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Toronto Hydro-Electric System Limited

**Conservation and Demand Management
Program Application:**

Business Outreach and Education

Submitted for Board Approval

**Submitted to:
Ontario Energy Board**

Submitted on January 10, 2011

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Executive Summary

Toronto Hydro-Electric System Limited (THESL) has identified an opportunity to deliver a Conservation and Demand Management (CDM) education program and seeks to respond to this need by developing and offering a Business Outreach and Education Program.

This submission is in conformance with the requirements of Section 4.3.2 of the CDM Code for Electricity Distributors. The specific requirements for an OEB Board Approved Program are found throughout this document and have been summarized in Appendix B for convenience.

THESL is seeking approval from the Ontario Energy Board (OEB) to expend \$1.65 million to deliver the program between the period of January 1, 2011 and December 31, 2011.

The Business Outreach and Education program will broadly target stakeholders operating within the commercial and institutional sectors across medium to large size businesses and multi-residential buildings, as well as the industrial sector with influence on energy efficiency projects. Due to the size, dispersion, and multiple facings, this is a challenging community to reach and educate about CDM, beyond simple awareness-raising marketing and messaging efforts. Subsequently, this program will educate the business community by reaching out to stakeholders at key events where they congregate. In addition, this program provides for focused on-site educational sessions and workshops at the workplace or other designated locations of influential organizations.

Between 2011 and 2014, THESL estimates that this outreach and education effort can provide tangible training to approximately 7,000 participants, as well as direct engagement with over 5,000 people on a one-on-one basis.

The objectives of this educational program are to:

- Introduce the various business stakeholders on the availability and benefits of the commercial and industrial CDM programs and the applicability of potential energy efficiency applications. This includes consideration of new OEB approved programs as these are launched in turn and blended into the mix of CDM program options.
- Train the various business stakeholders on the process and practicalities of applying for incentives and of the processes involved including online registration, eligibility, rules, measurement and verification.
- Maximize participation in CDM programs.

1. Program Description

1.1. Program Rationale

With the launch of the new CDM programs THESL must reach out and educate the business community on program details including eligibility rules, potential opportunities, the requirements for completing application forms and overall process. Participants will need to distinguish between the new and previous generation of programs, including new OEB approved programs as these are launched in turn and blended into the mix of CDM program options. **This requirement extends beyond simple awareness-raising marketing and messaging efforts.**

The building services audience itself is varied and comprised of many stakeholders including:

- Building owners and property managers
- Tenants and facility managers
- Consulting and engineering firms
- Builders, contractors and tradespeople
- Distributors, suppliers, and original equipment manufacturers
- Non-governmental agencies and advocates
- Government, institutions and private sectors
- Key decision makers, technical buyers, influencers, and budget managers

The Business Outreach and Education program will broadly target stakeholders within the commercial and institutional sectors across medium to large businesses and multi-residential buildings, as well as the industrial sector.

The Toronto business community serving this segment is a large, segmented, highly dispersed sector that is generally hard to reach at any one time, or through any single media channel. Past experience indicates that THESL will need to engage and educate business audiences directly and interactively as a follow-up to the messaging conveyed through conventional marketing forms. This can be accomplished at a general level on a larger scale, as well as a customized level on smaller scale.

To maximize efficiency and reach, outreach educational activities can leverage large stakeholder assemblies such as business association meetings, special events and tradeshow to great effect. Whereas, a more focused approach involving smaller or single-interest groups can usefully accommodate deeper or more focused training. Both of these approaches will be pursued under this program.

1.2. Program Objectives

The objectives of this educational program are to:

- Introduce the various business stakeholders on the availability and benefits of the commercial and industrial CDM programs and the applicability of potential energy efficiency applications.
- Train the various business stakeholders on the process and practicalities of applying for incentives and of the processes involved including online registration, eligibility, rules, measurement and verification.
- Maximize participation in CDM programs.

1.3. Program Details

The training and education delivery model would depend on the nature of the event.

Major Events

Significant training and education opportunities coincide with major high traffic volume events such as key business association conferences and industry tradeshows. In these cases, THESL can reach and engage a broad audience of key decision makers, technical buyers, and budget holders very efficiently.

For a major event, THESL would provide key-note or panel speakers for plenary-type sessions focusing on CDM programs. In addition, and depending on the focus of the event, a menu of session topics would be sponsored and generally include:

- CDM Program specific training
- Online application training
- Technology and case study review

Concurrently, THESL participation would typically include a physical presence in the form of a staffed booth or display area with marketing information made available in order to raise awareness, respond to follow-up and “pedestrian” enquiries.

Association Meetings

A less formal but still important outreach activity involves active membership and participation in business association forums used to inform the membership about CDM programs, advocate for CDM programs within the context of their typical participation, and to review case studies and customer experiences. This type of involvement would also provide secondary benefits such as establishing supportive stakeholder relationships, and securing future project or customer referrals.

The engagement model for this type of educational outreach would involve active membership in the form of keynote speaking opportunities, provision of information displays at association meetings, information packages, and guided sessions.

On-Site Seminars and Workshops

Another outreach tactic involves visiting key stakeholders at their workplace (or other designated locations) to offer on-site seminars as a convenient, time-efficient and inexpensive engagement model for small and medium-sized groups of important stakeholders with relevant or customized CDM program information.

Outreach and education topics on CDM programs would be flexible and delivered as simple presentations, seminars, workshops, case study presentations, technology clinics to suit the particular organization. These outreach events could be delivered by account managers, program managers, measurement and verification professionals, and project engineers. These sessions would be focused on organizations with multiple customer contacts such as engineering consultants and architects, builders, and contractors.

1.4. Value Proposition

Participants will experience the following benefits through the education and training offered under this program:

- Improved understanding of various CDM programs and their benefits, including new OEB approved programs as they launch
- Streamlined implementation through greater familiarity with processes and applications
- Opportunity to enhance project value or size of project by optimizing available incentives
- More efficient use of customers' time as compared with learning it themselves
- Convenient delivery model
- Ability to socialize and share experiences and ideas

1.5. Conformance with OPA Program Measures

Under Section 4.3 of the Code, a local distributor is permitted to apply to the Board for approval of a CDM education program.

1.6. Conformance with CDM Code Requirements

This submission is compliant under Section 4.3.2 of the "Conservation and Demand Management Code for Electricity Distributors", which specifies the requirements for a distributor's application for a proposed Board-Approved CDM Program and is documented under Appendix B.

2. Target Market

2.1. Sector Analysis

The Business Outreach and Education program will broadly target stakeholders within the Commercial and Institutional sectors across Medium to Large Businesses and Multi-residential buildings, as well as the Industrial sector.

Within these sectors, there is a tremendous diversity of business types as illustrated by Figure 1 and 2 for Commercial and Industrial sectors, respectively.

Figure 1 – THESL Commercial Sector Load Breakdown (Summer Demand)

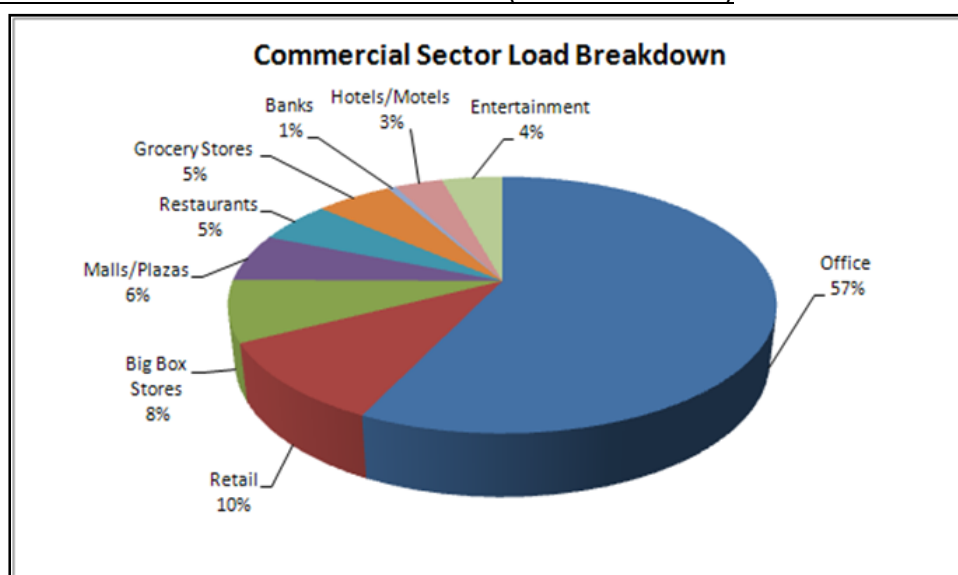
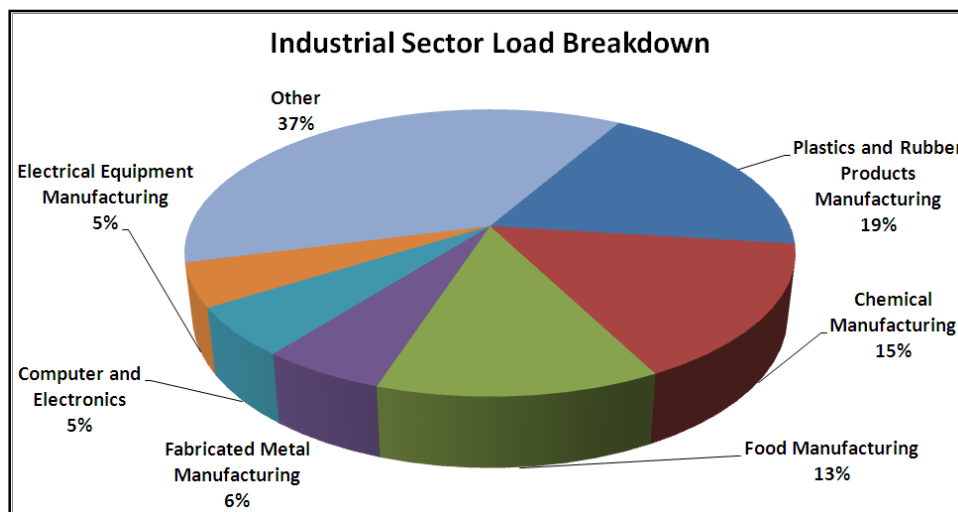


Figure 2 – THESL Industrial Sector Load Breakdown (Summer Demand)



2.2. Projected Number of Participants

The projected number of participants in educational events, as well as the number of people or pedestrians engaged in less formal one-on-one interactions is displayed in the table below, based on the estimated number of events and participation rates:

Engagement Model	Annual Engagements	Total Estimated # of Participants	Total Estimated # of Engaged Pedestrians
Association Membership	20		864
Key Event Education Sponsorship	20	1,200	
Show Booth Outreach	4		800
On-site Seminars	120	960	
Miscellaneous Materials			
Total Annual		2,160	1,664
Total 2011-2014		7,560	5,824

Note:

“Engagements” refers to a presence at a key event or conference.

“Participant” refers to someone enrolling in a seminar or workshop.

“Engaged Pedestrian” refers to unscheduled walk-in traffic at trade show events or industry association general meetings.

3. Projected MW and MWh Savings

Not Applicable

4. Marketing and Sales Plan

4.1. Marketing and Communications

The primary marketing strategy for the Business Outreach and Education Program is to promote improved energy efficiency in commercial, institutional and industrial building stock through direct outreach and personal engagement at significant events and other venues. The marketing strategy in

this regard is to participate in significant stakeholder events and offer educational engagements in a manner convenient for participants.

Selection of appropriate events and emphasis would be based on:

- (i) The relative importance of the group's membership or real estate portfolio within THESL's CDM savings target, and
- (ii) The relative reach of the organization within that particular real estate portfolio. Together, these considerations define the "event impact" and provide a formal methodology to prioritize the targeting of educational and training opportunities, which correspond to potential sales leads for THESL's sales forces.

The on-site seminar approach provides a mobile solution to visit workplaces of important stakeholder organizations to offer convenient, time-efficient and inexpensive seminars for small and medium-sized groups of influential stakeholders with relevant or customized CDM program information.

4.1.1. Marketing Objectives

- Build understanding of CDM programs
- Drive participation in the programs

4.1.2. Primary Target Market

- Building owners and property managers
- Tenants and facility managers
- Consulting and engineering firms
- Builders, contractors and tradespeople
- Distributors, suppliers, and original equipment manufacturers
- Non-governmental agencies and advocates
- Government, institutions and private sectors
- Key decision makers, technical buyers, influencers and budget managers
- Commercial and institutional trade associations

4.2. Collaboration with other LDC's

THESL will work with neighbouring LDC's to coordinate the timing and location of similar events to ensure these are complementary in location and occurrence, and not coincidental nor competitive. In this manner, awareness of CDM programs will be more evenly distributed. THESL will support participation by visitors from outlying region on a reciprocal basis. Where similar initiatives are deployed THESL will work with regional LDC's to ensure the programs share best practices.

4.3. Take-to-Market Approach

- Prioritize events of by order of potential “event impact” and determine level of useful participation. Work with event organizers to determine the degree engagement and appropriate activities and plan for slate of suitable educational sessions.
- Recognize and emphasize participation at high traffic events.
- Leverage relationships with professional and industry organizations to promote program to their membership within their event schedules.
- Engage Key Account Managers and leverage industry relationships identify key stakeholder groups that touch multiple customer projects to offer on-site educational seminars.

4.4. Tactics

- Develop relevant information packages for training sessions including CDM programs, application/enrolment process, technical opportunity and case studies/customer testimonials.
- Develop “event impact” priority lists based on survey of relevant associations and other stakeholder groups.
- Utilize third party communication channels (newsletters and websites) to communicate program events
- Promote through/to associations and relevant stakeholders
- E-marketing blast customer list and association members
- Issue media release to targeted media outlets within the industry (municipal, commercial, etc) to launch challenge and announce milestones over time
- Targeted advertisements and editorial in trade journals and online sites

4.5. Key Messaging

- CDM programs are continuing, but at the same time, have evolved and customers to should be well-informed to maximize potential benefits for their energy saving initiatives.
- THESL wants to work with its customers
- THESL is a trusted partner and honest broker

5. Program Evaluation

5.1. Program Evaluation Plan

Program evaluation will be carried out by a certified independent third-party M&V Professional based on the OPA EM&V Protocol, as applicable. It will focus on the following areas to assess the cost-effective delivery of the program:

Evaluation Objectives	Evaluation Goals
Process Design Effectiveness	<ul style="list-style-type: none"> • Participation rates • Perceived value of time invested
Program Administration Effectiveness	<ul style="list-style-type: none"> • Perceived effectiveness of the training delivery and program organization
Estimate Program Cost Effectiveness	<ul style="list-style-type: none"> • Effectiveness of the program delivery in terms of marketing/sales activities in signing up future participants
Ensure Level of Customer Satisfaction	<ul style="list-style-type: none"> • Perceived importance of information received

The draft EM&V template is used to represent the evaluation plan as shown in Appendix A, but the eventual evaluation plan will be prepared by the independent evaluator.

6. Program Budget

The 2011-2014 budgeting plan for the program is summarized in the following table:

Description	2011	2012	2013	2014	Total
Marginal Costs					
Fixed Costs					
Legal Cost	\$15,000	\$15,000	\$15,000	\$7,500	\$52,500
Program EMV	\$15,000	\$15,000	\$15,000	\$20,000	\$65,000
Total Fixed Costs	\$30,000	\$30,000	\$30,000	\$27,500	\$117,500
Variable Costs					
Operation Cost	\$424,345	\$424,345	\$424,345	\$212,173	\$1,485,209
Total Variable Costs	\$424,345	\$424,345	\$424,345	\$212,173	\$1,485,209
Total Marginal Cost	\$454,345	\$454,345	\$454,345	\$239,673	\$1,602,709
Total Allocable Cost	\$12,722	\$12,722	\$12,722	\$6,711	\$44,876
Total Program Costs	\$467,067	\$467,067	\$467,067	\$246,384	\$1,647,585
Total Incentives	\$0	\$0	\$0	\$0	\$0
Total Budget	\$467,067	\$467,067	\$467,067	\$246,384	\$1,647,585
Customer Costs	\$0	\$0	\$0	\$0	

7. Cost Benefit Analysis

Under Section 4.1.2 of the Code, a distributor is allowed to forego the Cost-Effectiveness Test when submitting a CDM program designed for educational purposes for Board approval where Cost-Effectiveness cannot be demonstrated.

8. Non-Duplication of OPA-Contracted Provincial Programs

The OPA-Contracted programs do not provide an initiative similar to the Business Outreach and Education program.

9. Data Collecting, Tracking and Reporting

Documentation archives will be maintained and will be used for governance, reference and audit purposes.

THESL employs a comprehensive financial and work order system to keep track of CDM related expenditures. After validation and verification of participant and third party invoices, payments will be made and recorded in the system. Each invoice will be substantiated by supporting documents.

