget will be returned to the OPA.

3.4.2 Participant Based Funding (PBF) Spending

Participant Based Funding (PBF) is to cover the costs of program delivery which are directly related to the actual number of participants in a CDM program (e.g. building audits, equipment and installation for '*direct install*' initiatives, operation and maintenance {O&M} costs for load control devices), excluding customer incentives.

London Hydro's 2013 PBF spending is given in Table 3-6 below.

Table 3-6, Breakdown of Participant-Based Funding Expenditures

CDM Initiative	Annual Expenditures			
	2011	2012	2013	2014
saveONerergy FOR HOME Programs:				
• peaksaver PLUS	--	--	--	--
saveONenergy FOR BUSINESS Programs:				
• SMALL BUSINESS LIGHTING	$2,900	$700	--	--
Low-Income Programs:				
• HOME ASSISTANCE	--	--	--	--
Other CDM Programs:				
Total Annual Incentives:	$2,900	$700	--	--

In London, the *peaksaver* PLUS program was not in market (for reasons identified in Section 3.2.1.3 herein). But participants in a Green Button initiative with WiFi-enabled programmable thermostats were enticed to also enroll in the *peaksaver* PLUS program. As outlined in Section 3.6.3 herein, whereas there could have been 2014 participant-based spending, London Hydro overlooked this element until late 2015.

For the saveONenergy SMALL BUSINESS LIGHTING initiative, the auditor assessment charges were categorized as a PBF expenditure in 2011 and partway through 2012. For the remainder of 2012 and throughout 2013, since the small amounts weren't deserving of special accounting treatment, the auditor assessment charges were considered an element of "*PI*".

3.4.3 Participant Incentives (PI)

Participant Incentives (PI) is to cover the cost of reimbursing LDCs for any cash incentives provided to program participants. This funding is essentially a flow-through from the OPA to program participants, through the LDCs.

The accumulated incentive amounts provided to customers that participated in the various CDM programs is presented in Table 3-7 by CDM program name.

Table 3-7, Breakdown of Incentives Paid to Customers

CDM Initiative	Participant Incentives			
	2011	2012	2013	2014
saveONenergy FOR HOME Programs:				
	--	--	--	--
saveONenergy FOR BUSINESS Programs:				
• SMALL BUSINESS LIGHTING	$27,384	$75,624	$198,945	$571,854
• RETROFIT PROGRAM	$395,834	$1,777,403	$1,654,993	$1,465,608
• AUDIT FUNDING	$0	$21,812	$137,525	$125,199
• EXISTING BUILDING COMMISSIONING	$0	$0	$0	--
• HIGH PERFORMANCE NEW CONSTRUCTION	$0	$4,048	$0	--
• PROCESS & SYSTEMS	$0	$0	$104,767	$214,390
• NEW HOME CONSTRUCTION	$0	$0	$0	--
Low-Income Programs:				
	--	$23,752	$359,251	$424,933
Other CDM Programs:				
• 2010 ERIP Carry-Over	$3,217,118	$132,536	--	--
Total Annual Incentives:	$3,640,336	$2,035,175	$2,455,481	$2,801,984

Note: The monies shown in the above tabulation relate only to energy-efficiency projects completed and paid for in 2014. If, for example, a project was completed in December 2014 but the incentive wasn't paid until early January 2015, then the "*participant incentive*" will not be included in the above tabulation.

The monetary amounts given in Table 3-7 do not include the Harmonized Sales Tax (HST).

For some mass-market CDM programs, such as the saveONenergy HEATING & COOLING INCENTIVE initiative, the participating customer does receive a monetary incentive from London Hydro for having their chosen HVAC contractor install an ENERGY STAR qualified central air conditioner or a furnace equipped with an energy-efficient ECM blower motor. However, such incentives are provided to the participating customer directly from the Ontario Power Authority (or their agent) and as such are not included in the tabulation above.

3.4.4 Capability Building Funding (CBF)

Capability Building Funding (CBF) is to cover the costs of accessing and/or delivering enabling initiatives (e.g. account manager funding; building operator

training) which support and increase program participation and which are not included in PAB.

London Hydro's 2011 to 2014 CBF spending is given in Table 3-8 below.

Table 3-8, Breakdown of Capability Building Funding Expenditures

CDM Initiative	Participant Incentives			
	2011	2012	2013	2014
saveONerergy FOR HOME Programs:				
	--	--	--	--
saveONenergy FOR BUSINESS Programs:				
• PROCESS & SYSTEMS	$0	$116,294	$231,162	$314,322
• SMALL BUS. LIGHTING	$6,732	$9,999	$32,461	$42,578
Low-Income Programs:				
	--	--	--	--
Other CDM Programs:				
	--			
Total Annual Incentives:	$6,732	$126,293	$263,623	$356,900

Note: The dollars associated with the saveONenergy SMALL BUSINESS LIGHTING initiative relates to incentive monies paid to the assessor / installation contractor in instances where the participating customer elects to undertake energy-efficiency upgrades beyond the $1,000 threshold. In future annual reports, this amount may be relocated to another table if such direction is received.

3.4.5 Summarized CDM Spending for 2014

The expenses incurred by London Hydro and the monies channeled through London Hydro to participating contractors for direct install programs and to participating customers in the form of incentive monies are summarized in Table 3-9 below:

Table 3-9, Overall 2014 Spending for Provincial CDM Programs

Initiative	Program Administrative Budget	Participant Based Funding	Participant Incentives	Capability Building Funding	Total
(Col 1)	(Col 2)	(Col 3)	(Col 4)	(Col 5)	(Col 6)
saveONenergy FOR HOME Programs:					
	$290,578	--	--	--	$290,578
saveONenergy FOR BUSINESS Programs:					
	$1,584,165	--	$2,377,051	$356,900	$4,318,116
Low-Income Programs:					
	$178,384	--	$424,933	--	$603,317
Other CDM Programs:					
	--	--	--	--	--
					$5,212,011

The above costs are insufficient to carry out any type of economic assessment (e.g. Ratepayer Impact Measure Test) of the CDM programs delivered by London Hydro. The costs borne by the OPA for the contractors associated with several of the consumer programs (e.g. saveONenergy FRIDGE & FREEZER PICKUP, saveONenergy HEATING & COOLING INCENTIVE, saveONenergy COUPON EVENT, etc.), the firms that carry out the CDM program evaluation (i.e. EM&V) work, and the provincial advertising of programs are unknown to London Hydro.

3.5 Evaluation

The Ontario Power Authority has retained a number of program evaluation contractors to assess the 2014 performance of each of the provincial CDM programs. The key evaluation findings included as Appendix E herein have been provided by the Ontario Power Authority to the community of LDCs. It is understood that the actual reports prepared by the various EM&V contractors will not be available until after September 30th, 2015.

3.6 Additional Comments

A number of challenges have arisen, all outside of London Hydro's control, which will certainly negatively affect London Hydro's ability to fulfill its obligations with respect to CDM performance. These matters are outlined below.

3.6.1 Challenges with the CDM Delivery Model

As noted in London Hydro's annual report of 2011 CDM activities and achievements,[28] there was emerging evidence of a fundamental flaw with the current CDM delivery framework. These early warning signs became more significant

[28] London Hydro Report EM-12-04, *Energy Conservation and Demand Management – Annual Report of London Hydro's 2011 Activities and Achievements*; September 2012; Section 3.6.1, *Emerging Challenges with the CDM Delivery Model*; pg 44 -46.

throughout 2012[29] and 2013[30] and it is now abundantly clear that the prevailing CDM delivery model didn't work (just like classical organizational theory suggests).

London Hydro has done all that it can to improve the CDM programs via active participation in the EDA's CDM Caucus, and the Industrial Working Group, the Commercial Working Group, the Residential Working Group, and the Low-Income Working Group. These endeavors continue to this day.

Fortunately, the Ministry's directive covering the 2015 to 2020 CDM delivery framework[31] delegates more authority to the community of LDC's, and specifically:

> 11. *Approvals and administrative requirements will be streamlined to provide Distributors flexibility to design, deliver and administer CDM programs to their customers.*

Clearly the Ministry was listening to the challenges associated with the 2011 – 2014 CDM delivery model and responded to the LDC community going forward.