Internal operational reports will be prepared and reviewed monthly subject to THESL's corporate governance rules and policies, including those established to govern OPA Programs. Annual reports consisting of financial and operational results will be submitted to the OEB.

All data collection efforts will be in conformance with OEB CDM Code as well as any other instruction received.

Appendix A - Program Evaluation Plan based on Draft OPA Template

Program Description	As described in Section 3 of this application document.
Evaluation Goals and Objectives	<p>The Evaluation objectives are:</p> <ol style="list-style-type: none"> Process Design Effectiveness Program Administration Effectiveness Estimate Program Cost Effectiveness Ensure Level of Customer Satisfaction <p>The Evaluation goals are:</p> <ol style="list-style-type: none"> Participation rates Perceived value of time invested Perceived effectiveness of the training delivery and program administration organization Effectiveness of the program delivery in terms of marketing/sales activities in signing up future participants Perceived importance of information received
Evaluation Deliverables	<ul style="list-style-type: none"> • Draft Evaluation Plan • Final Program Evaluation Plan • Annual Report - Elements • Final Report
Evaluation Description	<p>The evaluation elements of the Evaluation Goals and Objectives are anticipated to include (but are not limited to) those listed in the corresponding sections below.</p> <p>It is expected that these elements will be reviewed, discussed, evaluated or analyzed as appropriate to ensure that they meet the Program Evaluation Goals and Objectives during the Draft Evaluation Plan development phase.</p> <p>Review of these elements will assist THESL in determining and/or validating the appropriateness of the program design, administration and assumptions, and whether adjustments are necessary in order to successfully deliver the initiative and to achieve the anticipated goals and objectives and estimated participation and results.</p>
Evaluation Elements	<p>The cross elements against which the goals will be assessed, as applicable, are:</p> <ol style="list-style-type: none"> Program Process Design Effectiveness - Evaluation criteria: <ul style="list-style-type: none"> • Alignment with goals and objectives of program • Staffing and training • Tools and processes • Participant and non-participant satisfaction reporting • Reporting procedures

	<p>ii) Program Administration Effectiveness - Evaluation Criteria:</p> <ul style="list-style-type: none"> • Program statistics • Program Impact Evaluation • Marketing Effectiveness Assessment • Actual versus Budget Reporting • Market Participant review <p>iii) Program Cost Management:</p> <ul style="list-style-type: none"> • Verification of program expenditures versus budget • Verification of incurred payments
Data Collection Responsibilities to Support Program Evaluation	This will be completed with the assistance of an independent third party to ensure complete and appropriate collection of data to support program evaluation.
Evaluation Schedule & Budget	Report anticipated end of first quarter of the following year. Estimated Program evaluation budget is \$15,000 per year (years 2011 – 2013 results) and \$20,000 for final report (2014 results).

Appendix B – CDM Code Requirements

This section documents that this program application is compliant under Section 4.3.2 of the “Conservation and Demand Management Code for Electricity Distributors”, requiring that a distributor’s application for a proposed Board-Approved CDM Program must include the following:

CDM Code Reference	CDM Code Requirement	Section Addressing Requirement
4.3.2 (a)	identify the customer type(s) that will be targeted;	2.1
4.3.2 (b)	specify the number of participants that will be targeted;	2.1, 2.3
4.3.2 (c)	explain why the educational CDM program is needed (i.e., why there is a need to educate the specified customer type(s) on the specified energy issues);	1.1
4.3.2 (d)	articulate the educational approaches that will be utilized by the distributor (i.e., brochures, seminars, etc.);	1.1, 1.3, 4
4.3.2 (e)	provide estimates of costs of the educational CDM program; and	7
4.3.2 (f)	describe the anticipated benefits of the educational CDM program	1.2, 1.4

Toronto Hydro-Electric System Limited

**Conservation and Demand Management
Program Application:**

Commercial Energy Management and Load Control (“CEMLC”)

**Submitted to:
Ontario Energy Board**

Submitted on January 10, 2011

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Executive Summary

Toronto Hydro-Electric System Limited (THESL) has identified an opportunity within the small and medium size commercial market sectors to implement a conservation and demand response program that will contribute significantly towards THESL's mandated conservation targets. The small to medium sized commercial building sector cooling load contributes approximately 7% (309MW) of THESL's summer peak demand and this load will not be addressed under the existing Province Wide OPA programs. To address the electricity use and demand in these sectors, THESL is proposing the Commercial Energy Management and Load Control (CEMLC) program.

The CEMLC program has two elements: energy management and load control. The energy management aspect of the program is accomplished by providing the participants an Energy Management System (EMS) that will enable the end user to manage energy use in their facility. The load control portion of the program is modelled after the *peaksaver*® program that reduces the load cycle of air conditioning units when dispatched during hot summer days, when the demand for electricity is at its highest. In the case of smaller commercial buildings, cooling loads associated with roof-mounted air conditioning systems and non-essential equipment can be similarly controlled, to support a demand response program. In addition to contributing energy savings and developing demand response capacity, the CEMLC program will promote energy conservation within this market segment and transform how this class of facilities is operated.

THESL is seeking approval from the Ontario Energy Board (OEB) to expend \$11.7 million to achieve 13.8 GWh of net cumulative energy savings, and develop 6.7 MW of demand response capacity. The anticipated Total Resource Cost (TRC) benefit-to-cost ratio for this program is 1.7. The anticipated Program Administrator Cost (PAC) benefit-to-cost ratio for this program is 6.4.

This submission is in conformance with the requirements of Section 3.1.4 of the CDM Code. The specific requirements for an OEB Board Approved Program are found throughout this document and have been summarized in the Appendices for convenience.

The program will operate from the date of OEB approval and end on December 31, 2014. Refer to the table below for a program summary.

	2011	2012	2013	2014	Total
Cumulative Energy Savings (MWh)	867	3,466	8,087	13,864	13,864
Demand Response Capacity (MW)	1.0	2.0	2.3	1.3	6.7
Budget (000's)	\$1,851	\$3,242	\$3,903	\$2,690	\$11,686

Note: Savings are net. Budget includes program costs and incentives.

1. Program Description

1.1. Program Rationale

The CEMLC program is designed to reduce the energy use and peak summer demand in the office, retail, institutional and hospitality sectors in facilities with an average monthly demand less than 200kW.

This market sector is an important target group for CDM programs for the following reasons:

- There has been only limited application of energy savings measures beyond lighting upgrades, and this class of facility has typically not adopted building automation technology.
- The identified market for this program represents 21,350 customers that have a cooling load that is estimated to represent 7% (309MW) of the THESL's summer peak demand.
- Current demand response capacity is negligible in both the category of customers with average demands between 50-200kW and small commercial facilities that are under 50kW (less than 2% participation in *peaksaver*®).

1.2. Program Objectives

The objectives of the CEMLC program are to:

- Provide the small and mid-sized commercial and institutional sectors an EMS that will allow participants to manage their energy use while allowing THESL to control electricity loads during periods of high system demand
- Contribute 6.3 GWh in cumulative net electricity savings and 6.7 MW in demand response capacity by the end of the program on December 31, 2014.

1.3. Program Details

The CEMLC program will provide eligible participant with an Energy Management System (EMS) that will control the roof-top units cooling loads and potentially other discretionary electrical loads in the participating facility.

The EMS system will be installed on a turn-key basis by a vendor that will be selected via an RFP process, on behalf of THESL and possibly in conjunction with other utilities deploying the same program. The vendor will also maintain the customer interface, provide maintenance services and training.

A key success factor for this program is the selection and implementation of a viable system capable of both demand response for the provincial electricity grid and energy management for the participants, in terms of functionality, system reliability and robustness. System functional requirements and technical

specifications will be prepared, and RFP responses will undergo a rigorous evaluation process to ensure such a system is selected and implemented for program deployment.

1.3.1. EMS Description

The EMS consists of integrated Programmable Communicating Thermostats (PCTs) and load control switches in the facility that will communicate to a central web-based service operated by THESL's or a chosen subcontractor. The web-based service will provide a portal for the participant to schedule and control their energy use while at the same time providing access by the customer to their electricity use via a tie-in to the electricity meter (where possible). The central web service will then be used to initiate demand response events as required under the rules defined in Section 5.4.

A more detailed description of the capabilities of the EMS is in the Appendices.

1.3.2. EMS Capabilities

The EMS will provide scheduling, unoccupied modes (setup/setback), optimum start and centralized web access for viewing and load control. The participant will be provided training by the installing contractor on the use of the EMS system. The training will be designed to ensure that customers will be able to utilize the key features of the system and will be given strategies to save energy, monitor energy use, remote access features and basic troubleshooting.

If applicable, included with the provision of the EMS will be an allowance for third party monthly access fees until the program end date to ensure sustained use of the systems.

1.3.3. EMS Load Control Operation

Demand response is achieved by raising space temperature set points and turning off discretionary loads during load control events (LCE). This differs from THESL's **peaksaver**® program which uses a remotely controlled relay to interrupt the thermostat circuit part of the time to reduce load cycle. The CEMLC approach allows the system to remain in control and prevent extreme environmental conditions that has been a barrier to the adoption of **peaksaver**® in commercial applications. The impact of the two different control strategies on the demand reduction achieved is discussed in Section 2.2.

1.3.4. Program Scope

The program scope for THESL will include:

RFP Stage

- THESL will issue an RFP (in conjunction with those utilities that wish to participate in the CEMLC program) for the turn-key provision of EMS supply and installation services. The services will also include a web interface, training and maintenance services.
- RFP responses will undergo rigorous evaluation to ensure technology, installation and support services meet the strict performance criteria detailed in RFP.
- Contract awarded to successful vendor / service provider(s).

Application Stage

- Sales and marketing – THESL and vendor to communicate/promote program to target customer group.
- THESL and vendor to accept customer applications and review to ensure that the site is eligible to participate.

Implementation Stage

- THESL will manage third party program vendor/service providers.
- Service providers will offer fieldwork, installations, EMS education, service calls and technical support.
- THESL will provide vendor with customer enrolment data.

Post-Implementation Stage

- THESL will engage a third-party consultant to carry out the program EM&V to assess the savings and program effectiveness (see section 6.0)
- THESL will process incentives for the participants

1.4. Value Proposition

The value proposition for the participant is as follows:

- An EMS will be provided at no cost, which will enable participants to monitor and control their energy consumption.
- Incentives will be provided based on registration and subsequent participation in demand reduction events.
- The participant will have on-line access to technical support, which will promote customer utilization of the system.
- Participation will increase corporate profile through labelling and signage to indicate participation in the program.
- Participants will receive training from the EMS installers for programming the EMS system to save energy.

1.5. Conformance with OPA Program Measures

The CEMLC conservation measures are not specifically listed in the OPA Measures List, but they are used extensively across North America. With respect to the demand response load reduction element of the program, PCTs will control the air-conditioning load and will be used for space temperature set-up; discretionary loads will also be turned off for short periods of time. This type of demand response load control has been used successfully for many years in North America.

With respect to the EMS element of the program, various loads, including the air-conditioner, will be programmed or scheduled to optimize energy savings consistent with the participant's operation. Energy Management or Building Automation Systems are tools more commonly used by larger customers. The CEMLC program will merely make a similar tool available to the targeted customers.

1.6. Conformance with CDM Code Requirements

This submission is compliant under Section 3.1.4 of the "Conservation and Demand Management Code for Electricity Distributors", which specifies the requirements for a distributor's application for a proposed Board-Approved CDM Program and is documented under Appendix A.

2. Target Market

2.1. Sector Analysis

This program is targeted at small and medium size General Service rate class customers with an average monthly peak demand below 200 kW. The potential market for this program is approximately 21,350 THESL customers. The following table provides a breakdown of the customers by end-use occupancy and includes the total electricity demand and consumption (this information is based on THESL market segmentation analyses).

Sector	Sites	Electricity Demand (MW)	Electricity Consumption (GWh)
Offices	1,305	112.7	536.2
Retail	1,390	115.2	548.8
Hospitality	729	54.7	267.4
Institutional	1,124	90.3	350.0
Other	1,410	98.8	442.0
kWh Metered <50kW**	15,392	492.7	1,775.4
Total	21,350	964.4	3,920
THESL Total		4,592	24,050
		21%	16%

Note: the under-50kW class of customers has been sorted to remove those accounts that serve very small loads that would not be included in the program.

2.2. Market Penetration

The proposed program combines similar elements of the Power Savings Blitz (PSB) and **peaksaver**® programs that can be used to gauge the potential penetration rates.

The PSB used a direct install approach that will be used with the CEMLC program. The PSB achieved an install rate of almost 75%, indicating that the “direct install at no cost” approach can yield high market penetrations.

In THESL’S service area, the **peaksaver**® program was very successful with over 60,000 residential customers registered out of an eligible customer base of approximately 200,000. This equates to a penetration rate of almost 30% in the residential single family segment. However, among the eligible small commercial customers the response has been poor, with less than 2% of the potential market participating. The poor participation has been attributed to the low-value one-time incentive and perceived loss of comfort and productivity in the workplace.

Based on consideration of the programs with similar elements, and the enhancement of providing higher incentive levels and an EMS system in the program design, an overall penetration rate of 5% is conservatively estimated. The sector penetration rates are higher for the office and retail sector as these customers are easier to access and present the opportunities for wider roll-outs (chains, common property management firms).

Sector	Total	Penetration	Participating Sites
Offices	1,305	20%	261
Retail	1,390	20%	278
Hospitality	729	5%	36
Inst.	1,124	5%	56
Other	1,410	5%	71
kWh Metered <50kw	15,392	3%	462
Total	21,350	5%	1,164

The electricity demand response capacity was determined by assuming that the whole Rooftop Unit (RTU) cooling load would be activated during demand response events. This is then de-rated to account for the actual expected performance. The de-rating factor used is 21%¹ of the total cooling capacity based on an evaluation of the impact of the **peaksaver**® program in THESL’s service territory. To be conservative, this is lower than a pilot conducted in California, on this class of customer, where the

¹ Goodcents, **peaksaver**® Analysis of Load Data and Load Reduction Impact: 2008 Residential and Commercial Update: A Report To Toronto Hydro, 2009

findings showed a demand reduction of 14%² of the total peak demand or approximately 30% of the peak cooling load. Tests in California have shown that the impact of load switching (i.e. on/off) control versus temperature setup is similar over a four hour demand event³.

3. Projected MW and MWh Savings

3.1. Methodology

3.1.1. Technical Savings Potential

An analysis of the eligible participants in the program, and their estimated cooling electricity demand, identifies a potential for load control of 309 MW or 7% of the total electrical summer peak used by THESL customers is shown below. This value represents the total roof top load in the identified market and would only be achievable if all the roof top units were controlled and there is no diversity or over-sizing of units.

The estimated electricity consumption in this sector attributable to cooling equipment is 657 GWh or 3% of the total electricity consumption used by THESL customers.

Sector	Sites	RTU Demand (MW)	RTU Consumption (GWH)
Offices	1,305	46	67.0
Retail	1,390	52	137.3
Hospitality	729	18	56.1
Institutional	1,124	19	74.6
Other	1,410	29	64.2
kWh Metered <50kw	15,392	145	258.1
Total	21,350	309	657.3
THESL Total		4,592	24,050
		7%	3%

² Mark S. Martinez, Getting More Demand Response From the Small Business Customer, PLMA Fall Conference November 7-8, 2006 New York, NY

³ Lockheed Martin Aspen, Demand Response Enabling Technologies For Small-Medium Businesses, April 12, 2006

3.2. Achievable Electricity Demand and Consumption Savings Potential

The following table details the electricity demand and consumption savings associated with each category of facility within the target market based upon the expected market penetration and the expected demand and consumption savings. Electrical consumption savings were determined by using an 11% reduction in cooling use and a 13% reduction in heating energy use based on improved scheduling and control of set-points in a manner based on with Independent Electric System Operator (IESO) **peaksaver**® activation protocols. These values were determined using the U.S. Department of Energy (DOE) setback calculator⁴ (using Buffalo weather data).

Sector	Sites	Demand Savings (MW)	Electricity Consumption Savings (GWh)	Natural Gas Consumption Savings (000 m ³)
Offices	261	2.3	1,327	218
Retail	278	2.5	2,718	233
Hospitality	36	0.2	278	17
Institutional	56	0.2	369	20
Other	71	0.4	318	34
kWh Metered <50kw	462	1.2	766	110
Total	1,164	6.7	5,777	633

3.3. Savings Summary

The projected net electricity demand and consumption savings expected over the four year duration of the program are summarized in the following table:

	2011	2012	2013	2014	Total
# Participants	175	349	407	233	1,164
Projected MW DR Capacity	1.0	2.0	2.3	1.3	6.7
Projected MWH Savings	867	1,733	2,022	1,155	5,777
Cumulative MWH Savings	867	3,466	8,087	13,864	13,864
Natural Gas Savings (m ³)	175	349	407	233	1,164
Ave kW reduction/site	6.4				
Ave kWh reduction/site	5,515				

⁴ Life Cycle Cost Estimate for 1 Programmable Thermostat(s)

4. Marketing and Sales Plan

4.1. Marketing Strategy

This program will be delivered through a third-party vendor, selected through a competitive bidding process, using THESL's current procurement policies and procedures. The implementation vendor will be responsible for marketing (jointly with THESL), installing and maintaining all equipment, as well as tracking and reporting results. THESL staff will coordinate the program deployment and provide assistance to the vendor, as needed, while ensuring that the program delivery milestones, targets and timelines are met.

THESL will issue an RFP to select a viable EMS with the required energy management functions for the participating customers to use. The selected EMS system will meet the functional and technical requirements of both THESL and the program participants. Rigorous system acceptance testing will be performed on the selected system based on well-defined test conditions to ensure the suitability of the system for program deployment.

4.2. Marketing Objectives

Introduce Toronto Hydro's CEMLC program to approximately 21,350 prospective customers by middle of 2011 with a take up rate of 1,100 customers by the end of 2014. Goals of the program include:

- Build awareness and understanding for CEMLC program and drive participation in the program
- Integrate CEMLC into the CDM suite of services and marketing plans for co-promotion
- Create unique targeted opportunities to promote CEMLC
- Utilize a variety channels to promote the program

Target Sectors (<200kW)

- Offices
- Retail
- Hospitality
- Institutional

Target Market

The CEMLC program will target business owners, property managers, building operators, associations and stakeholder groups.

Key Program Drivers

- Provide double incentives (installations and per event) to encourage participation
- THESL's CEMLC will aid TOU customers in power shifting to better manage their electricity bills
- Promote the notion that what gets measured, gets managed
- Installation is free and comes with EMS training

Key Messaging

- EMS provides energy usage information and load control which allows more efficient use of energy
- Measurement and benchmarking allow for tighter budget controls
- Utilizing EMS helps improve buildings' overall energy efficiency
- Educate customers about energy conservation and TOU rates as well as the benefits of shifting usage to better manage their electricity bills
- Provide two incentives; installation of the EMS system and incentives for DR events
- THESL and its partners are honest brokers who provide a full suite of energy programs
- Help to keep Toronto Green and promotes a culture of energy conservation

Tactics

- Develop new webpage to provide a one-stop hub of information on THESL site
- Provide links to and from partner web site
- Create simple online enrolment/applications process
- Develop sell sheet, FAQ, scripts to be used by partner
- Create customer testimonials and case studies for print and web
- Direct mail to end use customers
- Utilize internal and third party communication channels (newsletters and websites) to communicate program
- Sell through/to associations and relevant stakeholders
- Targeted media releases, advertisements and editorial in trade journals (print and online)
- Work directly with third party vender (partner) to promote program and drive participation
- Leverage relationships with professional and industry based organizations to promote program to their membership
- Utilize third party endorsements to demonstrate product features and benefits
- Develop integrated sales plan with single customer touch points ensuring all customer specific applicable CDM programs are offered

4.3. Collaboration with other LDC's

If other utilities elect to participate in the program, THESL will work closely with these utilities to deploy the program, ensuring the programs are consistent and optimized for efficiency and cost effectiveness.

5. Program Rules

5.1. Eligibility

To be eligible for this program a participant must meet the following criteria:

- Be located in THESL service territory and must be active account holder with an average monthly peak electricity demand less than 200kW.
- Agree to provide access to electricity billing information for the duration of the program.
- Have a functional roof-mounted cooling system(s) with at least 5 tons of cooling capacity per unit.
- Be contractually committed to remain in the program until no earlier than December 31st, 2014. This condition is intended to support the persistence of demand response savings. Customers with an existing EMS may be enrolled in the program subject to technical review by THESL.

5.2. Enrolment Process

The participant will enroll via THESL's web site, direct mail or at CDM promotional/educational events. Specific customer groups will also be contacted by sales personnel to develop chain opportunities.

After the initial contact, an enrollment package will be made available to each potential participant electronically or via mail. The enrollment package will include an explanation of the program, the rules and an agreement that will require signature by the prospective participant that meets the eligibility criteria.

Upon receipt of a signed customer agreement, the third party vendor will visit each site to confirm installation requirements.

5.3. Incentives

Participants will receive the following incentives:

- On enrolment the participant will receive a one time payment of \$50.
- For each LCE \$20 per activation up to a maximum of 5 activations per year.
- For each subsequent year the customer remains enrolled, an additional incentive of \$10 per cooling ton and \$10 per kW of controlled load will be provided

An example of the incentive structure is shown below:

RTU Unit Size	Incentive Type	2011	2012	2013	2014	Total
2 x 10 tons	Enrolment	\$50				\$50
	Activation (assume 5 LCE)	\$100	\$100	\$100	\$100	\$400
	Persistence (20 tons)		\$200	\$200	\$200	\$600
	Total	\$150	\$300	\$300	\$300	\$1,050
1x 10 tons 10 kW Load	Enrolment		\$50			\$50
	Activation (assume 5 LCE)		\$100	\$100	\$100	\$300
	Persistence (10 tons + 10 kW)			\$200	\$200	\$400
	Total	\$0	\$150	\$300	\$300	\$750
1 x 5 tons	Enrolment	\$50				\$50
	Activation (assume 5 LCE)	\$100	\$100	\$100	\$100	\$400
	Persistence (5 tons)		\$50	\$50	\$50	\$150
	Total	\$150	\$150	\$150	\$150	\$600

5.4. Activation Rules & Requirements

5.4.1. Activation Rules

The activation protocol will be based primarily on the needs of the IESO. Based on the *peaksaver*® activation protocol,

- Activations will occur between May 1 and September 30 for up to 40 hours.
- Each activation (Load Control Event) has a 4 hour maximum duration.
- Activations will not occur on weekends or holidays.
- Each season there will be a test activation to confirm operation.

Activations are triggered by one of two conditions - a primary trigger or a secondary trigger. The primary trigger is when the criteria for an Energy Emergency Alert (EEA) are met (refer to IESO Systems Operation Manual for additional information). Secondary triggering occurs when the outside air temperature is above 30°C and the primary demand exceeds 23,000MW.

Secondary triggers are also subjected to the following rules and limitations:

- Only three triggers are allowed per season.
- The system will be activated in each month (June, July and August) if no activations have occurred.

5.4.2. System Requirements

The load control interface will have the following capabilities:

- Allow for rule based activation of the load control of participants.
- Provide a customer portal interface that allows scheduling, set point control and electricity usage data.
- Compile electricity data from demand events for EM&V purposes.
- Automatically store and provide reports indicating customer participation.

The Programmable Communicating Thermostat (PCT) will meet the following requirements:

- Capable of independent control.
- Wireless two-way communication with facility gateway.
- Provide verification signals of participation in an activation.
- Logging capability of overrides and other relevant data.
- Capable of remote programming of schedules, set points and activation protocols.
- Provide auxiliary load control capability.

6. Program Evaluation

6.1. Operational Program Evaluation Plan

The key component of the program is determining the effectiveness of the LCE's on system demand in a timely fashion. This will be determined by using the interval data from a statistically valid cross-section of customers. The centralized web software will upload this data and provide the comparison between the normalized baseline consumption versus the actual consumption throughout the LCE. This will provide a more up to date picture of the actual impact of the program rather than waiting several months for the formal evaluation of results. This feedback will be used to determine if the program has to be modified to meet the savings targets.

To ensure that the analysis being completed is in line with the overall program EM&V, the third party evaluator will be involved in reviewing and approving the protocols used for monitoring demand reductions.

6.2. Program Evaluation Plan

Program evaluation will be carried out by a certified third-party M&V Professional based on the OPA EM&V Protocol. It will focus on the following areas to assess the cost-effective delivery of the program:

- The demand response MW capacities established based on a statistically significant sample of the participants for the various maximum day temperatures and hours of the day
- The gross MWH energy savings from the energy management measure component of the program
- The net peak demand reduction capacities and energy savings in consideration of the realization rate to be determined; free-ridership should not be material for the demand response component, but needs to be determined for the energy management measure
- The actual TRC and PAC results based on the achieved savings
- The effectiveness of the program delivery in terms of marketing/sales activities in signing up participants
- Program administration and governance effectiveness

The draft OPA EM&V template is used to outline the evaluation plan as shown in Appendix A, but the eventual evaluation plan will be prepared by the M&V Professional evaluator based on the OPA EM&V protocols.

While the OPA EM&V protocol will provide the overall program evaluation framework, the combination of demand response and energy conservation of this program will require special attention to the two

very different aspects of CDM. While the demand response, or load control, component of the program is a well understood measure, it will require extensive effort in the selection of a representative sample to properly assess the program load reduction capacity achieved. Assessment of load reduction will require the third-party M&V consultant's close coordination with the THESL demand response operation. Rigorous statistical analysis will be required to process the interval data collected to isolate the load reduction resulting from the demand response activations.

The assessment of energy saved from the participants' energy management activities will require a different approach and methodology. Given the dependence of energy management on operational as well as behavioural changes on the part of the participants, the M&V assessment will not only have to isolate and determine the program energy savings achieved, it will also have to evaluate the persistence of the conservation measure.

7. Program Budget

The 2011-2014 budgeting plan for the program is summarized in the following table:

Description	2011	2012	2013	2014	Total
Marginal Costs					
Fixed Costs					
Legal Cost	\$52,500	\$15,750	\$15,750	\$15,750	\$99,750
Marketing	\$144,375	\$108,281	\$108,281	\$36,094	\$397,031
Sales	\$26,840	\$13,688	\$13,962	\$13,420	\$67,910
Program EMV*	\$0	\$60,000	\$60,000	\$120,000	\$240,000
Administrative	\$2,777	\$5,664	\$6,740	\$3,929	\$19,109
Operation Cost	\$40,684	\$35,027	\$35,946	\$19,880	\$131,536
Total Fixed Costs	\$267,175	\$238,410	\$240,680	\$209,072	\$955,337
Variable Costs					
Administrative Costs	\$11,106	\$22,656	\$33,701	\$19,643	\$87,107
Operation Cost	\$225,735	\$203,107	\$206,784	\$142,519	\$778,145
Vendor Cost	\$1,260,043	\$2,589,223	\$3,147,510	\$2,048,784	\$9,045,560
Total Variable Costs	\$1,496,884	\$2,814,986	\$3,387,995	\$2,210,947	\$9,910,811
Total Marginal Cost	\$1,764,059	\$3,053,396	\$3,628,674	\$2,420,019	\$10,866,149
Total Allocable Cost	\$49,394	\$85,495	\$101,603	\$67,761	\$304,252
Total Program Costs	\$1,813,453	\$3,138,891	\$3,730,277	\$2,487,780	\$11,170,401
Total Incentives	\$37,303	\$103,180	\$172,762	\$202,131	\$515,376
Total Budget	\$1,850,756	\$3,242,071	\$3,903,039	\$2,689,911	\$11,685,777

*Note: Program EMV costs will be delayed one year. i.e. 2011 Program EMV costs will be expended in 2012, 2012's costs will be expended in 2013, etc.

8. Cost Benefit Analysis

The table below summarizes the results for cost effectiveness tests using the most current OPA model named "Conservation_Program_Resource_Planning_Tool_V3.3". The tests include both Total Resource Cost (TRC) and Program Administrator Cost (PAC)⁵.

Name of Test	Benefits	Costs	Net Benefits	Ratio
TRC	\$ 15,026,152	\$ 8,839,316	\$ 6,186,836	1.7
PAC	\$ 13,152,630	\$ 3,196,973	\$ 9,955,657	4.1

/C

The above tests results are based on the following input assumptions:

- Free ridership : 10%
- Unit incremental equipment costs : \$7,989
- Operating life : 13 years
- Number of participants : 1164
- Unit peak demand savings : 6.4 kW
- Unit annual energy savings : 5,515 kWh
- Program costs : \$11,170,401
- Financial incentive : \$515,376

9. Non-Duplication of OPA-Contracted Provincial Programs

The proposed program will not be duplicating any OPA-Contracted programs for the following reasons:

- The initiative is designed to meet the needs of small commercial customers up to 200kW average monthly peak demand. This program is therefore different from the OPA-contracted Residential and Small Commercial DR initiative which is primarily intended to meet the needs of residential customers. Although the OPA initiative has been offered to small commercial customers (under 50kW load), over the last three years the participation rate has remained very limited (less than 2%).
- The proposed initiative is distinct from the OPA residential Demand Response as it provides customers with an EMS system that can assist them in optimizing energy use. Unlike the OPA Residential Demand Response, the proposed initiative covers the monthly fee required to allow the customers to have access to the full use of the EMS system that is installed in their premises. As a result, the system is used for both demand response and the customers' energy efficiency purposes.

⁵ TRC and PAC calculations are based on annualized savings.

One of the distinct features of this program is the offering of technical assistance to the participants on an on-going basis. At the point of installation customers will receive training from the EMS installers for programming the EMS system to save energy. The program will also provide online technical support to customers throughout the year.

10. Data Collecting, Tracking and Reporting

Savings will be calculated initially based on estimates consistent with acceptable engineering practices and reasonable energy monitoring and tracking practices. These saving estimates will be verified through the program EM&V process described in section 6.2 based on the OPA EM&V Protocol. THESL will require supporting data from program participants to substantiate the claimed savings. Documentation archives will be maintained and will be used for governance, reference and audit purposes.

THESL employs a comprehensive financial and work order system to keep track of CDM related expenditures. After validation and verification of participant and third party invoices, payments will be made and recorded in the system. Each invoice will be substantiated by supporting documents.

Internal operational reports will be prepared and reviewed monthly subject to THESL's corporate governance rules and policies, including those established to govern OPA Programs. Annual reports consisting of financial and operational results, energy and demand savings (based on project M&V and program EM&V results from independent third party reports) will be submitted to the OEB.

THESL is committed to delivering CDM programs that has a ratio of benefits to costs greater than one. TRC and PAC calculations will be performed annually and on completion of the program which will be included in the OEB reports.

All data collection efforts will be in conformance with OEB CDM Code as well as any other instruction received.

Appendix A – CDM Code Requirement Cross Reference

This section documents that this program application is compliant under Section 3.1.4 of the “Conservation and Demand Management Code for Electricity Distributors”, requiring that a distributor's application for a proposed Board-Approved CDM Program must include the following:

CDM Code Reference	CDM Code Requirement	Section Addressing Requirement
3.1.4 (a)	a program evaluation plan, based on the OPA's EM&V Protocols, for each program;	6.2
3.1.4 (b)	a benefit-cost analysis of each program which shall be completed by using the OPA's Cost Effectiveness Tests;	8
3.1.4 (c)	a detailed explanation of the program's objective(s) and method of delivery;	1.2, 1.3
3.1.4 (d)	the types of customers targeted by the program;	2.1
3.1.4 (e)	a forecasted number of participants that the distributor expects will participate in the program;	2.2
3.1.4 (e)	the total projected peak demand savings (kW) and electricity savings (kWh) per year, or if the program is for less than one year, the total projected peak demand savings (kW) and electricity savings (kWh) for the duration of the program;	3
3.1.4 (f)	a complete projected annual budget for each of the distributor's CDM Programs, including the following information:	7
3.1.4 (f) (i)	projected expenditures incurred on an annual basis, for each year of the CDM Programs, separated into customer incentive costs and program costs;	7
3.1.4 (f) (ii)	a division of program costs into Marginal Costs and Allocable Costs incurred as a result of program implementation;	7
3.1.4 (f) (iii)	information on the allocation of total expenditures incurred by targeted customer types for each direct projected expenditure; and	7
3.1.4 (f) (iv)	total projected expenditures for each program evaluation conducted; and	7
3.1.4 (g)	a statement that confirms that the distributor has used the OPA's Measures and Assumptions Lists or if the distributor has varied from the OPA's Measures and Assumptions Lists, the distributor must:	1.5
3.1.4 (g) (i)	appropriately justify the reason for varying from the OPA's Measures and Assumptions Lists in the application;	Not Applicable
3.1.4 (g) (ii)	provide the technical assumptions and substantiating data that the distributor used; and	Not Applicable
3.1.4 (g) (iii)	Provide a statement that the distributor has followed the OPA's EM&V Protocols for custom measures not included in the OPA's Measures and Assumptions Lists.	6.2