3.6.2 Demand Response – The Outcome of a Significant Landscape Change

In London Hydro's annual report of 2011 CDM activities and achievements, it was noted that once south-western Ontario was declared a "*discount zone*" for demand response, interest by both customers and demand response aggregators dried up.[32] This situation has been further aggravated by the elimination of the "*Option B (200 h)*" participation option in January 2013.[33]

As can be seen in Figure 3-25 below that participation (as depicted by the dotted blue line) initially increased at an acceptable rate until September 2011 after which participation interest abruptly stalled. The average contracted demand response capacity will be seen to be about 260 kW per participant (i.e. 3.4 MW for 13 participants in July and August, 2014).

[29] London Hydro Report EM-13-04, *Energy Conservation and Demand Management – Annual Report of London Hydro's 2012 Activities and Achievements*; September 2012; Section 3.6.1, *Challenges with the CDM Delivery Model*; pg 48 – 50.

[30] London Hydro Report EM-14-02, *Energy Conservation and Demand Management – Annual Report of London Hydro's 2013 Activities and Achievements*; September 2012; Section 3.6.1, *Challenges with the CDM Delivery Model*; pg 45 – 47.

[31] Directive, dated March 31, 2014 to Ontario Power Authority from the Ministry of Energy; re: *2015 -2020 Conservation First Framework*.

[32] London Hydro Report EM-12-04, *Energy Conservation and Demand Management – Annual Report of London Hydro's 2011 Activities and Achievements*; September 2012; Section 3.6.4, *Declaration of Discount Zone for Demand Response*; pages 48 – 50.

[33] Refer to saveONenergy E-BLAST: January 25, 2013; re: *Demand Response aggregators update*.

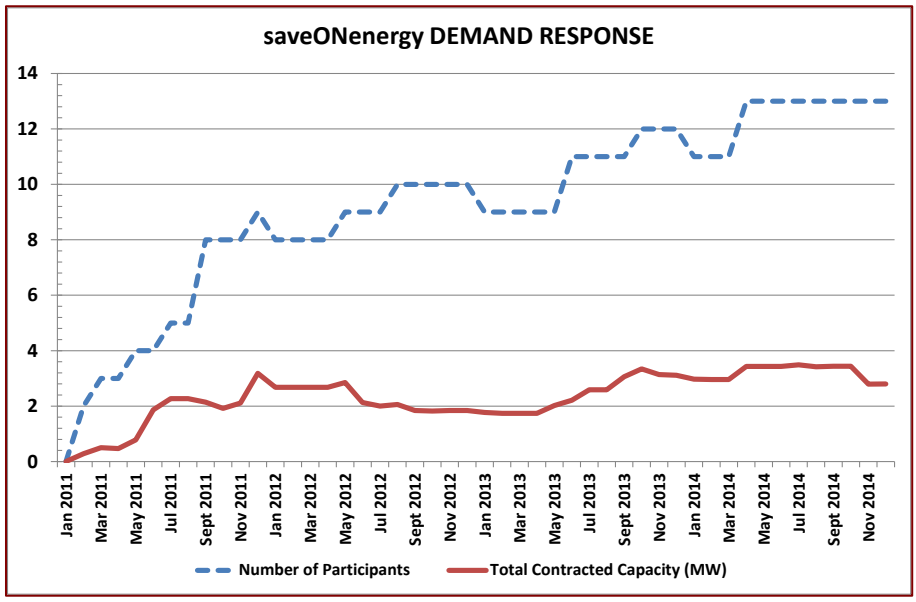

Figure 3-25, DEMAND RESPONSE Activity in London

Up until the Fall of 2011 several demand response aggregators seemed to be actively pursuing customers in the London area and there were frequent meetings with London Hydro. Nowadays communications with the aggregators are very infrequent and framed more as courtesy calls than to discuss a potential customer. The marketplace is sending a very clear signal that there aren't sufficient incentive monies to attract customer interest, there isn't a sufficient revenue opportunity for aggregators to justify the expended effort for little or no uptake, or both.

Note: It will be recalled from Section 3.2.2.1 herein that, with respect to the saveONenergy DEMAND RESPONSE program, the three (3) demand response aggregators authorized by Ontario Power Authority have primary responsibility for qualifying and enrolling customers; an LDC's role is limited to providing support to the Aggregators.

Electricity distributors (such as London Hydro) are not privy to the contractual arrangement between participants in the saveONenergy DEMAND RESPONSE program and the authorized demand response aggregators. As such, no explanation can be offered as to the underlying reason that the number of participants has increased slowly since the Fall of 2011 and yet the contracted demand response capacity remains in the 2 to 3 MW range.

A Ministry of Energy directive issued March 31st, 2014[34] effectively eradicated any prospect of attracting additional demand response participants or capacity within London Hydro's franchise service territory. This directive transfers demand response programs to the IESO, and precludes the OPA from entering into new demand response contracts.

[34] Directive dated March 31, 2014 to Ontario Power Authority from Ministry of Energy; re: *Continuance of the OPA's Demand Response Program Under IESO Management*. Electronic version available on OPA website at URL:: http://www.powerauthority.on.ca/sites/default/files/news/MC-2014-853.pdf

3.6.3 Peaksaver PLUS – Participation Without Attribution

The Green Button initiative is sometimes misunderstood to be an energy-efficiency technology. Rather it is correctly simply a standardized secure method of conveying revenue metering data (e.g. hourly consumption data for Smart-meters; 15-minute interval data, etc.) from a metering data repository to a third-party application with the explicit (electronic) authorization of the customer. Such third-party offerings (that analyze the revenue metering data) are the enabling technology that may motivate customers to undertake energy-efficiency actions.

In Ontario, London Hydro, in concert with the Ontario Ministry of Energy and MaRs, is spearheading a number of *Green Button Connect My Data* pilot projects.[35] [36]

In the summer of 2014, as part of London Hydro's pilot project with the *Green Button Connect My Data* initiative, London Hydro arranged for participants with Energate WiFi-enabled programmable thermostats to also participate in the *peaksaver* PLUS initiative.

Figure 3-26, Energate WiFi-Enabled Programmable Thermostat

Wherein these thermostats were correctly registered with Rodan, the default provincial aggregator, it wasn't realized that these installations wouldn't count towards London Hydro's CDM targets unless and until such time as the OPA was invoiced for recovery of the defined allowance monies.

There are 210 Energate WiFi-enabled programmable thermostats presently installed wherein the participants are also registered to participate in the peaksaver PLUS program. Given that the each peaksaver PLUS device provides about ½ kW of demand reduction, this oversight means that London Hydro's achieved net demand reduction is understated by about (210 thermostats @ ½ kW ≈) 100 kW. This understatement is so insignificant in comparison to London Hydro's overall demand reduction target, that it wasn't seen as worthwhile asking OPA to undertake extraordinary measures to correct London Hydro's final CDM results.

3.6.4 Peaksaver PLUS In-Home Displays – Much Ado About Nothing

London Hydro has encountered challenges with the requisite in-home display component of the peaksaver PLUS program, as previously outlined in Section 3.2.1.3 (starting on page 18 herein). Nonetheless, in the summer of 2014 as part of London Hydro's pilot project with the Green Button *Connect My Data* initiative, London

[35] News from the Green Button pilots; December 1, 2014. See URL:: http://greenbuttondata.ca/news/2014/11/28/news-from-the-green-button-pilots

[36] Ontario Newsroom article: Ontario's Green Button Initiative; February 27, 2014. See URL:: http://news.ontario.ca/mei/en/2014/02/ontarios-green-button-initiative-1.html

Hydro arranged for participants with Energate WiFi-enabled thermostats to also participate in the peaksaver PLUS initiative.

Interestingly (and as noted in Appendix E herein), the OPA's independent EM&V exercise has shown "*no statistically significant energy savings*" associated with an in-home display. This finding mirrors emerging results from other jurisdictions.[37]

Although there is much hype in the industry about Home Energy Management Systems (HEMS), the LDC industry certainly needs to heed the lessons of history and proceed with caution. Smart meters in conjunction with time-of-use electricity pricing hasn't produced the desired outcome, in-home displays haven't produced the desired outcome, and HEMS may just be the next device that also proves to be ineffective at measurably influencing customer behavior.

[37] ICF Marbek report: *Achievable Potential – Estimated Range of Electricity Savings Through Future Ontario Conservation Programs – Residential Sector*; March 26, 2014; pg 88.