Appendix B – Program Evaluation Plan

Program Description	As described in this application document
Conservation Measures	Section 1.5
Evaluation Goals and Objectives	<p>Evaluation Goals and Objectives</p> <ul style="list-style-type: none"> • Process Design Effectiveness • Program Administration Effectiveness • Measures and Assumptions Review • Establish gross and net energy savings and demand reductions achieved • Estimate Program Cost Effectiveness • Ensure Level of Customer Satisfaction
Evaluation Deliverables	<p>Evaluation Deliverables</p> <p>Draft Evaluation Plan</p> <p>Final Program Evaluation Plan</p> <p>Annual Report – Elements</p> <p>Final Report</p>
Evaluation Description	<p>The evaluation elements of the Evaluation Goals and Objectives are anticipated to include (but are not limited to) those listed in the corresponding sections below. It is expected that these elements will be reviewed, discussed, evaluated or analyzed as appropriate and according to the OPA's EM&V Protocols to ensure that they meet the Program Evaluation Goals and Objectives during the Draft Evaluation Plan development phase. Review of these elements will assist THESL in determining and/or validating the appropriateness of the program design, administration and measures assumption elements and whether adjustments are necessary in order to successfully deliver the Initiative and to achieve the anticipated goals and objectives and estimated participation and results.</p> <p>Within the above overall EM&V process, the combination of demand response and energy conservation of this program will require special attention to the two very different aspects of CDM. While the demand response, or load control, component of the program is a well understood measure, it will require extensive effort in the selection of a representative sample to properly assess the program load reduction capacity achieved. Assessment of load reduction will require the third-party M&V consultant's close coordination with the THESL demand response operation. Rigorous statistical analysis will be required to process the interval data collected to isolate the load reduction resulting from the demand response activations.</p> <p>The assessment of energy saved from the participants' energy management activities will</p>

	require a different approach and methodology. Given the dependence of energy management on operational as well as behavioural changes on the part of the participants, the M&V assessment will not only have to isolate and determine the program energy savings achieved, it will also have to evaluate the persistence of the conservation measure.
Evaluation Elements	<p>i) Program Process Design Effectiveness - Evaluation criteria:</p> <ul style="list-style-type: none"> • Goals of program • Staffing and training • Program timing and timelines • Incentives and motivation for participation • Participant satisfaction feedback • Non participant feedback back – participant satisfaction • Monitoring and tracking procedures • Reporting procedures <p>ii) Program Administration Effectiveness - Evaluation Criteria:</p> <ul style="list-style-type: none"> • Program statistics – including participants, calculations of energy and demand reductions etc. • Program Impact Evaluation • Pre and post Project Analysis Assessment • Marketing Effectiveness Assessment • Actual versus Budget Reporting • Market Participant review <p>iii) Measures and Performance Assumptions Review:</p> <ul style="list-style-type: none"> • Custom Measures Assumptions Review • Behavioural and Performance Assumptions Review <p>iv) Gross and Net Energy Savings and Demand Reductions Achieved: (To be performed by a 3rd party based on the OPA's EM&V protocols)</p> <ul style="list-style-type: none"> • Measurement and verification of program weather or production normalized energy and demand savings achieved • Net to Gross ratio (including free rider rate) • Audit and Verification of project completion <p>v) Program Cost Effectiveness:</p> <ul style="list-style-type: none"> • Verification of program expenditures versus budget • Verification of incurred payments
Special Provisions	N/A
Data Collection Responsibilities to Support Program Evaluation	This will be completed with the assistance of a third party EM&V expert to ensure complete and appropriate collection of data to support Program evaluation.

Evaluation Schedule & Budget	Schedule will be established by the Third-Party certified M&V consultant in conjunction with THESL. Budget estimate is indicated in section 8 of this document
Evaluation Team	Third-Party certified M&V consultant team with support from THESL CDM personnel

Appendix C – System Requirements

Field Hardware

- Programmable Communicating Thermostats (PCT)
- CSA/ULC approved
- CEC Title 24 Compliant
- Supports customer use at the PCT or via web interface
- Provides up to 7 daily schedules with a minimum of 4 set point regimes
- All settings can be remotely changed
- Two way communication to receive and send signals wirelessly
- Optimum start programming
-
- Load Control Switches (LCS)
- CSA/ULC approved
- Provide notification of activation
-
- Pulse Counter
- CSA/ULC approved
- One way communication
- Pulse accumulation

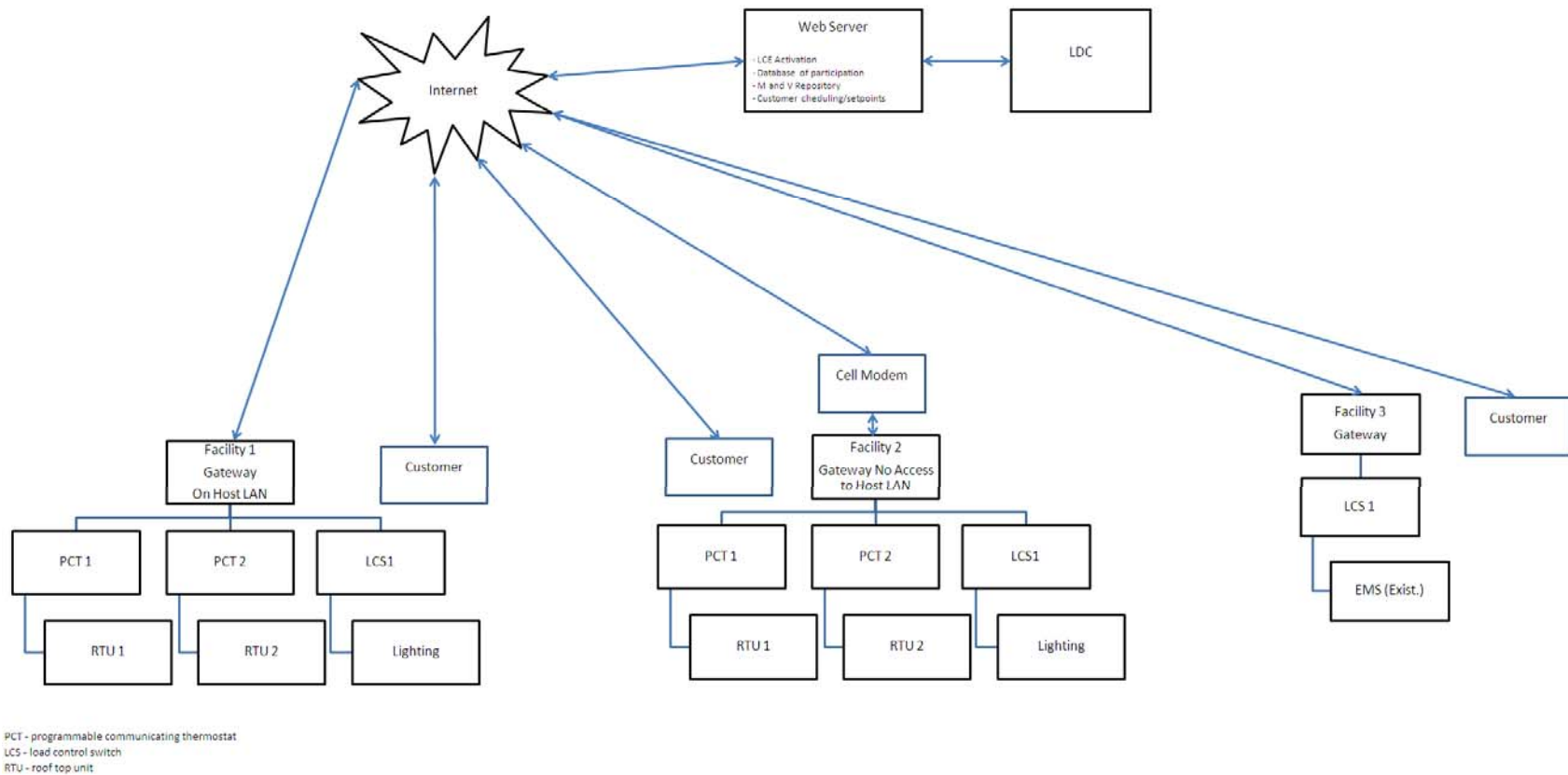
Central Web System

- Participant Features
- Password access to facility end use devices
- Ability to change set points and schedules
- Viewing capability of energy profiles where available
- LCE “opt out” features
-
- THESL Features
- Send LCE signals either via internet or via cellular communication
- Tracking and confirmation of participation by customer
- Energy demand analysis capability
- Customer tagging for different LCE responses
- Recording all customer system changes
- Optimum start global control
-
-

Typical Architecture

- Typical

Layouts



Toronto Hydro-Electric System Limited

**Conservation and Demand Management
Program Application:**

**Commercial, Institutional and Small Industrial
Monitoring & Targeting (“M&T”)**

**Submitted to:
Ontario Energy Board**

Submitted on January 10, 2011

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Executive Summary

Toronto Hydro-Electric System Limited (THESL) has identified a gap within the OPA's Province-Wide Conservation and Demand Management (CDM) programs and seeks to respond to this need by submitting the Commercial, Institutional and Small Industrial Monitoring and Targeting (M&T) Program application.

This submission is in conformance with the requirements of Section 3.1.4 of the CDM Code. The specific requirements for an OEB Board Approved Program are found throughout this document and have been summarized in Appendix C for convenience.

THESL is seeking approval from the Ontario Energy Board (OEB) to expend \$5.5 million to achieve 40.7 GWh of net cumulative energy savings, and 0.86 MW of net summer peak demand reduction. The anticipated Total Resource Cost (TRC) benefit to cost ratio for this program is 1.6. The anticipated Program Administrator Cost (PAC) benefit to cost ratio for this program is 1.5.

The program will operate between January 1, 2011 and December 31, 2014. Refer to the table below for program summary.

	2011	2012	2013	2014	Total
Cumulative Energy Savings (GWh)	0	5.8	15.3	19.6	40.7
Peak Demand Savings (MW)	0.00	0.26	0.42	0.19	0.86
Budget (000's)	\$967	\$1,887	\$1,615	\$1,032	\$5,501

Savings are net. Budget includes fixed and variable incentive budget.

M&T is an advanced operational practice employed by progressive building operators and managers to track energy consumption in real-time against targets, pursue operational improvements, and intervene proactively. This program will assist participants in achieving this elevated standard of operational excellence. Participants targeted in this M&T program will be offered financial incentives to install a sub-metering, tracking and reporting system that compares current energy use against a pre-defined performance baseline.

In essence, this program supports the concept that “what gets measured, gets managed.”

An additional performance incentive will be offered to encourage participants to sustain projected savings. Participants will be required to demonstrate that results of the operational process changes implemented are maintained on a go forward basis. In this manner, the expectation is that enhanced operational processes will be adopted by building operators and managers as the standard service level for the building.

Objectives of the program include:

- Provide a cost effective program targeting a market that has been overlooked by existing Conservation Programs.
- Mobilize a transformation of the building operations industry to manage energy consumption continuously.
- Support projects that provide building operation teams and management with training and new skills to improve the efficiency and operating effectiveness of their buildings.
- Support projects that provide monitoring and tracking tools, professional services, and process revisions to achieve sustainable operational and behavioural improvements.
- Improve the quality and effectiveness of a building's operating procedures.
- Transform operational behaviour within building operation teams and reinforce a culture of conservation.

1. Program Description

1.1. Program Rationale

Current commissioning processes focus on establishing a building's operational and equipment settings based on a moment in time. Inevitably, over the course of time, the building will drift away from these conditions and settings resulting in sub-optimal performance and inefficient use of energy resources.

An emerging trend in the practice of facility management and more specifically building commissioning is the important distinction between “points in time” versus “ongoing” or “continuous optimization”.¹ This is in recognition that even the performance of re-commissioned buildings will deteriorate over time. Continuous optimization, through the use of real-time metering, monitoring, targeting and reporting, offers advantages over conventional commissioning events by immediately spotting energy waste, and uncover deeper saving opportunities that are often missed with initial or periodic commissioning.²

In general, continuous optimization incorporates three components³:

- 1) Energy monitoring systems and diagnostic tools
- 2) Optimization efforts based on the information from these tools and savings that emphasizes measurement and continuous performance targeting, as opposed to estimation or assumptions
- 3) Ongoing commissioning to ensure efficient building operations

The Commercial, Institutional and Small Industrial Monitoring and Targeting (M&T) enables continuous optimization and supports the concept that “what gets measured, gets managed”.

Surprisingly, continuous optimization or ongoing M&T is an underutilized strategy in the marketplace for saving energy despite its attractive payback for many reasons, including⁴:

- Widespread lack of awareness of benefits
- Insufficient skills and experience within the building operating trades
- Lack of unified messaging
- A misperception that commissioning type work is not cost effective in smaller buildings
- Absence of ongoing requirements in many building codes
- Omission of operating procedures in most energy efficiency studies/audits

While researchers have demonstrated success in bringing in experts to “fix” building systems, few off-the-shelf tools are available for the on-site engineer or building manager to conduct such

¹ Also referred to interchangeably as “Monitoring-Based Commissioning” (MBCx) or “Continuous Commissioning”.

² Ibid

³ Evan Mills, Ph.D. Lawrence Berkeley National Laboratory. Berkeley, CA 94720 USA. Report Prepared for: California Energy Commission Public Interest Energy Research (PIER) July 21, 2009

⁴ Ibid

improvements. A related problem is that Building Automation Systems (BAS) are becoming more complex over time and are difficult for the average operator to understand⁵. Furthermore, most BAS do not normally include energy monitoring in their scope. Building operators often have only the monthly utility bills to help track how much energy is used. This information can be more than 60 days old and reflects lost opportunity that may no longer be relevant. Over time, operator interest and engagement wanes⁶. Building operators need assistance in sifting through the large volume of data available with new monitoring technologies. Current commercially installed BAS have limited capabilities for collecting, archiving, and displaying important building performance data.

THESL's M&T program will offer building operators and managers improved monitoring systems and tracking software to fully account for energy usage within their facility and deliver new energy efficiency improvements through targeting, process changes, behavioural modifications and future upgrades. The M&T Program will assist operators to sustain new savings.

1.2. Program Objectives

This program supports the concept that “what gets measured, gets managed” and that managing energy efficiency improves with continuous monitoring and targeting. This program will be run for four years from January 1, 2011 to December 31, 2014.

More specifically, the program goals can be categorized as follows:

- Mobilize a transformation of the building operations industry to managing energy continuously.
- Support projects that provide monitoring and tracking tools, professional services, and process revisions to achieve sustainable operational and behavioural improvements.
- Drive behavioural change within building operation teams and reinforce a culture of conservation.
- Improve the quality and effectiveness of a building's operating procedures.
- Support projects that provide building operation teams and management with training and new skills to improve the efficiency and operating effectiveness of their buildings.
- Provide a cost effective program to deliver sustained energy saving benefits and contribute to CDM targets.

⁵ Hyvärinen, J. and S. Kärki, Editors. 1996. “Building Optimisation and Fault Diagnosis System Source Book,” IEA Annex 25: Real Time Simulation of HVAC systems for Building Optimization, Fault detection and Diagnosis, Technical Research Centre of Finland, ESPOO FINLAND, August.

⁶Behrens, David W. and Kenneth Belfer. 1996. “Commercial Customer Applications Demonstration: Open Systems Communication Architecture Project,” Pacific Gas and Electric Company Research Development Report. Customer Systems File 006-96.1 December.

1.3. Program Details

Under the M&T projects supported by this program, building operators will be provided with additional tools, training, information, and assistance from external energy consultants to secure deeper and ongoing savings. This is distinct from traditional CDM programs that focus strictly on improved technology or equipment replacement.

While targeted facilities will already have automated building control systems, the priority of building operators is usually focused on minimizing occupant complaints rather than energy efficiency. The additional information tools and up front diagnostic engineering review supported under this program will assist the building operator to become more effective at managing energy as part of their daily routine. Current practice is reactive; by examining old utility information. Moving forward this program seeks to instil a proactive triage based on real-time information.

Potential participants will be offered a financial incentive to install a sub-metering, tracking and reporting system that compares energy use against an established baseline, as well as technical assistance to diagnose operating deficiencies. In addition, a performance incentive is available for successfully achieving savings relative to the baseline as a means of sustaining the ongoing.

1.3.1. Program Scope

The program will support the following activities shown by their stage of engagement in a project:

- 1) Pre-Application Stage
 - a) Includes professional services from qualified third-party energy professional(s) to help the participant,
 - i) Undertake a preliminary review and analysis of building systems and operating procedures to identify operational and behavioural change opportunities
 - ii) Select monitoring and tracking software
 - iii) Analyze data to establish practical conservation targets
 - iv) Develop a work plan including monitoring system scope and architecture, additional control or metering points, and implementation time table
 - v) Provide a project cost estimate
- 2) Application Stage
 - a) Includes professional services from qualified third-party energy professional(s) to help the participant complete the program application including required information.
- 3) Implementation Stage
 - a) Includes professional services from qualified third-party energy professional(s) and/or engineers to,

- i) Undertake more detailed follow up and investigation of building systems and operating procedures as required
 - ii) Design specification and development of procurement packages for metering and system enhancements
 - iii) Gather data to develop baseline
 - iv) Update standard operating procedures and provide operator training
 - b) Includes installation services by specialized trades to,
 - i) Provide operational adjustments, optimization and commissioning to improve energy performance
 - ii) Install sub-metering, and supplementary controls to monitor the electrical loads and building system operating conditions
 - iii) Deploy monitoring and tracking software to enable the participant to gather data from the various electricity usage points being monitored
- 4) Post-Implementation Stage
- a) Once the M&T deployment is complete, the installed monitoring equipment will feed back energy asset information to establish an operational baseline. Using the baseline, energy reduction targets will be established to achieve sustained savings. Thereafter, operational procedures and systems will be tuned to surpass targets and increase savings.
 - b) Includes professional services from qualified third-party energy professional(s) and/or engineers to,
 - i) Development of reports and reporting processes
 - ii) Train building operators on energy reporting processes
 - iii) Train building operators and managers on general energy efficiency strategies
 - iv) Identify additional operational savings in support of savings targets

The activities noted above will be recognized as eligible project costs for purposes of calculating the “Monitoring” incentive. Project costs shall include materials, labour, consulting, engineering, training and project management.

The next activities are recognized under the ongoing “Targeting” stage:

- 5) On the Yearly Anniversary of Project Completion
- a) Includes professional services from qualified third-party energy professional(s) and/or engineers to,
 - i) Submit annual project savings Measurement & Verification report
 - ii) Identify and propose base year adjustment(s)

The actual building systems or assumptions to be monitored and tested will vary by building and use but may typically include:

- Occupancy patterns
- Temperature regimes
- lighting and HVAC operating schedules
- heating and cooling plant operation
- ventilation
- maintenance and production scheduling
- discretionary tenant and process loads
- use automatic and manual control overrides

The M&T program will systemically improve a building operator's ability to investigate, recognize and correct sub-optimal performance issues across a building's entire operations. Forearmed with the operating requirements of their buildings, abnormal or unexpected energy loading will quickly be flagged for follow up and possible corrective action.

Appendix B provides an overview of the mechanics involved in the M&T process with regards to establishing energy baselines, setting targets, reporting results, and accounting for variations in factors such as changing production levels, weather differences, changing comfort conditions and building use, etc.

1.4. Value Proposition

The following considerations are key program drivers:

- Popularizing monitoring and targeting procedures to help uncover and ensure persistence of energy savings after re-commissioning efforts have been undertaken
- Providing building operators who often lack the skills, knowledge, time or resources required to find these efficiency gains within their facilities with support to achieve deeper savings
- Resolving that what gets measured, gets managed
- Recognizing that typical building operating procedures are inadequate by focusing on maintaining status quo and minimizing occupant complaints rather than uncovering energy efficiency opportunities
- Understanding that while capital budgets are required to implement change, the success of initiatives are linked to operational budgets and require additional support to assure success
- Providing incentives in the market to encourage the mobilization of this type of activity

Participants will experience the following benefits by implementing the M&T program:

- Reduced energy costs, which improves industrial production cost efficiency, or attractiveness of leased space to existing and prospective commercial tenants
- Reduced greenhouse gas emissions

- Established energy baseline to serve as a background to allow more reliable comparisons, savings calculations and performance reporting
- Documented building operating and monitoring procedures that sustain energy efficiency successes into the future through stay-resident tools
- Improved understanding of building operating dynamics through diagnostic and technical reviews, training undertaken by skilled energy consultants hired to guide the delivery
- Improved building operator skills and diagnostic capabilities resulting from the tools and training provide by M&T projects supported under this initiative.
- Transformed operating philosophy based on a faster proactive real-time response to developing situations versus reactive after-the-fact approach when focusing on utility bill reporting
- Optimized use of existing building and control system assets

In addition, through implementation of the program the resulting monitoring systems will be beneficial for buildings contemplating certification programs like LEED or BOMA BEST in the commercial sector.

1.5. Conformance with OPA Program Measures

M&T is a recognized operational technique used to conserve energy. Although this does not appear on an OPA list, this conservation measure is consistent, but not duplicative, with the approach used by the OPA-Contracted Province-Wide Industrial Accelerator Program.

1.6. Conformance with CDM Code Requirements

This submission is compliant under Section 3.1.4 of the “Conservation and Demand Management Code for Electricity Distributors”, which specifies the requirements for a distributor's application for a proposed Board-Approved CDM Program and is documented under Appendix C.

2. Target Market

2.1. Sector Analysis

Historically, the building operations and operator group has been particularly difficult to engage with regard to M&T despite the large potential for energy savings in this sector. The general mindset of this particular group is to maintain the status quo rather than proactively seek to improve efficiencies⁷.

⁷ Brown, Marilyn A. (1996). Energy efficient buildings: does the marketplace work? Proceedings of the International symposium on surface nano-control of environmental catalysts and related materials, Tokyo (Japan), 25-27 Nov 1996; Other Information: PBD: 1996

The difficulties in reaching this market segment have been both technology related and also service provider biased. Service providers have, not surprisingly, favoured technology replacement as their preferred recommendations to facility operators. The tangible nature of actual equipment has carried favour over perceived soft measures such as improved operational control and management. The “low hanging fruit” approach offers easily identifiable equipment changes and simple payback thresholds that are well understood at lower risk. Ironically, any technologically innovative and energy efficient equipment will still remain subject to operational decisions and therefore savings projections are contingent upon the operational knowledge base.

Specifically, the target market for the M&T program includes medium and large-sized facilities in the Office, Retail, Institutional and Industrial sectors with average monthly peak demand exceeding 200 kW per month, but not exceeding 15 GWh in annual electricity consumption.

This program will also assist participants who have already implemented energy efficiency measures covered by OPA-Contracted Province-Wide conservation programs and encourage those customers to undertake a M&T process at their facilities so that they can track their energy usage and track the effect of additional operational efficiency measures.

The targeted market segments, based on screening data from THESL’s customer billing system, includes approximately 2,476 facilities, with a total demand and consumption of 1,470 MW and 8,238 GWh. The breakdown of the potential market is summarized in the table below (based on 2009 data):

Sector	No. Of Facilities	Load (MW)	Consumption (GWh)
Offices	678	446	2,800
Institutional	711	433	2,548
Retail	523	223	1,378
Industrial	564	304	1,511
Total	2,476	1,470	8,238

Source: THESL billing, Customer Information System and market analysis

2.2. Market Penetration

Based on the research cited below, THESL expects 5% of the commercial/institutional sector and 2% of the industrial sector will participate in the M&T program.

The anticipated commercial/institutional market penetration rates are based on the following observations:

- The retro-commissioning market, which has similar paybacks and goals as the M&T program, has been evaluated in California and shows an annual 5.1%⁸ penetration rate within a much more established conservation market.
- At the same time, 80% of organizations will consider proceeding with projects having a payback of less than 1.9 years in the commercial sector⁹, which is consistent with the expectations for this program.
- The REALPac initiative of 20 equivalent kilowatt-hours per square foot by 2015 will be driving the commercial sector to incorporate energy tracking and targeting into their sites to help meet objectives.
- Studies have found that higher energy costs lead to a greater adoption of energy savings measures¹⁰, which is important as electricity prices are expected to rise 46%¹¹ over the next five years.
- The program will be targeted towards customers that have already completed major energy efficiency retrofits and are looking to further enhance building operational efficiency.

The industrial sector is a considerably tougher market to penetrate due to the perpetual uncertainty surrounding the economy and the complex relationship between production needs and market demand. The industrial sector has specific considerations which include:

- Recognizing the economic uncertainty for industry located in Ontario
- The mean payback criteria is generally quite low with a study of American industry showing that the threshold for considering an energy efficiency project is on average 1.4 years¹²
- There are approximately 1000 industrial sites that practice monitoring and targeting in the UK¹³ and by prorating that to the Ontario economy, based on manufacturing output, it would be expected that the total number of sites would be approximately 91. Subtracting out the OPA estimate of 80 larger sites, a residual group of 11 smaller industrial sites appears reasonable.

⁸ PECL and Summit Building Engineering. California Commissioning Collaborative, (2007). California retro-commissioning market characterization

⁹ DeCanio, Stephen. (1993). Barriers within firms to energy-efficient investments. *Energy Policy*, 21, 906-914.

¹⁰ Anderson, S.T., & Newell, R.G. (2004). Information programs for technology adoption: the case of energy-efficiency audits. *Resource and Energy Economics*, 26, 27-50.

¹¹ Leslie, Keith. (2010, November 21). Huge investments to update power system, plus green energy, behind rate hikes. *The Canadian Press*.

¹² Gillingham, K, Newell, R.G, & Palmer, K. (2009). *Energy efficiency economics and policy. Resources for the Future*.

¹³ Zak, Juan, & Ramirez, Edwin. (1999). Introduction to monitoring and targeting. *Proceedings of the Ministry of Economy and Planning (Cuba)*.

Using a 5% commercial/institutional sector and 2% industrial sector participation factor in the M&T program, it is estimated that these market penetration rates could yield approximately 107 participants during the four year term of the project. The potential market penetration by sector is shown below:

Sector	Total Number of Facilities	# of Participants over Duration of Program
Offices	678	55
Institutional	711	24
Retail	523	17
Industrial	564	11
TOTAL	2,476	107

When establishing the projections we have relied upon the experience from other jurisdictions with programs similar in scope. We have also placed some importance in evaluating the different investment criteria used by the market segments for general energy efficiency projects. A key criterion for evaluating investment is simple payback. When evaluating the M&T program penetration we employed the guidelines established from the Canadian Industry Program for Energy Conservation (CIPEC). The typical system cost is extrapolated from system cost data in the CIPEC report¹⁴ for the two sectors.

Type	Utility Bill Size (Electricity)	Recommended M&T System Maximum Cost (\$)	Simple Payback (years)
Commercial/Retail & Institutional	\$323,944	\$42,113	2.17
Industrial	\$362,535	\$43,215	1.99

3. Projected MW and MWh Savings

The savings attributable to M&T systems vary with studies noting 5-15% savings based on industrial installations in the UK¹³, and by the Department of Energy in the USA¹⁵. CIPEC recommends using 8%¹⁴ energy savings as the basis of evaluating these systems. To be consistent with the CIPEC report we have used a factor of 8% for potential electricity savings.

On this basis, the program cumulative net peak demand reduction has been estimated to be 0.86 MW and a cumulative electrical savings of 40.7 GWh at program conclusion.

¹⁴ Office of Energy Efficiency of Natural Resources Canada. (2004). Energy management information systems. CIPEC.

¹⁵ Guidance for Electric Metering in Federal Buildings. (2006). US Department of Energy: Energy Efficiency and Renewable Energy.

The tables below summarize the net total estimated savings with a free-ridership factor of 30%¹⁶ assumed in calculating net savings. Evaluation, Measurement and Verification (EM&V) will determine actual results. Ultimately, a project specific weather normalized M&V will be completed that will measure savings for every project in relation to its baseline (refer to Appendix B for a description of the methodology).

Net MW Reduction					
	2011	2012	2013	2014	Total
Commercial	0.00	0.19	0.38	0.19	0.75
Industrial	0.00	0.07	0.04	0.00	0.11
Total	0.00	0.26	0.42	0.19	0.86
Cumulative Net MWh Reduction					
	2011	2012	2013	2014	Total
Commercial	0	4,336	13,007	17,343	34,685
Industrial	0	1,457	2,290	2,290	6,037
Total	0	5,793	15,297	19,633	40,723

4. Marketing and Sales Plan

4.1. Marketing and Communications

THESL's marketing strategy for the M&T Program is intended to transform the building operations industry's approach to managing energy such that M&T programs will become commonplace in building management moving forward.

Accordingly, the incentives are designed to change behaviour and motivate the ongoing efforts of building operation teams and encourage early adopters. Generally, installation-only incentives fail to provide the necessary operational support especially since operating and labour budgets may be managed by different organizations or companies.

THESL's efforts are aimed at educating the building owners and managers of this target market. These decision makers are expected to deliver building improvements, innovation, and benchmarking while reducing costs. THESL's sales forces will engage them to emphasize the alignment between this program and their management objectives. THESL will target the Large Office segment, Industrial, Large Retail and Institutional market segments in that order.

¹⁶ This is the default free-rider factor for custom projects as noted in OEB Decision and Order, EB-2007-0096 (Page 9).

The M&T program will also support and leverage the alignment between M&T and national certifications such as BOMA BEST and LEED-EB: Operations & Maintenance (LEED-EB:O&M), which are popular with this segment as they provide a means of differentiating properties and ultimately help attract and retain tenants.

Potential program participation also exists through professional Facility Management (FM) and Property Management (PM) organizations as energy performance is an important service delivery indicator in their client contracts. THESL will also engage suppliers (metering vendors, controls companies) and commissioning agents as natural allies in promoting participation in the M&T program.

4.1.1. Marketing Objectives

Introduce THESL's M&T program to approx. 2,476 prospective customers by the end of 2011 with a take up rate of 107 customers by the end of 2014.

4.1.2. Primary Target Market

- Building Owners & Landlords
- Building Operators includes Property Managers and Facility Management Organizations
- Sub-Metering Companies
- Control Companies
- Commissioning Companies

4.1.3. Secondary Market

- Stakeholder groups
- Commercial, institutional and industrial industry and trade associations

4.1.4. Goals

- Build awareness and understanding for the M&T program and drive participation in the program
- Integrate M&T into the CDM suite of services and marketing plans for co-promotion
- Create unique targeted opportunities to promote M&T
- Utilize a variety of channels, ally network partners and stakeholders

4.2. Collaboration with other LDC's

THESL will work closely with other LDCs to deploy the program, ensuring the programs deployed are consistent and optimized for efficiency and cost effectiveness including joint Request for Proposals, software assessment, and establishing approved vendor lists.

4.3. Take-to-Market Approach

- Utilize THESL and Channel Partners as direct sales channels.
- Develop ally partnerships with sub-metering, control and commissioning companies to help reach targeted customer base.
- Leverage relationships with professional and industry based organizations to promote program to their membership.
- Utilize 3rd party endorsements to demonstrate product features and benefits.
- Develop integrated sales plan with single customer touch points ensuring all customer specific applicable CDM programs are offered
- Key account management and education

4.4. Tactics

- Develop new webpage to provide a one-stop hub of information including installation video and enrolment/application
- Develop sell sheet, FAQ, scripts to be used by channel partners, sales staff
- Create customer testimonials and case studies for print and web
- Direct mail package to vendors (commissioning, controls and sub-metering)
- Utilize third party communication channels (newsletters and websites) to communicate program
- Sell through/to associations and relevant stakeholders
- Customer outreach: trade shows and seminars
- Issue media release to targeted media outlets within the industry (municipal, commercial, etc).
- Targeted advertisements and editorial in trade journals and online sites

4.5. Key Messaging

- Monitoring and targeting provide sustained energy saving
- Improves building's energy efficiency
- Trains and builds the operational capabilities of building operations team
- Differentiates buildings – to attract and retain tenants
- Provides two incentives: an implementation and performance incentive
- THESL and channel partners are honest brokers with expertise to provide a full suite of CDM solutions
- Experienced staff providing guidance throughout the process
- Results provide sustainable, measurable and verifiable electrical savings
- Helps to meet social corporate responsibility targets (reduced environmental footprint)

5. Program Rules

Program rules have been vetted against the OEB's CDM Code to ensure compliance including but not limited to program M&V, cost effectiveness, measures and assumptions, TRC and PAC.

5.1. Eligibility

To be eligible for this program Commercial, Institutional and Industrial participants,

- Building must be a minimum of 3 years old. In addition, they must have an average monthly peak demand exceeding 200 kW verified by the most recent 12 months' billing history.
- To avoid overlap with the OPA Industrial Accelerator program in the industrial sector there is a restriction that industrial facilities must not exceed 15 GWh in annual electricity consumption.
- Participant building must be located in THESL service territory with an active account.
- Participants will be required to commit contractually to December 31st, 2014. This condition is intended to support the persistence of savings allowing new procedures to set and become normal practice with building operations staff.

5.2. Incentives

The proposed M&T Program offers two types of financial incentives for eligible customer participation: Monitoring and Targeting.

5.2.1. Monitoring Incentive

Implementation incentives are designed to assist with the project cost, which includes equipment, software, project management, and labour costs associated with the investigation, design/consultation, acquisition, installation, configuration and set up/commissioning of the M&T system.

The Implementation Incentive contribution is calculated as the lesser of,

- \$0.20 per kWh multiplied by the customer's annual estimated savings in kWh,
- 50% of the project cost,
- Up to \$75,000.