4 COMBINED CDM REPORTING ELEMENTS

4.1 Progress Towards CDM Targets

4.1.1 London Hydro's CDM Achievements in 2014

As will be recalled from Section 1.1 herein, LDC's have two (2) distinct CDM targets, namely a "*2014 net peak demand savings*" target and a "*2011 – 2014 net cumulative energy savings*" target.

Table 4-1 below indicates London Hydro's 2014 progress towards its demand savings target.

Table 4-1, Net Peak Demand Savings at End-User Level (MW)

Implementation Period	Annual Peak Demand Savings (MW)			
	2011	2012	2013	2014
2011 - Verified	6.7	4.1	4.1	4.0
2012 - Verified		4.7	3.1	3.1
2013 - Verified		0.2 ✪	5.9	3.1
2014 - Verified		0.2 ✪	1.2 ✪	9.1
Verified Net Annual Peak Demand Savings in 2014 (MW):				19.3
London Hydro's 2014 Annual CDM Capacity Target (MW):				41.4
Verified Portion of Peak Demand Savings Target Achieved (%):				46.6%

✪ - Adjustments for under-reporting in previous years.

There are two (2) distinct methods for achieving the peak demand reduction targets, namely (i) energy efficiency, which achieves both energy savings and a demand reduction, and (ii) demand response, which affects the peak load during a DR activation. These concepts are illustrated in Figure 4-1 and Figure 4-2 below:[38]

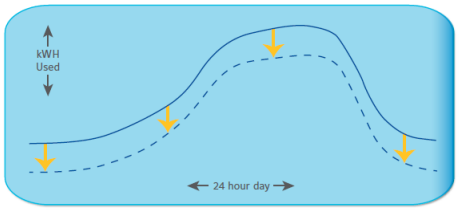

Figure 4-1, Effect of Energy-Efficiency

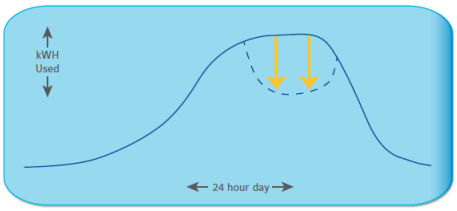

Figure 4-2, Effect of Demand Response

It can be implied from Table 4-1:

[38] Johnson Controls publication: *Energy Efficiency and Demand Response: Working Together in an Integrated Approach to Managing Energy*; Kelly Smith and Katrina Managan, Johnson Controls; February 2012; pg 3.

- London Hydro's net peak demand savings for 2014 is a combination of 17.1 MW of net demand reduction achieved from energy-efficiency projects and 2.19 MW from customer participation in the demand response marketplace.
- With respect to the first line (labeled "*2011 – Verified*") the slight drop-off to 4.0 MW in 2014 from the 4.1 MW of net demand reduction in 2012 and 2013 is likely attributable to some of the implemented energy-efficiency measures having a persistence of only 3 years (meaning that they contribute in 2011, 2012 and 2013, but are considered at the end of their useful life by 2014).

Table 4-2 below indicates London Hydro's 2014 progress towards its energy savings target.

Table 4-2, Net Energy Savings at the End-User Level (GWh)

Implementation Period	Annual Energy Savings (GWh)				Cumulative Savings (GWh)
	2011	2012	2013	2014	
2011 - Verified	21.1	21.0	21.0	20.9	84.0
2012 - Verified	0.3 ✪	14.4	14.1	13.9	42.7
2013 - Verified		1.5 ✪	15.8	13.4	30.7
2014 - Verified		1.2 ✪	6.39 ✪	29.1	36.7
Verified Net Cumulative Energy Savings, 2011 – 2014 (GWh):					194.1
London Hydro's 2011 – 2014 Cumulative CDM Energy Target (GWh):					156.6
Verified Portion of Cumulative Energy Target Achieved (%):					123.9%

✪ - Adjustments for under-reporting in previous years.

As indicated in Table 4-2 above, with a verified net cumulative energy savings of 194.1 GWh, London Hydro has achieved 123.9% of its 2011 - 2014 performance objective.

4.1.2 Comparison of London Hydro's CDM Achievements to Other LDC's

Figure 4-3 shows London Hydro's *2014 net demand reduction* achievements in comparison to the achievements of all other LDC's throughout the province. Although London Hydro's 2014 achievement with respect to peak demand reduction is less than the organization's internal target, the chart indicates that meeting the demand reduction targets may be a provincial challenge.

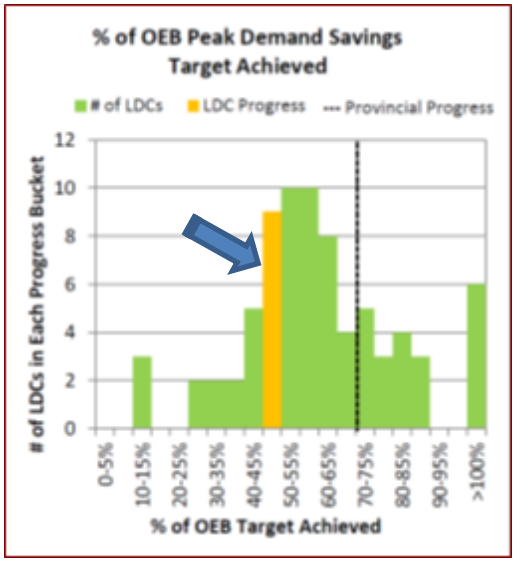

Figure 4-3, London Hydro's 2014 Demand Reduction Achievements

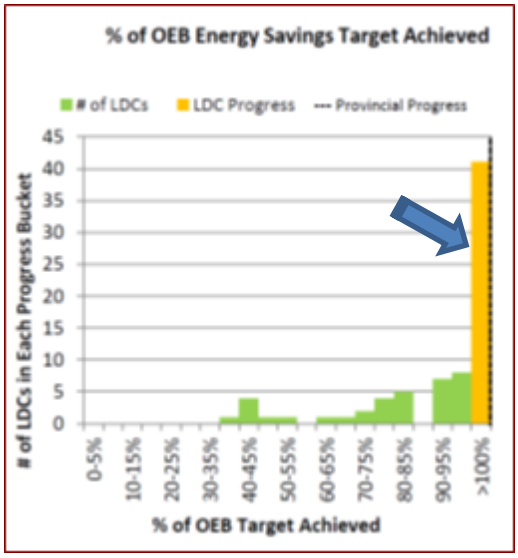

Figure 4-4, London Hydro's 2014 Energy Savings Achievements

Figure 4-4 shows London Hydro's *2014 net energy savings* achievements in comparison to the achievements of all other LDC's throughout the province. Interestingly, London Hydro achieved its 2011 – 2014 net accumulated energy savings target in 3 years – 1 year ahead of schedule.

5 CONCLUSIONS

Over the course of 2014, London Hydro has achieved another 9.1 MW in net peak demand reduction and 29.1 GWh in net energy savings, which together with its 2011, 2012 and 2013 achievements represents 46.6% and 123.9% respectively of London Hydro's 2011 - 2014 CDM target.

Whilst these results are representative of a considerable effort expended by London Hydro in cooperation with other LDC's, customers, channel partners, and active participation in the EDA's three CDM working groups, the unfortunate reality is that the LDC community could do much better but is significantly hampered in its endeavors by the combination of:

- A CDM delivery framework that can't and doesn't work effectively for reasons as described the three previous Annual CDM Reports; and
- A provincial agency at the helm that is best described as "*ineffective and dysfunctional*". There is an abundance of examples throughout the previous three (3) Annual CDM Reports to support this conclusion.

Not surprisingly perhaps is London Hydro's judgment that none of the provincial CDM programs would be considered "*best of breed*" by peer utilities and agencies throughout North America.

On the good news front, on March 30th, 2014, the Ministry of Energy issued a directive covering the forthcoming 2015 – 2020 CDM delivery framework wherein the community of distributors is delegated greater authority for the design, delivery and administration of CDM programs going forward. As such, 2015 is expected to be largely a transition year as the IESO and community of LDC's adjust to their new roles and responsibilities, new governance structures are put into place, and new administrative processes and systems implemented. An important parameter of success will be ensuring the customer isn't confused or negatively impacted by the host of framework transition matters that will certainly arise. The emerging new spirit of partnership between the IESO and community of LDC's suggests both this goal is achievable and the future will be better (with respect to joint achievements on the energy-efficiency front) than the past.