5.2.2. Targeting Incentive

In order to encourage a sustained level of effort during the term of the program, building operators and management customers will also be eligible for an energy savings incentive at a rate of \$0.025 for each kWh saved as defined by the baseline¹⁷. This performance incentive will be paid at the end of each year for savings achieved during the four-year program. To be eligible for this incentive, the annual kWh

¹⁷ Equivalent to \$0.052 per kWh (i.e. total Targeting incentives of \$ 1,454,383 divided by total gross incremental savings of 28,047 MWh)

savings indicated must be equal to or greater than 8% with respect to the (normalized) baseline year kWh consumption.

5.3. Activation Rules & Requirements

5.3.1. Incentive Application

As part of incentive application, the participant will be required to:

- Describe the proposed M&T system including metered and monitored sub-systems and additional BAS control points and reporting software.
- Illustrate the proposed metering system architecture.
- Identify the selected energy consultant and their qualifications or credentials.
- Outline the M&T work plan showing work elements, deliverables, timetable and budget.
- Provide assurance that resulting operational changes will be sustained for a minimum of 5 years in order to assure persistence of savings. This assurance can be in the form of a binding agreement or commitment with the applicant or another party such as the building owner, facility or property manager who has operational responsibility for that facility.
- Agree to baseline normalization process to occur as part of savings reconciliation.

5.3.2. Incentive Approval

Once the application is approved by THESL, the participant will work with the energy consultant and the selected building automation/building controls/metering vendor(s) to:

- Install and commission the M&T system and the necessary monitoring equipment.
- Specify the monitoring and analysis activities to establish savings targets and outcomes.
- Document the revised sequences of operation to the building control systems.
- Agree on any adjustment to baseline / normalization adjustments to be applied.
- Project must be completed and verified within 16 weeks from approval, unless otherwise approved by THESL. Participant must specify the Savings Commencement Date (thereby establishing the savings anniversary dates) falling within that period.

5.3.3. Savings Reports

The participant shall submit an energy savings report as evidence of actual achieved savings to THESL within 60 days of the anniversary of Savings Commencement Date. Participant will need to provide supporting evidence from the M&T system to substantiate claims. Weather normalized savings information should be generated by the M&T program referencing the baseline. Annual savings report must be prepared by a Certified Measurement & Verification Professional (CMVP) or approved equivalent.

Reported savings will account and allow for building and operational variations such as modified production levels, weather differences, building use, occupancy, etc. which are commonly beyond the control of the participant and would otherwise have increased the energy consumption even without

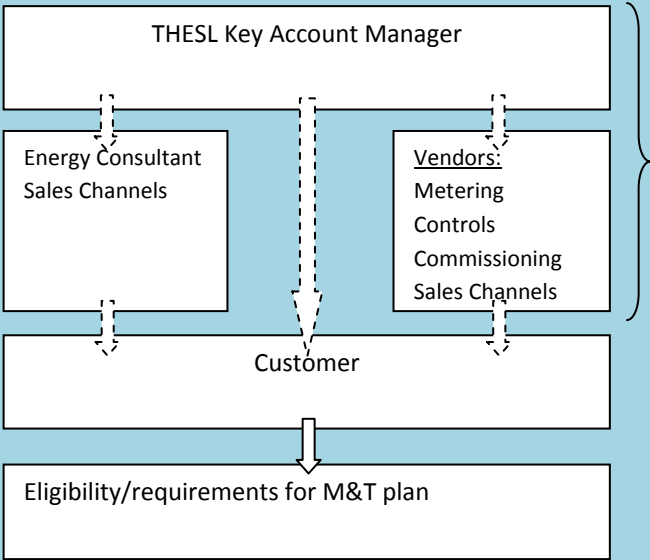
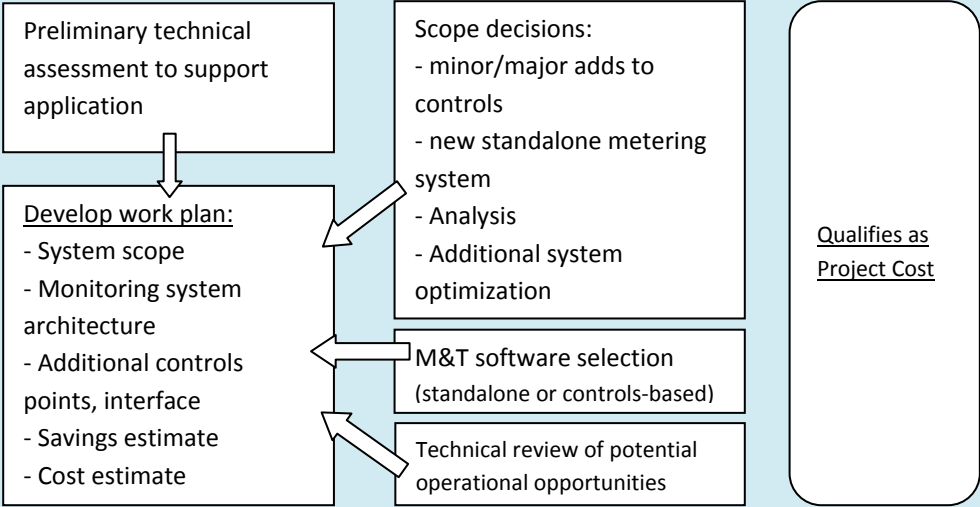
the M&T measures. This would be accomplished using a baseline adjustment mechanism submitted by the participant in conformance with International Performance Measurement & Verification Protocol (IPMVP). THESL agreement will be required for all baseline adjustments.

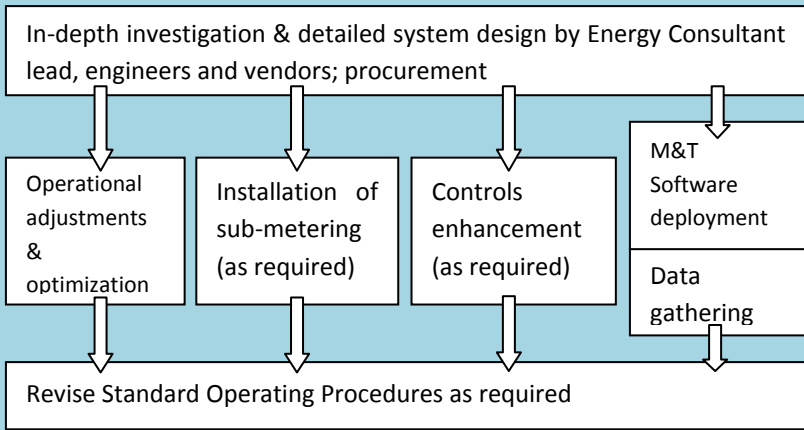
Applicant must inform THESL of participation in any other CDM initiative that would impact results during the monitoring period. Energy Savings recognized under this program will be net of other CDM program savings.

Any incentive amounts due beyond 2014 will require settlement before program end-date.¹⁸

The overall process is illustrated below for greater clarity:

¹⁸ For example, projects with a July anniversary date will require a reduced final savings report reflecting results from July through December (7 months) and the customer will be incented on reduced reporting period.

	Activity	Applicant Commitment	Responsibility	Financial Support
Engagement	 <p>THESL and partners will work with Customers to identify the value proposition of M&T initiatives.</p>	Not Applicable	Shared	None
Pre-Application	 <p><u>Qualifies as Project Cost</u></p>	Not Applicable	<p>Applicant (prime) in association with Energy Consultant and process support by THESL</p> <p>Also supported by vendors: Metering, Controls, Commissioning agents</p>	Recognized as Project Cost under Monitoring Incentive

Application	<p>Application submission includes:</p> <ul style="list-style-type: none"> - Specific M&T work plan (scope, preliminary system architecture, schedule, cost estimate) - Identification of energy consultant and savings estimate - Anticipated Monitoring Incentive - Anticipated Targeting incentive 	<ul style="list-style-type: none"> - Participant agreement - Confirm savings estimate (min 8% relative to baseline) 	Applicant (prime) in association with Energy Consultant	Recognized as Project Cost under Monitoring Incentive
	Application Approval	Not Applicable	THESL	None
Implementation	 <p><u>Project Costs include:</u></p> <ul style="list-style-type: none"> - Engineering - Consulting - Training - Software - Materials - Labour - Project Management 	<ul style="list-style-type: none"> - Sign off revised Standard Operating Procedures 	<p>Applicant (prime)</p> <p>Potential contracts with:</p> <ul style="list-style-type: none"> - Energy Consultant - Engineer - Metering vendor - Controls vendor - Commissioning agent 	Recognized as Project Cost under Monitoring Incentive
Post-Implementation	<ul style="list-style-type: none"> - Establish baseline - Submit “close-out” report (including baseline, etc.) - Load baseline into M&T software - Initial training on M&T software and reporting - Energy efficiency training - Identify preliminary operational savings opportunities <p><u>Qualifies as Project Cost</u></p>	<ul style="list-style-type: none"> - Provide evidence of intent to sustain application of revised Standard Operating Procedures 	Applicant (prime) in association with Energy Consultant	Recognized as Project Cost under Monitoring Incentive
	<ul style="list-style-type: none"> - System site verification to confirm scope and completion of project 		THESL	Monitoring incentive paid
Anniversary	<ul style="list-style-type: none"> - Submit project savings Measurement & Verification (M&V) Report to THESL - Identify base year adjustment 	<ul style="list-style-type: none"> - Identify other CDM initiatives 	Applicant	
	<ul style="list-style-type: none"> - Review for approval M&V report and any proposed base year adjustments 		THESL	Targeting incentive paid

6. Program Evaluation

6.1. Project M&V

Project M&V will be based on standard industry accepted IPMVP M&V practices. The M&T plan and the detailed M&T reports will be generated by the M&T system. This will provide the required information for the M&V of each project showing weather and/or production-normalized energy savings and peak demand reductions as required.

Savings report will provide savings results in conformance with IPMVP standards and/or OPA M&V protocols. Refer to Appendix B for a description of M&T methodology.

6.2. Program Evaluation Plan

Program evaluation will be carried out by a certified independent third-party M&V Professional based on the OPA EM&V Protocol. It will focus on the following areas to assess the cost-effective delivery of the program:

- The achieved program gross peak demand (MW) and energy savings (MWh) reductions
- The net program peak demand reductions and energy savings in consideration of the free-ridership and realization rates to be determined
- The actual TRC and PAC results based on the achieved savings
- The effectiveness of the program delivery in terms of marketing/sales activities in signing up participants
- Program administration and governance effectiveness

The draft OPA EM&V template is used to outline the evaluation plan as shown in Appendix A, but the eventual evaluation plan will be prepared by the M&V Professional evaluator based on the OPA EM&V protocols.

Within the overall EM&V process provided by the OPA EM&V protocol, the nature of this program will require specific attention to the assessment of savings delivered and sustained, given the program reliance on changes in participants' operational procedures and staff behaviour instead of equipment efficiency implementation. Program evaluation will be end-to-end, from program design, through delivery, to the final financial settlement of each project completed.

7. Program Budget

The 2011-2014 budgeting plan for the program is summarized in the following table:

Description	2011	2012	2013	2014	Total
Marginal Costs					
Fixed Costs					
Legal Cost	\$42,000	\$15,750	\$15,750	\$15,750	\$89,250
Marketing	\$99,750	\$73,500	\$52,500	\$5,250	\$231,000
Sales	\$140,910	\$143,728	\$109,952	\$35,227	\$429,817
Program EMV	\$68,250	\$68,250	\$68,250	\$68,250	\$273,000
Administrative Costs	\$4,391	\$10,831	\$8,806	\$5,996	\$30,024
Operation Cost	\$15,194	\$29,686	\$34,715	\$33,615	\$113,210
Total Fixed Costs	\$370,494	\$341,745	\$289,973	\$164,088	\$1,166,300
Variable Costs					
Administrative Costs	\$17,564	\$43,324	\$35,225	\$23,983	\$120,097
Operation Cost	\$60,774	\$118,744	\$138,862	\$134,459	\$452,839
Total Variable Costs	\$78,339	\$162,068	\$174,087	\$158,442	\$572,936
Total Marginal Cost	\$448,833	\$503,813	\$464,060	\$322,530	\$1,739,236
Total Allocable Cost	\$12,567	\$14,107	\$12,994	\$9,031	\$48,699
Total Program Costs	\$461,400	\$517,920	\$477,054	\$331,560	\$1,787,935
Total Incentives	\$505,352	\$1,368,850	\$1,138,106	\$701,168	\$3,713,475
Total Budget	\$966,752	\$1,886,770	\$1,615,160	\$1,032,728	\$5,501,410

8. Cost Benefit Analysis

The table below summarizes the results for cost effectiveness tests using the most current OPA model named "Conservation_Program_Resource_Planning_Tool_V3.3". The tests include both Total Resource Cost (TRC) and Program Administrator Cost (PAC)¹⁹.

Name of Test	Benefits	Cost	Net Benefit	Ratio
TRC	\$7,199,115	\$4,362,282	\$2,835,833	1.6
PAC	\$7,199,115	\$4,852,186	\$2,346,929	1.5

/C

The above tests results are based on the following input assumptions:

- Free ridership : 30%¹⁶
- Unit incremental equipment costs : \$42,113 for Commercial/Institutional
: \$43,215 for Industrial
- Operating life : 8 years
- Number of participants : 107
- Unit peak demand savings : 11.19 kW for Commercial/Institutional
: 14.39 kW for Industrial
- Unit Annual Energy Savings : 258,075 kWh for Commercial/Institutional
: 297,411 kWh for Industrial
- Program costs : \$1,787,935
- Financial incentive : \$3,713,475

As a sensitivity analysis, the table below shows the test results if unit kW and kWh savings are reduced by 25%.

Name of Test	Benefits	Cost	Net Benefit	Ratio
TRC	\$5,399,336	\$4,363,282	\$1,036,054	1.2
PAC	\$5,399,336	\$4,529,515	\$869,821	1.2

¹⁹ TRC and PAC calculations are based on annualized savings.

9. Non-Duplication of OPA-Contracted Provincial Programs

The proposed program will not duplicate any existing OPA programs for the following reasons:

- In the OPA Industrial Accelerator (IA) initiative, M&T is offered as an enabler tool only. The proposed THESL M&T program, by contrast, is a full-fledged conservation program with the enabler and an incentive structure designed to ensure savings that will persist.
- The OPA-Contracted Industrial Accelerator program requires that the Industrial customer have an annual consumption of over 15GWh. The THESL M&T program will address the need of a segment of customers that does not have access to the OPA-Contracted program.
- M&T is not offered in the Commercial/Institutional CDM Program.

10. Data Collecting, Tracking and Reporting

Commercially reasonable energy practices will be used to ensure that kWh and kW savings are calculated using commercially reasonable engineering practice. THESL will require supporting data from program participants to substantiate the claimed savings. Documentation archives will be maintained and will be used for governance, reference and audit purposes.

THESL employs a comprehensive financial and work order system to keep track of CDM related expenditures. After validation and verification of participant and third party invoices, payments will be made and recorded in the system. Each invoice will be substantiated by supporting documents.

Internal operational reports will be prepared and reviewed monthly subject to THESL's corporate governance rules and policies, including those established to govern OPA Programs. Annual reports consisting of financial and operational results, energy and demand savings (based on project M&V and program EM&V results from independent third party reports) will be submitted to the OEB.

THESL is committed to delivering CDM programs that have a ratio of benefits to costs greater than one. TRC and PAC calculations will be performed annually and on completion of the program which will be included in the OEB reports.

All data collection efforts will be in conformance with the OEB CDM Code as well as any other instruction received.