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Appendix A, Promotional Materials for saveONenergy FRIDGE & FREEZER PICKUP

The saveONenergy FRIDGE & FREEZER PICKUP initiative is promoted within the City of London publication entitled *Waste Reduction & Conservation Calendar*, which is distributed to all households in the city.

Selected excerpts from the *Waste Reduction & Conservation Calendar* are included below:

London Hydro also promotes the saveONenergy FRIDGE & FREEZER PICKUP program via messaging printed on the outer reverse side of the monthly billing envelope received by residential customers.

Appendix B, Recognition of Excellence in the Delivery of the HOME ASSISTANCE Program

Abstract: The provincial saveONenergy HOME ASSISTANCE program was viewed by London Hydro as a very weak offering with a significant administrative burden. London Hydro used these observations as the motivation to innovate and transform the program into a best-of-breed offering by leveraging technology and other municipal agencies to maximize the perceived value provided to participants and eliminate administrative inefficiencies that would otherwise be incurred by London Hydro and its partner contractors.

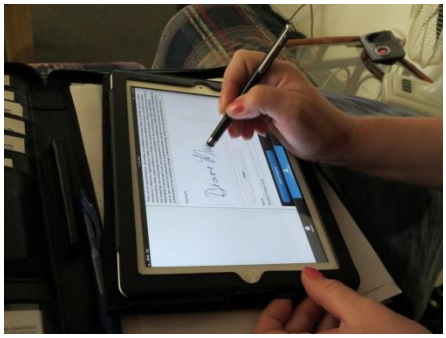
Innovation occurred on several fronts, namely:

- Development (in conjunction with our partner, Parachute Software) of a mobile iPad-based application and work management system that was internally referred to as the Dragon software.
- Engaging participating customers.
- Involving the London Fire Department and the City of London's water conservation group to provide greater perceived value to participants.

For this last element, London Hydro was honored as the recipient of the Ontario Fire Marshall's *2014 Fire Safety Award*, depicted to the right.

B.1 Development of a Mobile iPad-based Qpplication and Work Management System –

Dragon software removes greater than 80 percent of the time required to manage the smothering volume of paperwork for assisting customers. Dragon is virtually paperless, while ensuring adherence to process and facilitating QA/QC protocols. Customers are encouraged to use the IPad with the auditor during the Audit (as shown below). This promotes better tenant education and engagement, which is far superior to an unengaged installation process.



As illustrated above, participants can use a stylus to electronically sign the various agreements. Participants are advised that signed agreements will be maintained by London Hydro, but the Dragon software includes functionality to send a copy of the signed agreement to participants by e-mail or alternatively simply print the signed agreement. Interestingly, but perhaps not

surprisingly, of the 1,236 participants in the HOME ASSISTANCE program over the 2011 – 2014 timeframe, not a single customer was interested in receiving a copy of the various signed agreements.

The Dragon application allows for documentation with photographs included in each application file.

As an added bonus, the Dragon software was specifically designed to handle all invoicing between the contractors and the LDC, and between the LDC and OPA.

B.2 Customer Engagement -

Engaging participating customers via a unique strategy of surgical outreach to our partners. While other utilities hired program managers, London Hydro dovetailed with our Low-Income Energy Assistance Program (LEAP) partner embedding a London Hydro staff within the Salvation Army Assistance Center. London Hydro is able to acquire a higher percentage of in-need customers. London Hydro also chose to focus on individuals rather than Social Housing entities for HAP.

B.3 Other Collaborative Channel Partnerships –

For the HOME ASSISTANCE program in London, London Hydro established partnerships with the London Fire Department and the City of London's Water Department. The nature of these partnerships is described in the subsections that follow:

B.3.1 The London Fire Department –

The London Fire Department was invited and enthusiastically participated in the enhanced HOME ASSISTANCE program. Auditors, as part of the basic audit, perform a whole home check of fire safety and remedy all shortcomings such as dated batteries, and non-working or missing smoke alarms. Batteries, smoke alarms and continuous training are exchanged for detailed data of fire protection status in low-income homes. London Fire chief Kobarda touts the unique relationship as the only such one in North America. "*This data we receive, and the in-home audit/repair is something that is highly valuable and not seen in any other jurisdiction in North America*" says Kobarda. London Hydro was unknowingly nominated and received the Ontario Fire Marshals "*Fire Safety Award*". Kobarda claims the data gathered is used to modify Fire Safety awareness campaigns. Kobarda says, "*This helps us to fight the fire before it starts, as this demographic is over represented in actual fires*". The Fire department also provides educational materials for all members of the family at the end of the audit/installation.

The following tabulation is an example of the statistics provided by London Hydro to the London Fire Department.

2014 Fire Safety Summary				
	Q1	**Q2**	**Q3**	**Q4**
Completed Projects	188	218	115	182
Under-Protected Homes	138	153	78	28
% Under-Protected	73%	70%	68%	15%
Notes: Q4 percentage is low due to high social housing and non-profit components. Typically these complexes are well-maintained with existing fire safety process in-place.				

As shown in the above tabulation, the shockingly high number of low-income dwelling units found with inadequate levels of working fire detection systems serves as testament to the virtue of this unique collaborative approach to delivery of the HOME ASSISTANCE program.

B.3.2 City of London Water Department

The City of London's water department was also invited to participate in the program. COL sets aside up to $200,000 per year for water conservation repairs and upgrades directed at HAP participants. As part of the audit process, all faucets and toilets are checked for leaks and low-flow aerators are installed. In addition, low-flow toilets and repairs to valves and fixtures are also included in the program. In 2014 the London HAP program was responsible for upgrading 190 toilets in London, resulting in significant water and financial savings for clients

B.4 Unique Program Elements

London Hydro's delivery of the HOME ASSISTANCE program was different to the program delivered by other LDC's in their respective service territories. Some of these elements are described following:

B.4.1 A Hybrid Approach

Often social housing agencies are better served under the provincial saveONenergy RETROFIT PROGRAM than under the HOME ASSISTANCE program. As such, social housing agencies were offered a modified hybrid of programs rather than just the HOME ASSISTANCE program. London Hydro worked with the agencies to provide a turnkey solution of Retrofit (in-suite lighting, HVAC and external lighting) rather than just installing short persistence measures such as screw-in CFLs. In London's case, GU 24 long persistence measures were installed and LED external lighting installed for significantly enhanced persistence and low cost acquisition of kWhs. Internal Program Coordinators have project meetings to determine if any cross pollination (program sharing) is possible.

B.4.2 Furnace Filter Replacements

London Hydro is the only LDC in Ontario to perform furnace filter replacement for forced air systems. This saves up to an additional 5% of energy savings in running the blower motor for the furnace. Extra filters are left behind and the occupant is educated on the value and necessity of the filter maintenance.

B.4.3 Electrical Safety –

Electrical Safety is a high focus for London Hydro in all of our programs but specifically in HOME ASSISTANCE program. As part of the Audit, electrical safety is reviewed. Auditors search for items such as, incorrectly installed wiring, missing cover plates (on switches and receptacles) and similar items such as broken light fixtures, receptacles and switches. Licensed electricians are utilized in the repair or replacement of such out-of-compliance items. Although not technically allowed under the overburdened rules of the HOME ASSISTANCE program documents, London Hydro believes it is the responsible action to take.

B.5 A Collaborative Approach to Maximizing Program Value

Although recently touted as a foundation of the new 2015 – 2020 Conservation First framework, this newly touted "*vision*" of collaboration is not a new buzzword for London Hydro. As can be seen by the enhanced program delivery model for the HOME ASSISTANCE program in London Hydro's franchise service territory, collaboration with all stakeholders is key to the philosophy of highly efficient and effective program delivery. By internally managing all programs in-house, London Hydro is able to bring together program coordinators, and outside stakeholders in a truly collaborative fashion that maximizes the value of this program to all participants.

A multi-organization collaborative approach to CDM program delivery is successful when all organizations contribute perceived value and in return receive value that directly contributes toward their organization's goals and objectives. Specifically:

- The Salvation Army was able to qualify customers to participate in the HOME ASSISTANCE program and in return was able to provide their clients with some relief from energy poverty.
- The London Fire Department was able to supply batteries, smoke detectors, and educations material to "*hard to reach*" citizens and in return fulfill their fire prevention mandate amongst these "*hard to reach*" citizens.
- The City of London's Water Department was able to contribute monies toward the installation of water conservation measures and in return was able to fulfill their water conservation goals in a '*hard to reach*" sector.
- The province (through the OPA) funded the electricity retrofit measures and minor electrical deficiencies, as necessary, and in return was able to attain electrical energy savings in the sector most vulnerable to rising electricity prices.

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Appendix C, Power of Collaboration Business Customer Engagement Symposium

C.1 Overview and Goals

On March 6th, 2014 London Hydro held its first "*Power of Collaboration*" symposium (in concert with London Economic Development Corporation and Ontario Power Authority) for its larger commercial and industrial customers. The event centered on direct engagement with these customers in a unique and exciting format. The format consisted of a high intensity and highly active agenda, which differs from the traditional format used by utilities of long technical presentations. The goal of the event was twofold, namely:

1. Acquire both the "suits and the boots". In other words, get both the plant or facility managers and the senior executives in the same venue so that they can both understand each other's functions.
   a. Suits – Make decisions based on financials and corporate goals to manage the business
   b. Boots - Keep the operation up and running while maintaining production or a suitable environment
2. Do NOT provide the answers, but provide enough knowledge to start asking the right questions.

The event was deemed extremely successful in that attendance was sold out at 245 participants who were later surveyed, with very good results.

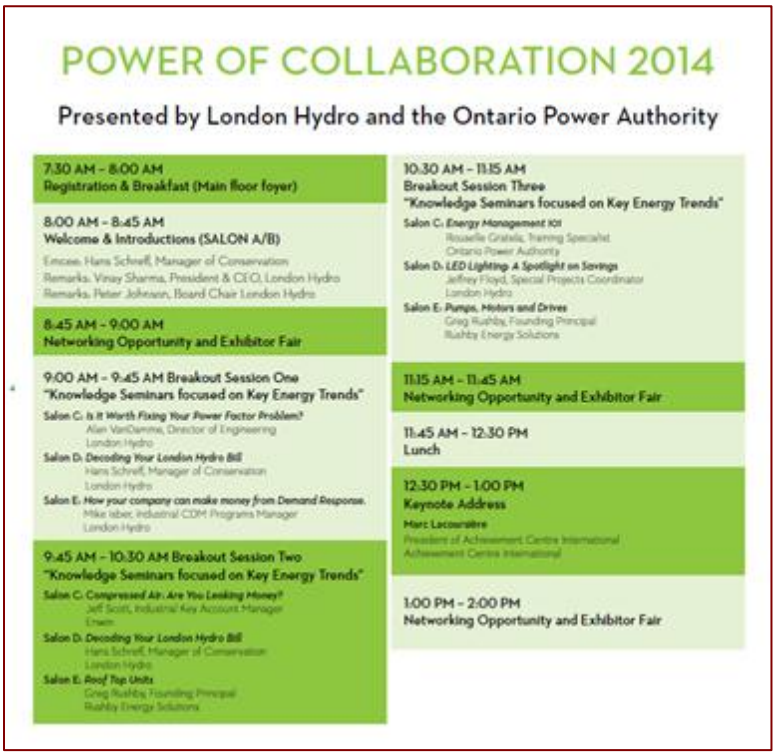
C.2 Symposium Organization and Format

C.2.1 Partnerships

Many entities coming together made the event successful. Thirteen highly engaged channel partners were included in the technology showcase section of the event for hands-on introduction to new and valuable technologies such as LED lighting, power factor correction and among many on display. Several other business partners from other LDCs, the OPA and/or subject matter experts assisted by developing seminar content and giving the presentations.

C.2.2 Format

The event centered on lots of physical movement and short informative sessions. There were eight (8) sessions, which included topics such as conservation programs, understanding the bill and others.



POWER OF COLLABORATION 2014

Presented by London Hydro and the Ontario Power Authority

7:30 AM – 8:00 AM
Registration & Breakfast (Main floor foyer)

8:00 AM – 8:45 AM
Welcome & Introductions (SALON A/B)
Emcee: Hans Schreff, Manager of Conservation
Remarks: Vinay Sharma, President & CEO, London Hydro
Remarks: Peter Johnson, Board Chair London Hydro

8:45 AM – 9:00 AM
Networking Opportunity and Exhibitor Fair

9:00 AM – 9:45 AM Breakout Session One
"Knowledge Seminars focused on Key Energy Trends"
Salon C: *Is It Worth Fixing Your Power Factor Problem?*
Alan VanDamme, Director of Engineering
London Hydro
Salon D: *Decoding Your London Hydro Bill*
Hans Schreff, Manager of Conservation
London Hydro
Salon E: *How your company can make money from Demand Response.*
Mike Iaber, Industrial CDM Programs Manager
London Hydro

9:45 AM – 10:30 AM Breakout Session Two
"Knowledge Seminars focused on Key Energy Trends"
Salon C: *Compressed Air: Are You Leaking Money?*
Jeff Scott, Industrial Key Account Manager
Enwin
Salon D: *Decoding Your London Hydro Bill*
Hans Schreff, Manager of Conservation
London Hydro
Salon E: *Roof Top Units*
Greg Rushby, Founding Principal
Rushby Energy Solutions

10:30 AM – 11:15 AM
Breakout Session Three
"Knowledge Seminars focused on Key Energy Trends"
Salon C: *Energy Management 101*
Rouselle Grateia, Training Specialist
Ontario Power Authority
Salon D: *LED Lighting: A Spotlight on Savings*
Jeffrey Floyd, Special Projects Coordinator
London Hydro
Salon E: *Pumps, Motors and Drives*
Greg Rushby, Founding Principal
Rushby Energy Solutions

11:15 AM – 11:45 AM
Networking Opportunity and Exhibitor Fair

11:45 AM – 12:30 PM
Lunch

12:30 PM – 1:00 PM
Keynote Address
Marc Lacoursière
President of Achievement Centre International
Achievement Centre International

1:00 PM – 2:00 PM
Networking Opportunity and Exhibitor Fair

The concept was short information blasts with sessions running 3 at a time, and 3 in a row. The sessions were laid out as to attract multiple staff from a client so that they could cover the ground necessary. In between each session was a frantic networking opportunity as attendees had to maneuver through the exhibit and networking area "Vegas Style". The venue was tight and full, which created great opportunities for discussions.

DECODING YOUR LONDON HYDRO BILL

Hans Schreff
9:00 AM – 9:45 AM
SALON D

Hans Schreff
Manager of Conservation Programs
London Hydro

More than six regulators and other agencies are involved in setting the rates that determine how much you'll pay on your next hydro bill. In this seminar, you'll learn how to read your bill, who's responsible for calculating the rates and what each line item represents.

Your hydro bill reflects the costs of generation, distribution and infrastructure and is probably the most complicated billing you receive. London Hydro is responsible for the distribution of power within the City of London and the utility's portion represents about 18 percent of the amount you pay each month. London Hydro's rates are among the lowest in the Province and our efficiencies actually allowed us to lower commercial rates in 2015. With a better understanding of your bill, you'll be able to determine the best way to cut your costs even more. You'll also be able to amaze and amuse your friends and loved ones with your new insight into terms like "debt retirement charge", "adjustment factor" and your understanding of acronyms like IESO, OEB, HONI and OPA.

COMPRESSED AIR:
Are you Leaking Money?

Jeff Scott
9:45 AM – 10:30 AM
SALON C

Jeff Scott
Key Account Manager
Erwin Utilities

Jeff is an Industrial Key Account Manager with Erwin Utilities, Windsor's equivalent of London Hydro. A Certified Energy Manager and Certified Measurement and Verification Professional, Jeff has been working in the compressed air and gas industry for more than 15 years. Jeff enjoys his work so much, he wishes he could clone himself and devote one self to business and the other to play.

Leaks can be a significant source of wasted energy in an industrial compressed air system, sometimes wasting 20-30% of a compressor's output. In this seminar, you'll learn strategies and solutions for reducing the cost of compressed air.

In addition to being a source of wasted energy, leaks can also contribute to other operating losses. They cause a drop in system pressure, which can make air tools function less efficiently and cause production to suffer. Furthermore, by forcing the equipment to cycle more frequently, leaks shorten the life of the compressor and almost all other system equipment. When leaks are not addressed, unnecessary compressor capacity may be added and there can be additional maintenance costs and unscheduled downtime. A typical plant that has not been well maintained will likely have a leak rate equal to 20% of total compressed air production capacity. Fortunately, proactive leak detection and repair can reduce leaks to less than 10% of compressor output. You could call all the effort you put into stopping air leaks "braking wind."