Appendix A - Program Evaluation Plan based on Draft OPA Template

Program Description	As described in this application document
Conservation Measures	Section 6
Evaluation Goals and Objectives	<p>Evaluation Goals and Objectives</p> <ul style="list-style-type: none"> • Process Design Effectiveness • Program Administration Effectiveness • Measures and Assumptions Review • Establish gross and net energy savings and demand reductions achieved • Estimate Program Cost Effectiveness • Ensure Level of Customer Satisfaction
Evaluation Deliverables	<p>Evaluation Deliverables</p> <p>Draft Evaluation Plan</p> <p>Final Program Evaluation Plan</p> <p>Annual Report – Elements</p> <p>Final Report</p>
Evaluation Description	<p>The evaluation elements of the Evaluation Goals and Objectives are anticipated to include (but are not limited to) those listed in the corresponding sections below. It is expected that these elements will be reviewed, discussed, evaluated or analyzed as appropriate and according to the OPA's EM&V Protocols to ensure that they meet the Program Evaluation Goals and Objectives during the Draft Evaluation Plan development phase. Review of these elements will assist THESL in determining and/or validating the appropriateness of the program design, administration and measures assumption elements and whether adjustments are necessary in order to successfully deliver the Initiative and to achieve the anticipated goals and objectives and estimated participation and results.</p> <p>Within the above overall EM&V process, the nature of this program will require specific attention to the assessment of savings delivered and sustained, given the program reliance on changes in participants' operational procedures and staff behaviour instead of equipment efficiency implementation. Program evaluation will be end-to-end, from program design, through delivery, to the final financial settlement of each project completed.</p>
Evaluation Elements	<p>i) Program Process Design Effectiveness - Evaluation criteria:</p> <ul style="list-style-type: none"> • Goals of program • Staffing and training • Program timing and timelines • Incentives and motivation for participation • Participant satisfaction feedback • Non participant feedback back – participant satisfaction • Monitoring and tracking procedures

	<ul style="list-style-type: none"> • Reporting procedures <p>ii) Program Administration Effectiveness - Evaluation Criteria:</p> <ul style="list-style-type: none"> • Program statistics – including participants, calculations of energy and demand reductions etc. • Program Impact Evaluation • Pre and post Project Analysis Assessment • Marketing Effectiveness Assessment • Actual versus Budget Reporting • Market Participant review <p>iii) Measures and Performance Assumptions Review:</p> <ul style="list-style-type: none"> • Custom Measures Assumptions Review • Behavioural and Performance Assumptions Review <p>iv) Gross and Net Energy Savings and Demand Reductions Achieved: (To be performed by a 3rd party based on the OPA's EM&V protocols)</p> <ul style="list-style-type: none"> • Measurement and verification of program weather or production normalized energy and demand savings achieved • Net to Gross ratio (including free rider rate) • Audit and Verification of project completion <p>v) Program Cost Effectiveness:</p> <ul style="list-style-type: none"> • Verification of program expenditures versus budget • Verification of incurred payments
Special Provisions	N/A
Data Collection Responsibilities to Support Program Evaluation	This will be completed with the assistance of a third party EM&V expert to ensure complete and appropriate collection of data to support Program evaluation.
Evaluation Schedule & Budget	Schedule will be established by the Third-Party certified M&V consultant in conjunction with THESL. Budget estimate is indicated in section 8 of this document
Evaluation Team	Third-Party certified M&V consultant team with support from THESL CDM personnel

Appendix B – Monitoring & Targeting Procedure

M&T techniques rely on Monitoring, Setting Target, and Reporting, forming a constant feedback cycle to improve the control of energy use. The tasks are explained as follows:

Monitoring - The regular collection of information on energy use, in order to establish a basis for energy management and explain deviations from an established pattern.

Target setting - Targeting consists in defining the levels of energy consumption desirable for the management. Targets are based on the previous knowledge acquired during the monitoring phase as well as intimate knowledge of the business.

Reporting - The final principle is the one which enables ongoing control of energy use, achievement of targets and verification of savings: reports must be issued to the appropriate managers. This in turn allows decision-making and actions to be taken in order to achieve the targets, as well as confirmation or denial that the targets have been reached.

The actual M&T procedure consists of the following steps:

Measure - The first step is to compile the data from the different meters. Some measurements can be taken directly from the meters, others must be calculated.

Define Base-line - The data compiled are plotted on a graph in order to define the general consumption base-line. Consumption rates are plotted in a scatter plot against production, weather, occupancy, or any other variables previously identified, and the best fit line is identified. This graph is the image of the business' average energy performance, and conveys a lot of information:

- The y-intercept gives the minimal consumption in the absence of the variable (no production, zero degree-day). This is the base load of the system, the minimal consumption when it is not operating.
- The slope represents the relationship between the consumption and the previously identified variables. This represents the efficiency of the process or building energy systems.
- The scatter is the degree of variability of the consumption with operational factors.

Monitor Variations - The next step is to monitor the difference between the expected consumption and the actual measured consumption. This consists in first calculating the difference between the expected and actual performances (the best fit line previously identified and the points themselves). The slope is the main indicator of the savings achieved.

Identify Causes - Energy efficiency specialists, in collaboration with building managers, will decipher the graph and identify the causes leading to variations in the consumption. This can be a change in behaviour, a modification to the process, building usage, different exterior conditions, etc. These changes must be monitored and the causes identified in order to promote and enhance good behaviour, and discourage bad ones.

Set Targets - Once the base line has been established, and causes for variations in energy consumption have been identified, it is time to set targets for the future. Now with all this information in hand, the targets are more realistic, as they are based on the building's actual consumption.

Targeting consists in two main parts: the measure to which the consumption can be reduced, and the timeframe during which the compression will be achieved. A good initial target is the best fit line identified previously. This line represents the average historical performance. Therefore, keeping all consumption below or equal to the historical average is an achievable target, yet remains a challenge as it involves eliminating high consumption peaks.

Monitor results - This brings us back to the step Measure Consumption. One of the specificities of M&T is that it is an ongoing process, requiring constant feedback in order to consistently improve performance.

Appendix C – CDM Code Requirements

This section documents that this program application is compliant under Section 3.1.4 of the “Conservation and Demand Management Code for Electricity Distributors”, requiring that a distributor's application for a proposed Board-Approved CDM Program must include the following:

CDM Code Reference	CDM Code Requirement	Section Addressing Requirement
3.1.4 (a)	a program evaluation plan, based on the OPA's EM&V Protocols, for each program;	6.2
3.1.4 (b)	a benefit-cost analysis of each program which shall be completed by using the OPA's Cost Effectiveness Tests;	8
3.1.4 (c)	a detailed explanation of the program's objective(s) and method of delivery;	1.2, 1.3
3.1.4 (d)	the types of customers targeted by the program;	2.1
3.1.4 (e) ₁	a forecasted number of participants that the distributor expects will participate in the program;	2.2
3.1.4 (e) ₂	the total projected peak demand savings (kW) and electricity savings (kWh) per year, or if the program is for less than one year, the total projected peak demand savings (kW) and electricity savings (kWh) for the duration of the program;	3
3.1.4 (f)	a complete projected annual budget for each of the distributor's CDM Programs, including the following information:	7
3.1.4 (f) (i)	projected expenditures incurred on an annual basis, for each year of the CDM Programs, separated into customer incentive costs and program costs;	7
3.1.4 (f) (ii)	a division of program costs into Marginal Costs and Allocable Costs incurred as a result of program implementation;	7
3.1.4 (f) (iii)	information on the allocation of total expenditures incurred by targeted customer types for each direct projected expenditure; and	7
3.1.4 (f) (iv)	total projected expenditures for each program evaluation conducted; and	7
3.1.4 (g)	a statement that confirms that the distributor has used the OPA's Measures and Assumptions Lists or if the distributor has varied from the OPA's Measures and Assumptions Lists, the distributor must:	1.5
3.1.4 (g) (i)	appropriately justify the reason for varying from the OPA's Measures and Assumptions Lists in the application;	Not Applicable
3.1.4 (g) (ii)	provide the technical assumptions and substantiating data that the distributor used; and	Not Applicable
3.1.4 (g) (iii)	provide a statement that the distributor has followed the OPA's EM&V Protocols for custom measures not included in the OPA's Measures and Assumptions Lists.	6.2

Toronto Hydro-Electric System Limited

**Conservation and Demand Management
Program Application:**

Community Outreach and Education Initiative

Submitted for Board Approval

**Submitted to:
Ontario Energy Board**

Submitted on January 10, 2011

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Executive Summary

Toronto Hydro-Electric System Limited (THESL) has identified a gap within the OPA's Province-Wide Conservation and Demand Management (CDM) programs as it pertains to specific engagement and education needs within the City of Toronto and seeks to respond to this need by submitting the Community Outreach and Education Program application.

This submission is in conformance with the requirements of Section 4.3.2 of the CDM Code. The specific requirements for an OEB Board Approved Program are found throughout this document and have been summarized in Appendix B for convenience.

THESL is seeking approval from the Ontario Energy Board (OEB) to expend \$5.7 million to provide effective Conservation, Energy Efficiency and Time-Of-Use education to Torontonians at targeted community events in collaboration with other Toronto organizations.

The Community Outreach and Education Initiative will consist of annual outreach from 2011 to 2014. Outreach will take place through the following four channels:

- In store retail campaign
- Festive light exchange
- Toronto Police partnership
- School education and outreach

This program will promote the understanding of energy issues and lead to behavioural changes that result in the overall reduction of electricity demand and/or consumption.

With exposure, we will target a minimum of 1 million Torontonians annually with the Community Outreach and Education Initiative.

Toronto's vastly diverse population requires significant face-to-face engagement to elicit understanding and behavior change as it relates to conservation, energy efficiency, and most recently, Time-Of-Use rates.

The latest Stats Canada census estimated there were 2,503,281 people living in Toronto in June 2006, making it the largest city in Canada, and the fifth most populous municipality in North America. Toronto has 140 diverse neighbourhoods including 13 designated Priority Neighbourhoods. Toronto has the second-highest percentage of constant foreign-born population among world cities and no single nationality or culture dominates Toronto's immigrant population, placing it among the most diverse cities in the world.

With its dense population, major media outlets, and government offices, Toronto is a critical hub that will influence acceptance (or rejection) of Ontario's electricity strategy. Toronto Hydro plays a key role in educating and engaging the Toronto public and Toronto media to build support of the province's conservation culture.

This program is a continuation of Toronto's successful outreach and education over the past six years. With a desire to connect with customers where they live, work and play, Toronto Hydro will tap into our experience and Toronto connections to leverage various venues, partners and events across the city. Over the past several years, Toronto Hydro has hosted thousands of events providing an opportunity to communicate key messages, answer questions, distribute energy efficiency product samples, and enrol customers in current programs. Hundreds of thousands of Torontonians have actively participated in these education-based events. As a result, customer satisfaction research has indicated our customers are very satisfied with Toronto Hydro with regards to conservation and demand management, as such, we experienced little customer pushback with our recent TOU roll-out.

This educational initiative targets behaviour change and puts energy efficient products in consumers' hands. Toronto Hydro will leverage events and partners to take advantage of a captive audience, providing electricity education and engagement, specifically:

- shifting use to off-peak times;
- using less electricity (conservation);
- using electricity more efficiently via technologies, appliances etc (energy efficiency).

The anticipated customer benefits of the educational CDM program are as follows:

- Improving understanding of the potential for energy efficiency initiatives within their homes and workplaces by meeting energy experts face-to-face to learn about energy efficiency, conservation and TOU through education, dialogue, and demonstration;
- Benefitting from reduced energy costs by making behaviour changes;
- Reducing their environmental footprint and demonstrating good corporate social responsibility;
- Ability to socialize and share experiences and ideas with other community members;
- Accessibility to conservation and energy efficiency programs at a local, neighbourhood level.

1. Program Description

1.1. Program Rationale

This educational CDM program will promote the understanding of energy issues and lead to behavioural changes that result in the overall reduction of electricity demand and/or consumption.

This initiative supports three main efforts to increase the knowledge level and awareness amongst the target audience:

- Reach a large volume of customers, especially our diverse, multi-cultural customers and youth;
- Leverage traffic and captive audience at existing events and/or through partnerships and engage them in dialogue and education;
- Offer an electricity education experience through a demonstrative, interactive booth staffed with engaging, knowledgeable multi-lingual conservation ambassadors.

1.2. Program Objectives

The program objective is to proactively engage customers face-to-face, and deliver education and outreach to reach Toronto's diverse, often over-exposed and sometimes hard-to-reach population. A significant group includes a large population of vulnerable customers in designated priority neighbourhoods. Many of these residents are disconnected from mainstream marketing activity and programs because of economic, language and cultural barriers.

As such, delivery via face-to-face engagement is critical to facilitate education, understanding and behavior change.

We also strive to keep conservation and energy efficiency top of mind, build a positive relationship with Torontonians and generate positive media coverage for Toronto Hydro and stakeholders including the Ministry of Energy, the Ontario Power Authority, and the Ontario Energy Board.

1.3. Program Details

This program aims to achieve its objectives by bringing education directly to the customer, via a targeted venue/event. By fostering dialogue through unique interactions at events, Toronto Hydro will reach people it may not otherwise, effectively delivering the message of conservation throughout Toronto's 140 diverse neighbourhoods including 13 designated Priority Neighbourhoods (underserved low income), energy efficiency and time-shifting through engagement and demonstration.

IN STORE RETAIL CAMPAIGN

The retail setting allows Toronto Hydro to reach a large volume of diverse customers at a time when they are making key purchasing decisions. This approach includes a comprehensive education and demonstration booth with informative and engaging staff that will take each customer through an educational session to build awareness and influence behavior change. Watt meters, educational posters, signs and brochures will engage customers to build an understanding of actions they can take to shift and reduce their electricity use. Customers will then be directed to appropriate products and tools that can enable this within the retail setting.

This program aims to achieve its objectives by bringing education directly to the customer, via a high-traffic venue. By fostering dialogue through unique interactions at events, Toronto Hydro will reach people it may not otherwise, effectively delivering the message of conservation, energy efficiency and time-shifting through engagement and demonstration.

Building on six years of successful retail partnerships and retail-based events, THESL will continue to deliver its award-winning in-store educational outreach that has proven so successful in the past. A small energy efficient product giveaway is used as the “hook” (such as CFLs, LEDs, programmable thermostats etc.) to create excitement and ‘buzz’ and drive traffic to retail locations. An integrated communications strategy is developed to create awareness, provide details of the offer and event logistics (date, location, time). In addition to local mass market, direct mail drops and public relations strategies are used.

Once at the retail channel, our highly trained conservation ambassadors will engage with people face-to-face to provide education on conservation, energy efficient products and Time-of-Use rates; demonstrate how products work and encourage the adoption of use. It is important to note the intention is to expose and trial this new technology in the hopes consumers will make educated decisions to switch. This type of face-to-face engagement, using a giveaway/exchange as a hook, in a retail setting has proven successful over the past six years with unprecedented participation in Toronto.

Toronto Hydro Unique Retail Events	2010	2009	2008	2007	2006	2005
Customer Participation	90,000	48,000	80,000	24,000	170,000	204,000

Given Toronto is such a densely populated City with a diverse, ethnic base we have ambassadors that can communicate in the five most commonly spoken languages.

FESTIVE LIGHT EXCHANGE

Along with targeting the broad, highly-populated City of Toronto in high-traffic retail settings as discussed above, THESL will target critical smaller community events and work closely with the Toronto Association of Business Improvements Areas (TABIA), Toronto Police Services (TPS), and Toronto School Boards and affiliates to deliver education and outreach to hard-to-reach Toronto customer segments.

Working with TABIA, THESL will continue successful community outreach at outdoor lighting events throughout Toronto. Residents have the opportunity to engage with THESL at community-based events and turn in old incandescent light strings for recycling. This program provides an ideal opportunity to educate specific Toronto communities (many ethnic communities) and demonstrate new technologies to build familiarity. For two sets of light strings turned in, residents receive a set of efficient LED light strings from THESL.

TORONTO POLICE OUTREACH

THESL will partner with TPS and their Toronto Anti-Violence Intervention Strategy (TAVIS), and bring education and information to the high volume of hard-to-reach, at-risk neighbourhoods unique to the City of Toronto. This market segment is not reached by standard programs and marketing outreach and will remain untouched without special attention. Leveraging outreach already being undertaken by TPS, THESL is able to provide conservation and energy efficiency education effectively and efficiently. It is critical to provide education to these communities along with tools to enable them to conserve at the right time, to better manage their electricity costs. With a high proportion of young families and seniors, many of these residents are home during the day, and using electricity at peak times, rather than off peak.

Working with TPS and TAVIS, THESL is able to leverage their outreach and overlay its own effort, speaking to vulnerable Torontonians about TOU and energy conservation. For most, English is a second language and face-to-face dialogue is critical as these community members are very much isolated and not currently engaged.

SCHOOL EDUCATION AND OUTREACH

Provide hands-on electricity conservation and efficiency learning. Toronto Hydro has been approached by school boards and teachers to support and enable school-based education and outreach around electricity conservation and efficiency. In 2010, Toronto Hydro successfully partnered with both the public and Catholic district school boards to execute on campus events engaging students and teachers with hands-on education and engagement. Toronto Hydro will continue to work with the boards and schools as well as related programs and partners, especially targeting those in designated Priority Neighbourhoods, to provide programs and educational material to empower students and enable them to take the conservation and efficiency message back to their homes.

1.4. Value Proposition

Targeting customers when they are in decision-making (purchasing) mode, Toronto Hydro will provide face-to-face education and outreach. Customers will see the following benefits:

- Improving their understanding of the potential for energy efficiency initiatives within their homes and workplaces by meeting energy experts face-to-face to learn about energy efficiency, conservation and TOU through education, dialogue, and demonstration
- Benefitting from reduced energy costs by making behaviour changes
- Reducing their environmental footprint and demonstrating good corporate social responsibility
- Ability to socialize and share experiences and ideas with other community members
- Accessibility to conservation and energy efficiency programs at a local, neighbourhood level

This educational initiative targets behaviour change and strives to build an understanding around conservation and energy efficiency, specifically:

- shifting their use to off-peak times;
- using less electricity (conservation);
- using electricity more efficiently via technologies, appliances etc (energy efficiency)

1.5. Conformance with OPA Program Measures

Under Section 4.3 of the Code, a distributor is allowed to apply to the Board for approval of CDM education program.