COLLABORATION

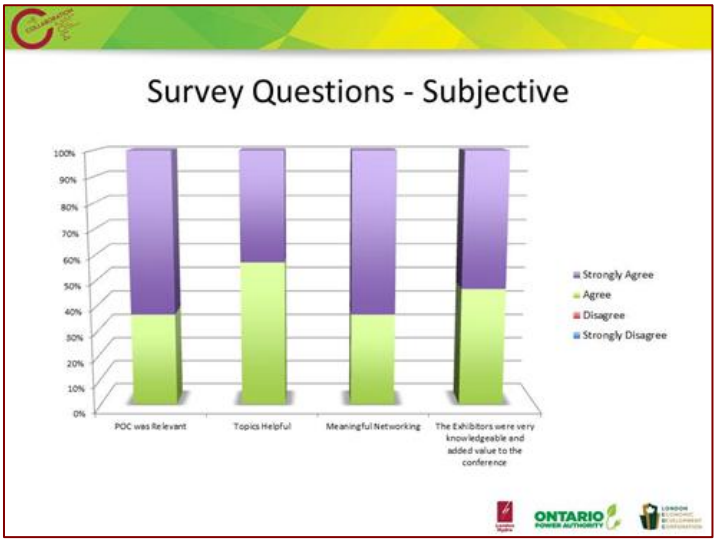
C.2.3 Staffing

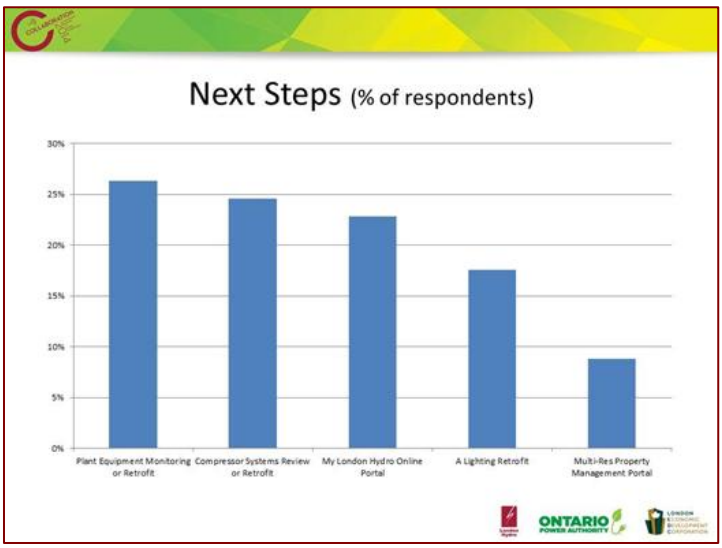
All of the CDM staff and several from other departments were tasked with interacting with all customers. The staffs were all instructed on proper networking techniques and not to congregate together, and spend only a few minutes with each customer, while arranging for a follow-up call at a later date. Few people are natural "*engagers*", yet can be coached to network effectively with great results. Follow-up discussions and survey provided evidence that this engagement strategy was fruitful and will be focused on in future customer relations.

Note: All London Hydro's CDM staffs undergo relationship management training. This includes every individual in the department from students to Senior Executives. Prior to each customer engagement opportunity, short meetings are held to review engagement strategies and goals.

C.3 Results

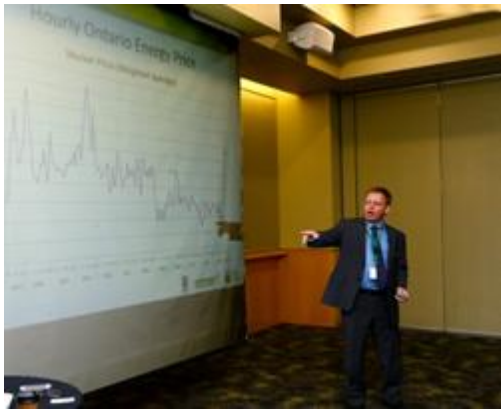
There are two important measurements of success for such engagement symposiums, namely: (i) what were the participants' impressions of the event itself (i.e. venue, quality of speakers, relevance of topics, relevance of exhibitors, etc.), and (ii) what is the likelihood that participants will contemplate undertaking some type of energy action as a result of attending this symposium?





The results were better than expected in that the event generated many opportunities for site visits and further engagement of customers. An after-event survey and follow-up discussions have resulted in this event being scheduled as an annual event for the business community. The event allowed London Hydro to showcase some of the engagement tools that were developed in-house, such as the Property Managers Portal, and My London Hydro portal. New tools such as IDC2 (Interval Data Center 2) and Green Button tools are also being introduced to the customers through the sites.


London's Community Energy Action Plan




Your Single Source Electrical Distributor

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Appendix D, Cross-Reference Between Program Marketing Names and Master Agreement Schedule Identifiers

The marketing or customer-facing names of the various provincial (Tier1) CDM programs are quite different from the CDM program identifiers used within the Master CDM Program Agreement between the Ontario Power Authority and community of Local Distribution Companies (LDC's).

The following tabulation provides a cross-reference between the customer-facing CDM program names (Column 1) and the identifiers used in legal agreements (Columns 2 and 3). Column 4 indicates the date when the various schedules were posted for acceptance by the LDC community. Column 5 indicates the date when London Hydro's subscription to each provincial CDM program was recognized on their iCon web portal interface.

Customer-Facing (Marketing) Name of Initiative	Name of Initiative within OPA's Master CDM Agreement	Schedule within OPA's Master CDM Agreement	Date Schedule Posted	Date London Hydro Subscribed
(Col 1)	(Col 2)	(Col 3)	(Col 4)	(Col 5)
saveONenergy FOR HOME Portfolio:				
saveONenergy FRIDGE & FREEZER PICKUP	Appliance Retirement	Schedule B-1, Exhibit D	January 26, 2011	February 22, 2011
saveONenergy HEATING & COOLING INCENTIVE	HVAC Incentives	Schedule B-1, Exhibit B	January 26, 2011	February 22, 2011
saveONenergy *peaksaver* PLUS	Residential Demand Response	Schedule B-3	August 22, 2011	
saveONenergy COUPON EVENT	Conservation Instant Coupon Booklet	Schedule B-1, Exhibit A	January 26, 2011	February 22, 2011
saveONenergy EXCHANGE EVENT	Appliance Exchange	Schedule B-1, Exhibit E	January 26, 2011	February 22, 2011
--	Bi-Annual Retailer Event	Schedule B-1, Exhibit C	January 26, 2011	February 22, 2011
	Home Energy Assessment Tool			
	Midstream Electronics			
	Midstream Pool Equipment			
saveONenergy FOR BUSINESS Portfolio:				

Customer-Facing (Marketing) Name of Initiative	Name of Initiative within OPA's Master CDM Agreement	Schedule within OPA's Master CDM Agreement	Date Schedule Posted	Date London Hydro Subscribed
(Col 1)	(Col 2)	(Col 3)	(Col 4)	(Col 5)
saveONenergy DEMAND RESPONSE VOLUNTARY DR1	Demand Response 1	Schedule D-5		February 22, 2011
saveONenergy DEMAND RESPONSE CONTRACTUAL DR3	Demand Response 3	Schedule D-6	May 31, 2011	February 22, 2011
saveONenergy SMALL BUSINESS LIGHTING	Direct Install Lighting and Water Heating	Schedule C-3	January 26, 2011	February 22, 2011
saveONenergy SMALL BUSINESS A/C	Direct Service Space Cooling	Schedule C-5	January 26, 2011	February 22, 2011
saveONenergy RETROFIT PROGRAM	Efficiency: Equipment Replacement Incentive	Schedule C-2	January 26, 2011	February 22, 2011
saveONenergy AUDIT FUNDING	Energy Audit	Schedule C-1	January 26, 2011	February 22, 2011
saveONenergy EXISING BUILDING COMMISSIONING	Building Commissioning	Schedule C-6		February 22, 2011
saveONenergy HIGH PERFORMANCE NEW CONSTRUCTION	New Construction and Major Renovation	Schedule C-4	February, 2011	February 22, 2011
saveONenergy PROCESS & SYSTEMS	Process & Systems Upgrades	Schedule D-1	May 31, 2011	April 11, 2011
"	Monitoring & Targeting	Schedule D-2	May 31, 2011	April 11, 2011
"	Energy Manager	Schedule D-3	May 31, 2011	April 11, 2011
"	Key Account Manager	Schedule C-4	May 31, 2011	April 11, 2011
saveONenergy NEW HOME CONSTRUCTION	New Construction Program	Schedule B-2	January 26, 2011	April 11, 2011
Low-Income Programs:				
saveONenergy HOME ASSISTANCE	Home Assistance Program	Schedule E-1	May 9, 2011	August 18, 2011

Notes:

1. Although the saveONenergy *peaksaver* PLUS initiative is primarily targeted to residential customers with central air conditioning systems, small business customers can also participate (although the latter won't receive an in-home display), the initiative has been categorized in the above tabulation under the saveONenergy FOR HOME portfolio.
2. The saveONenergy NEW HOME CONSTRUCTION is marketed to both residential customers (for the purposes of awareness) and new home builders. Since London Hydro primary interactions are with new home builders, this program has been categories herein as a "*business*" program. Other LDC's may well categorize it differently in their respective Annual CDM Report.
3. The information is column 4 (date posted) can be somewhat misleading. For example, Schedule E-1 for the saveONenergy HOME ASSISTANCE program shows a posted date of May 9th, 2011 implying that the program was ready for delivery to eligible customers on that date. The unfortunate reality is that it wasn't' until late summer of 2012 (i.e. well more than a year later) that there was a payment process in place and the calculation tool used by assessors (i.e. the so-called Field Audit Support Tool) was finally corrected to a satisfactory state – refer to announcement in OPA E-Blast dated August 24th, 2012.

Appendix E, Summarized Province-Wide EM&V Findings

The Ontario Power Authority has retained a number of program evaluation contractors to assess the 2014 performance of each of the provincial CDM programs. The key evaluation findings given below have been provided by the Ontario Power Authority to the community of LDCs. It is understood that the actual reports prepared by the various EM&V contractors won't be available until Q4 of 2015.

Customer-Facing Name of CDM Initiative	**Province-Wide Key Evaluation Findings**
(Col 1)	**(Col 2)**
saveONenergy FOR HOME Portfolio:	
saveONenergy FRIDGE & FREEZER PICKUP	• Participation increased slightly to 22,563 (7.7%) in 2014 compared with 20,952 in 2013. • Since 2011 overall Initiative participation has decreased nearly 60%. • The greatest decrease was seen in the number of refrigerators collected year-over-year • Of appliances collected, refrigerators and freezers remain the most dominate measures accounting for 90%. However, window AC units and dehumidifiers saw a marked increase of 29.6% and 27% respectively in 2014. • Net to gross ratio (NTG) increased slightly to 47% compared to 43% as reported for 2013 and 2012 program years.
saveONenergy HEATING & COOLING INCENTIVE	• In 2014 net savings increased by 20% from 2013 and overall participation increased by 17% to 113,002 compared to 2013 • The ECM measure has remained the dominant source of savings since 2011 • Per unit furnace savings increased 12.7% due to a shift in the number of participants who use their furnace fan continuously both before and after the retrofit. • Per unit energy and demand savings assumptions for central air conditioners decreased by 56% due to reduced run hours • Net to Gross ratio (NTG) remained unchanged from 2013 at 48%
saveONenergy peaksaver PLUS	• There were an additional 55,000 CAC load control devices enrolled in the program in 2014 relative to 2013, which increased the capacity of the residential segment of the program from 129 MW in 2013 to 143 MW in 2014. • Ex-ante impacts on a per device basis were lower than 2013 average. • There were no energy savings in 2014 because there were no system-wide events were called.

Customer-Facing Name of CDM Initiative	Province-Wide Key Evaluation Findings
(Col 1)	(Col 2)
	• Load impact estimates for the average small and medium business and for electric water heaters among residential customers remain consistent with prior year's analysis • IHD's yielded no statistically significant energy savings. .
saveONenergy COUPON EVENT	<u>Bi-Annual Retailer Event:</u> • Over 2.5 million coupons were redeemed in 2014 compared with 2013 redemptions • The Bi-Annual Coupon Event saw a substantial increase in the number of coupons redeemed during the Spring and Fall Events in 2014 compared to 2013. The increase can be linked to a substantial increase in LED purchases with event coupons accounting for 84% of all Bi-Annual Coupons redeemed. • Reductions in per unit savings were overshadowed by the increase in coupon redemptions. Overall savings increased by approximately 85% in 2014 compared with 2013 Demand and Energy Savings. • Similar to the Annual Coupon Event measured NTG ratios rose by 53% compared to 2013 NTG ratios. The rise is due to the inclusion of participant spillover, i.e., purchase of additional coupon initiative and general energy efficient measures without the use of a coupon but influenced by the Bi-Annual Coupon event. <u>Annual Coupons</u>: • Customers redeemed more than five times as many annual coupons in 2014 as in 2013. In total, approximately 500, 000 Annual Coupons were redeemed in 2014 with 110,000 being LDC Coded Coupons. • There was a further reduction in savings for lighting measures from changes in the baseline due to the phase out of 72W and 100W incandescent bulbs. • Despite the significant per unit savings reductions for lighting measure, the Net Annual Savings from Annual Coupons in 2014 was more than six times that in 2013. This is primarily because of higher participation and the inclusion of LED coupons and full year availability of all coupons. • Measured NTG ratios grew significantly in 2014. The NTG ratio is 53% higher in 2014 than in 2013 due to the inclusion of participant spillover, i.e., purchase of additional coupon initiative measures and general energy efficient measures without the use of a coupon but influenced by the coupon program.
saveONenergy EXCHANGE EVENT	• Participation in 2014 increased by 6.5% to 5,685 appliances from 5,337 compared to 2013 • Per-unit savings has increased by 36.6% as ENERGY STAR criteria increases and more participants purchase ENERGY STAR replacements appliances. This resulted in a 6.5% increase in Net Energy & Demand savings. • Net to Gross ratio (NTG) remained unchanged from 2013 at 52.6%

Customer-Facing Name of CDM Initiative	Province-Wide Key Evaluation Findings
(Col 1)	(Col 2)
saveONenergy FOR BUSINESS Portfolio:	
saveONenergy DEMAND RESPONSE VOLUNTARY DR1	This program was previously withdrawn from the marketplace due to lack of participation.
saveONenergy DEMAND RESPONSE CONTRACTUAL DR3	• The largest 25 contributors account for 60% of the contractual demand reduction – that is, less than 4% of contributors account for the majority of the load reductions. • A multi-year analysis indicates 2012 was the best year for program performance. After 2012, a single large contributor left the program, resulting in a decrease in overall performance in 2013 and 2014. This highlights the risk having a highly concentrated program with a few large contributors representing a large share of the program capacity. • There were no events called in 2014 and the contracted capacity was similar to 2013.
saveONenergy SMALL BUSINESS LIGHTING	• 23,784 projects were completed in 2014 (34% increase from 2013) • The category of 'Other' business type projects increased 71% when compared to 2013. Agribusinesses make up 74% of the 'Other' business type category. While growth in the number of projects is good, agribusinesses projects, in particular, have a realization rate of only 58.5%. This is primarily due to the verified annual operating hours being approximately 45% less than the assumed annual operating hours. • In 2014 LED measures provide the most net savings of any other SBL measure making up 59% of net energy savings in 2014. Their long effective useful life and retention of a larger amount of savings after the baseline adjustment allow LED measures to also contribute substantially more lifetime savings than CFLs and linear fluorescents. • Overall energy and demand realization rates decreased by 1.8 and 3.1 %, respectively, from 2013. ○ Sampled rural projects have lower energy realization rather than urban projects (63.8% compared to 83.5%) across the 2011 – 2014 sample ○ Sampled rural projects have even lower demand realization rather than urban projects (49.7% compared to 74.1%) across the 2011 – 2014 sample ○ The annual proportion of net energy savings from rural projects has increased from 30% in 2011 to 41% in 2014
saveONenergy RETROFIT PROGRAM	• The number of prescriptive projects increased slightly (1.2%) in 2014 to a total of 4,812. However, total net verified savings and peak demand savings dropped significantly (19% and 30% respectively). This is due to a 19% drop in per-project net verified savings, which can be attributed to lower track level realization rate and net-to-gross ratio and is related to smaller average project sizes. • The quantity of engineered projects increased 22% to a total of 3,906 in 2014, combined with a net

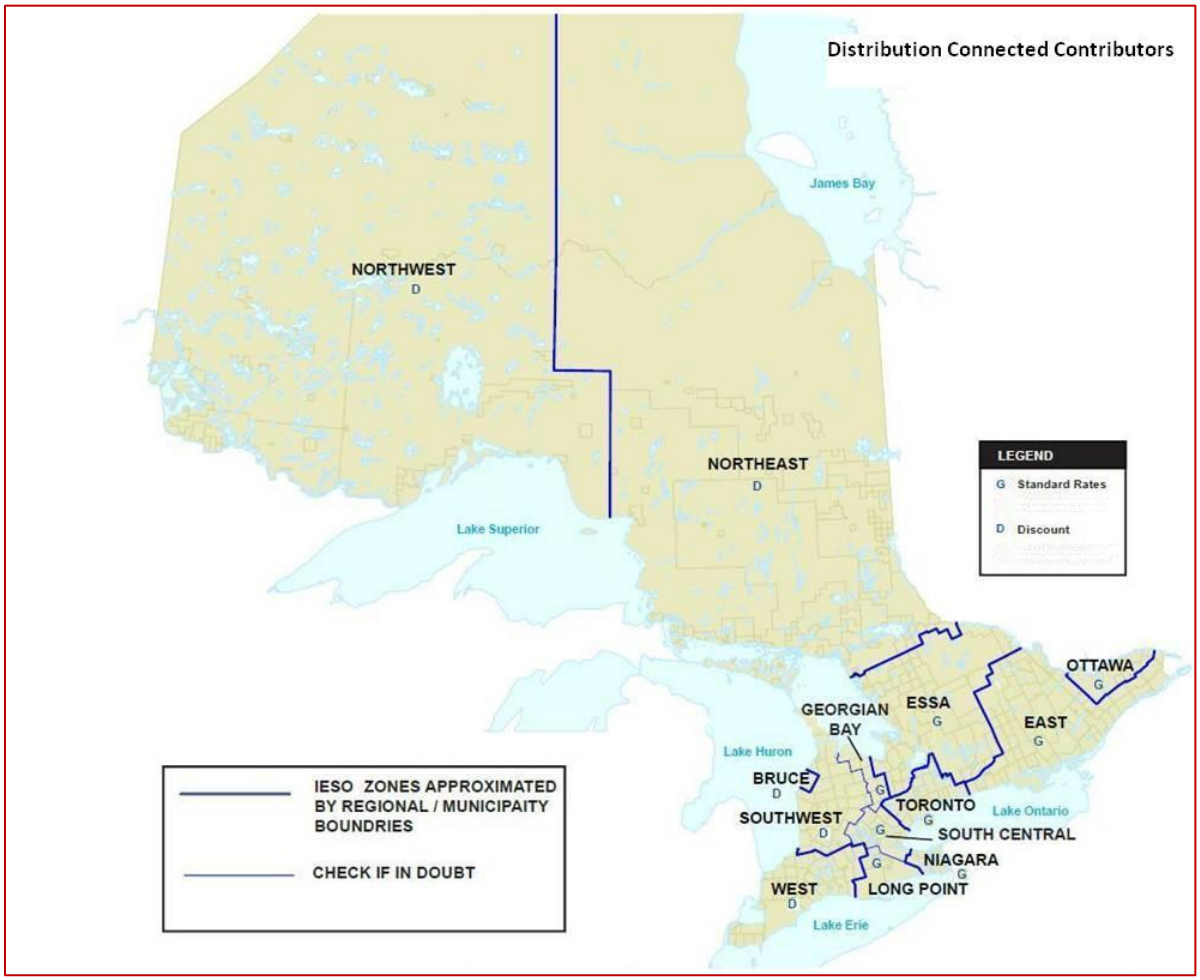
Customer-Facing Name of CDM Initiative	Province-Wide Key Evaluation Findings
(Col 1)	(Col 2)
	verified savings per project increase of 17% the track saw a dramatic 47% increase in net energy savings. • Lower demand realization rates across the program as a whole were tied to equipment differences between reported and calculated values. For lighting projects the difference was most often seen in baseline and retrofit lamp wattages and ballast factors. Non-lighting tracks exhibited lower demand realization rates due to the following factors: o Variations in load profiles where the evaluation team found equipment that operated fewer hours or at a lower capacity than expected from the project documentation. o Inconsistencies in equipment nameplate data (typically efficiency or capacity) between project documentation and equipment installed on-site. o Weather dependent control systems leading to shifts in how often the equipment operated.
saveONenergy AUDIT FUNDING	• The number of audits carried out in 2014 decreased by 20% when compared to 2013. • The average per audit net energy savings attributable to the Audit Funding Initiative was estimated to be 65 MWh and 13 kW of summer peak demands savings. • Time series analysis quantified additional savings from measures implemented after initial program year. It was found that an additional 7.2%, 5.0% and 0.1% can be added to all previously reported projects in 2011, 2012 and 2013 projects, respectively.
saveONenergy EXISING BUILDING COMMISSIONING	• 5 projects completed the Hand-off stage in 2014. • Energy realization rate was estimated at 116% and demand realization rate at 202%. • About 31 participants are still in the scoping stage or implementation stage.
saveONenergy HIGH PERFORMANCE NEW CONSTRUCTION	• Savings have increased every year of the initiative with an increased participation of 50% from 2013 • In 2014, most savings came from the custom track providing 71% of demand savings. • Participation from HVAC measures occurred for the first time in 2014 (providing 14% of summer peak kW savings and 5% of kWh savings). • The measures with the greatest impact on low realization rates for prescriptive measures were high volume low speed (HVLS) fans and variable frequency drives (VFDs). • Province-wide realization rates declined slightly for 2014, as a result of the wider variety of measures being implemented. • Key drivers for participation are: initial project cost, followed by electricity costs and expected energy savings are the key drivers to participation.

Customer-Facing Name of CDM Initiative	Province-Wide Key Evaluation Findings
(Col 1)	(Col 2)
saveONenergy PROCESS & SYSTEMS	Capital Incentive Initiative • 10 PSUI Capital Incentive projects implemented in 2014, compared to 5 in2013. • 4 projects are Behind the Meter Generation (BMG) projects. • The remaining projects were energy efficiency improvements in pumping, cooling, compressed air systems and industrial processes. • Each project received its own Net to Gross (NTG) value. NTG ratios ranged from 62% to 100% for the 10 projects • Realization rates remained high in 2014, ranging from 90 to over 100%. Energy Managers Initiative – Non incented savings • 379 Energy Manager projects were completed in 2014 compared to 306 in 2013 • Energy Managers are important drivers of non incented savings projects. • In 2014, the Energy Mangers initiative has contributed to 35% of energy savings for Industrial Programs Monitoring and Targeting Initiative – Non incented savings • 5 projects were completed in 2014, compared to 3 in 2013. • Low realization rates (36% for energy savings and 59% for demand savings) are attributed to reported savings based on total potential savings rather than non-incentivized realized savings, while the verified savings only include non-incentivized savings).
saveONenergy NEW HOME CONSTRUCTION	• The most significant growth in the initiative has been participation in the prescriptive track. MW savings in the prescriptive track increased from zero summer peak MW savings in 2011 to 352 summer peak kW savings in 2014. • The custom track saw participation for the first time in 2014. One custom project of 55 homes contributed 37 kW demand savings and 0.5 GWh of energy savings. • New deemed savings for performance track homes were developed and implemented, resulting more consistent realization rates for 2014. • ENERGY STAR New Homes was introduced as an eligible measure within the performance track in 2014. As a result, these ENERGY STAR New Homes provided 1% of peak kW savings and 4% of kWh savings.
Low-Income Programs:	
saveONenergy HOME ASSISTANCE	• Participation decreased by 5 % to 25,424 participants compared with 2013 (26,756). The decrease was

Customer-Facing Name of CDM Initiative	Province-Wide Key Evaluation Findings
(Col 1)	(Col 2)
	due to six LDCs not participating in the Home Assistance Program in 2014. • Realization rates for demand doubled in 2014 to 56% compared with 2013 (26%). However, energy realization rates decreased by 10% to 77% compared with 2013 results. • Realization rate for demand savings increased due to the adoption of the new FAST Tool which incorporated updated kW savings for weatherization measures in particular insulation measures.

Appendix F, Map of Settlement Zones for Demand Response

This map shows the demand response settlement zones throughout the Province. London is located in the "West" settlement zone.



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