1.6. Conformance with CDM Code Requirements

This submission is compliant under Section 4.3.2 of the “Conservation and Demand Management Code for Electricity Distributors”, which specifies the requirements for a distributor's application for a proposed Board-Approved CDM Education Program and is documented under Appendix B.

2. Target Market

2.1. Sector Analysis

The residential sector represents 80% of THESL's customer base and 21% of THESL's annual electricity consumption. This large sector heavily influences government and media, as both are prevalent and accessible in Toronto.

2.2. Market Penetration

This educational initiative will target the residential sector or 'mass market' which represents 2.5 million people in the City of Toronto. Toronto has an incredibly diverse customer base so targeted events will reach customers of all income brackets and ethnicities.

2.3. Projected Number of Participants

With exposure, we will reach a minimum of 1 million Torontonians through this program.

3. Projected MW and MWh Savings

Not Applicable

4. Marketing and Sales Plan

4.1. Marketing and Communications

A combination of advertising, public and media relations and direct marketing will be used to create awareness and drive traffic to certain events. Toronto Hydro will work directly with retailers to execute events in high-traffic areas of Toronto stores.

Direct-to-customer, event-based marketing will be used to facilitate face-to-face customer interaction and education. Existing events and outreach unique to Toronto will be leveraged for this program to reach unique Toronto communities efficiently and effectively.

4.1.1. Marketing Objectives

- Leverage existing events and partnerships creating synergies and powerful, relevant messages
- Build awareness of events
- Drive participation in the event

4.1.2. Primary Target Market

- Residential customers in the City of Toronto especially new immigrants, English as a second language, visible minorities, and vulnerable Torontonians
- Youth (students)

4.1.3. Secondary Market

- Toronto media outlets
- Small business customers

4.2. Collaboration with other LDC's

These will be Toronto-only events, contained with THESL's service territory.

4.3. Take-to-Market Approach

High-traffic events provide a venue for significant exposure for conservation, efficiency and Time-Of-Use education.

Direct-to-customer, event-based marketing will be used to facilitate face-to-face customer interaction and education.

Events will take place throughout each calendar year, with an emphasis on spring and summer, prior and during Toronto's peak electricity usage. In store events will take place over pre-arranged consecutive weekends. Retail and other partners will be selected through an RFEI or RFP process.

4.4. Tactics

Localized marketing tactics will be used to drive traffic to events. Tactics include:

- Newspaper (community and ethnic)
- Public relations (media releases, advisories)
- Outdoor media
- Community mailers, posters, announcements
- Partner communication channels (retailers, TABIA, TPS, City of Toronto, School Boards)
- Website
- Social media

4.5. Key Messaging

Conserving, shifting, and using electricity efficiently are three ways you can do your part to reduce the strain on the electricity grid and manage electricity costs.

5. Program Rules

5.1. Eligibility

Proof of Toronto residency is required.

6. Program Evaluation

6.1. Program Evaluation Plan

Program evaluation will be carried out by a certified independent third-party M&V Professional based on the OPA EM&V Protocol, as applicable. It will focus on the following areas to assess the cost-effective delivery of the program:

Evaluation Objectives	Evaluation Goals
Process Design Effectiveness	<ul style="list-style-type: none"> • Participation rates • Perceived value of time invested
Program Administration Effectiveness	<ul style="list-style-type: none"> • Perceived effectiveness of the training delivery and program organization
Estimate Program Cost Effectiveness	<ul style="list-style-type: none"> • Effectiveness of the program delivery in terms of marketing/sales activities in signing up future participants
Ensure Level of Customer Satisfaction	<ul style="list-style-type: none"> • Perceived importance of information received

The draft EM&V template is used to represent the evaluation plan as shown in Appendix A, but the eventual evaluation plan will be prepared by the independent evaluator.

7. Program Budget

The 2011-2014 budgeting plan for the program is summarized in the following table:

DESCRIPTION	2011	2012	2013	2014	Total
Marginal Costs					
Fixed Costs					
Administrative Costs	\$10,000	\$10,000	\$10,000	\$10,000	\$40,000
Legal Cost	\$25,000	\$10,000	\$10,000	\$10,000	\$55,000
Operation Cost	\$0	\$0	\$0	\$0	\$0
Marketing (includes staff)	\$505,000	\$505,000	\$505,000	\$505,000	\$2,020,000
Sales	\$0	\$0	\$0	\$0	\$0
External Costs	\$384,916	\$384,916	\$384,916	\$384,916	\$1,539,664
Program EMV	\$10,000	\$10,000	\$10,000	\$15,000	\$45,000
Total Fixed Costs	\$934,916	\$919,916	\$919,916	\$924,916	\$3,699,664
Total Variable Costs	\$0	\$0	\$0	\$0	\$0
Total Allocatable Costs	\$0	\$0	\$0	\$0	\$0
Total Program Costs	\$934,916	\$919,916	\$919,916	\$924,916	\$3,699,664
Incentives/Premiums	\$490,000	\$490,000	\$490,000	\$490,000	\$1,960,000
Total Budget	\$1,424,916	\$1,409,916	\$1,409,916	\$1,414,916	\$5,659,664

8. Cost Benefit Analysis

Under Section 4.1.2 of the Code, a distributor is allowed to forego the Cost-Effectiveness Test when submitting a CDM program designed for educational purposes for Board approval where Cost-Effectiveness cannot be demonstrated.

9. Non-Duplication of OPA-Contracted Provincial Programs

The OPA-Contracted programs do not provide an initiative similar to this program.

10. Data Collecting, Tracking and Reporting

Documentation archives will be maintained and will be used for governance, reference and audit purposes.

THESL employs a comprehensive financial and work order system to keep track of CDM related expenditures. After validation and verification of participant and third party invoices, payments will be made and recorded in the system. Each invoice will be substantiated by supporting documents.

Internal operational reports will be prepared and reviewed monthly subject to THESL's corporate governance rules and policies, including those established to govern OPA Programs. Annual reports consisting of financial and operational results will be submitted to the OEB.

All data collection efforts will be in conformance with OEB CDM Code as well as any other instruction received.

Appendix A - Program Evaluation Plan based on Draft OPA Template

Program Description	As described in Section 3 of this application document.
Evaluation Goals and Objectives	<p>The Evaluation objectives are:</p> <ol style="list-style-type: none"> Process Design Effectiveness Program Administration Effectiveness Estimate Program Cost Effectiveness Ensure Level of Customer Satisfaction <p>The Evaluation goals are:</p> <ol style="list-style-type: none"> Participation rates Perceived value of time invested Perceived effectiveness of the training delivery and program administration organization Effectiveness of the program delivery in terms of marketing/sales activities in signing up future participants Perceived importance of information received
Evaluation Deliverables	<ul style="list-style-type: none"> Draft Evaluation Plan Final Program Evaluation Plan Annual Report - Elements Final Report
Evaluation Description	<p>The evaluation elements of the Evaluation Goals and Objectives are anticipated to include (but are not limited to) those listed in the corresponding sections below.</p> <p>It is expected that these elements will be reviewed, discussed, evaluated or analyzed as appropriate to ensure that they meet the Program Evaluation Goals and Objectives during the Draft Evaluation Plan development phase.</p> <p>Review of these elements will assist THESL in determining and/or validating the appropriateness of the program design, administration and assumptions, and whether adjustments are necessary in order to successfully deliver the initiative and to achieve the anticipated goals and objectives and estimated participation and results.</p>
Evaluation Elements	<p>The cross elements against which the goals will be assessed, as applicable, are:</p> <ol style="list-style-type: none"> Program Process Design Effectiveness - Evaluation criteria:

	<ul style="list-style-type: none"> • Alignment with goals and objectives of program • Staffing and training • Tools and processes • Participant and non-participant satisfaction reporting • Reporting procedures <p>ii) Program Administration Effectiveness - Evaluation Criteria:</p> <ul style="list-style-type: none"> • Program statistics • Program Impact Evaluation • Marketing Effectiveness Assessment • Actual versus Budget Reporting • Market Participant review <p>iii) Program Cost Management:</p> <ul style="list-style-type: none"> • Verification of program expenditures versus budget • Verification of incurred payments
Data Collection Responsibilities to Support Program Evaluation	This will be completed with the assistance of an independent third party to ensure complete and appropriate collection of data to support program evaluation.
Evaluation Schedule & Budget	Report anticipated end of first quarter of the following year. Estimated Program evaluation budget is \$15,000 per year (years 2011 – 2013 results) and \$20,000 for final report (2014 results).

Appendix B – CDM Code Requirements

This section documents that this program application is compliant under Section 4.3.2 of the “Conservation and Demand Management Code for Electricity Distributors”, requiring that a distributor’s application for a proposed Board-Approved CDM Program must include the following:

CDM Code Reference	CDM Code Requirement	Section Addressing Requirement
4.3.2 (a)	identify the customer type(s) that will be targeted;	2.1
4.3.2 (b)	specify the number of participants that will be targeted;	2.1, 2.3
4.3.2 (c)	explain why the educational CDM program is needed (i.e., why there is a need to educate the specified customer type(s) on the specified energy issues);	1.1
4.3.2 (d)	articulate the educational approaches that will be utilized by the distributor (i.e., brochures, seminars, etc.);	1.1, 1.3, 4
4.3.2 (e)	provide estimates of costs of the educational CDM program; and	7
4.3.2 (f)	describe the anticipated benefits of the educational CDM program	1.2, 1.4

Toronto Hydro-Electric System Limited

**Conservation and Demand Management
Program Application:**

**Flat Rate Water Heater Conversion &
Demand Response (“FRWHDR”)**

**Submitted to:
Ontario Energy Board**

Submitted on January 10, 2011

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Executive Summary

Toronto Hydro-Electric System Limited (THESL) has identified an opportunity for increased conservation within its jurisdiction through the conversion of Flat Rate Water Heaters (FRWH) to a metered service. This energy conservation measure will be coupled with the installation of a load control switch on the domestic hot water tank, which will allow these loads to be controlled during periods of high demand.

To reduce the high electricity consumption that occurs with unmetered services, the Flat Rate Water Heater Demand Response (FRWHDR) Program will incent owners to convert to a metered service and install a load control switch. The proposed incentives are expected to encourage conversion of 80% of the remaining 5,516 single family residences that remain on the flat rate domestic hot water heater service.

To proceed with this program, THESL is seeking approval from the Ontario Energy Board (OEB) to expend \$2.7 million to achieve 10.2 GWh of net cumulative energy savings, 0.3 MW of peak demand savings and develop 1.49 MW of additional demand response capability. The anticipated Total Resource Cost (TRC) benefit to cost ratio for this program is 1.3. The anticipated Program Administrator Cost (PAC) benefit to cost ratio for this program is 1.3.

This submission is in conformance with the requirements of Section 3.1.4 of the CDM Code. The specific requirements for an OEB Board-Approved Program are found throughout this document and have been summarized in the Appendices for convenience.

The FRWHDR program will operate for two years from funding approval. For the purposes of this submission the start date is assuming approval before the end of the first Quarter in 2011. Refer to the table below for a program summary.

	2011	2012	2013	2014	Total
Cumulative Energy Savings (MWh)	1,019	4,076	7,134	10,191	10,191
Demand Response Savings (MW)	0.50	0.99	1.49	1.49	1.49
Peak Demand Savings (MW)	0.10	0.20	0.30	0.30	0.30
Budget (000's)	\$926	\$1,753	\$0	\$0	\$2,679

Note: Savings are net. Budget includes fixed and variable incentive budget.

Other objectives of the FRWHDR program include:

- Provide a cost effective program targeting a market that has been overlooked by existing conservation programs.
- Mobilize a transformation of FRWH to a metered service and provide information to help customers manage consumption.
- Transform participant's behaviour and reinforce a culture of conservation.

1. Program Description

1.1. Program Rationale

In THESL's service territory, there are approximately 11,000 electric FRWH customers, which include a mixture of residential, small commercial and low rise multi residential buildings. Originally this water heater load was installed on an unmetered circuit and was controlled by THESL to manage peak load. These electric water heaters represent a controllable load that can still be used to reduce demand during periods when the electricity grid is at high capacity.

As this load is unmetered, the customers typically do not manage their energy use as efficiently or effectively as those that are metered. This has been confirmed with studies conducted by THESL on over 50 FRWH single family residences that converted to metered water heater where the metering showed average electricity savings of 20.5% (refer to Appendix A for more information). However, it is not expected that this level of savings would be seen in Multi-Unit Residential Buildings (MURB) or other rental situations where the occupant does not directly pay for electricity.

A summary of the total and remaining eligible customers can be found below:

Customer Description	Water Heater Conversions Remaining
Customer Owned	951
Rentals (not eligible)	2,092
Residential	3,574
Multi-Units (not eligible)	3,356
Move-Ins *	991
TOTAL	10,964
TOTAL (Eligible Units)	5,516

* Move-Ins are single family residences that have changed ownership and are categorized for marketing purposes as such.

1.2. Program Objectives

The objectives of the FRWHDR conversion program are as follows:

- Encourage 80% of the remaining 5,500 single family residences with flat rate water heaters to convert to metered service. The conversions are anticipated to be completed by the end of December 31, 2012 provided approval is received by the end of March 2011. If approval is delayed beyond that the program will extend into 2013.
- Contribute 10.2 GWh in cumulative net electricity savings, 0.3 MW in summer demand reduction plus 1.49 MW in demand response capacity over the four-year Conservation Demand Management (CDM) programs timeline to THESL'S mandated conservation targets.

1.3. Program Details

The FRWHDR program is proposed to assist single family residential owners in converting flat rate water heaters to a metered service.

The FRWHDR program will provide an incentive of \$0.20 per kWh of the estimated electricity savings to single family residential FRWH customers to convert to a metered service. As noted, rental, commercial and multi unit residential buildings are not eligible for this program. This incentive will reduce approximately 50% of the estimated cost attributed from the total average cost for the conversion. The rationale for providing an incentive higher than OPA's province-wide programs is to make the conversion an attractive proposition and to encourage the desired behavioural changes.

The incentives for the typical tank conversions are shown below:

Gallons	Bottom Element Size (Watts)	Top Element Size (Watts)	Incentive (\$)
40	800	800	\$138.70
40	1000	1000	\$165.95
40	1000	3000	\$176.66
40	3000	1000	\$220.95
40	3000	3000	\$264.75
60	1000	3000	\$198.07

This program will run for two from program approval date. It is anticipated that approval will be received in Q1 of 2011 which would allow a program end date of December 31, 2012.

1.3.1. Program Scope

The program scope for THESL will include:

- 1) Pre- Application Stage
 - a) Communicate program to target customer group.
- 2) Application Stage
 - a) Accept customer applications and review to ensure that the site is eligible for incentives.
- 3) Implementation Stage
 - a) Coordinate with customer and THESL's installation contractor to undertake conversion on behalf of customer.
- 4) Post-Implementation Stage
 - a) Process incentives based on incentive list.
 - b) Manage the third party program evaluation process.

1.4. Value Proposition

The value proposition for the customer is they will:

- Reduces electricity used for generating DHW by 20.5 % on average.
- Reduces green house gas emissions.
- Receive incentives that will cover a substantial portion of the customer's electrical upgrade costs.

1.5. Conformance with OPA Program Measures

The proposed program is designed to address a unique conservation opportunity in THESL's service territory. There is no current program to incent FRWH conversions to metered electric systems and the domestic hot water fuel conversion measure is no longer available via the OPA-Contracted Province-Wide programs. As such, there are no means of targeting this excess energy use under the 2011-2014 CDM programs.

1.6. Conformance CDM Code Requirements

This submission is compliant under Section 3.1.4 of the “Conservation and Demand Management Code for Electricity Distributors”, which specifies the requirements for a distributor's application for a proposed Board-Approved CDM Program and is documented under Appendix D.

2. Target Market

2.1. Sector Analysis

The target market for this program (as of November 2010) is single family housing units with flat rate water heaters. This market is targeted because evaluation has shown that there is a substantial reduction in electricity consumption when the units are converted to metered service (see Appendix A).

Customer Description	Water Heater Conversions Remaining	Eligible for Program
Customer Owned	951	951
Rentals	2,092	Not Eligible
Residential	3,574	3574
Multi-Units (not eligible)	3,356	Not Eligible
Move Ins	991	991
TOTAL	10,964	5,561

2.2. Market Penetration

The current approach to encourage conversion to a metered service has relied exclusively on mail outs and other communications. This approach is reaching the limit of effectiveness as the remaining customers have more difficult conversion choices and require additional inducements to consider changing their service. It is expected that the incentives will encourage 80% of the remaining 5,561 tanks to convert.

Type	2011	2012	Total
Total	1471	2942	4413
Monthly Conversion Rate	123	245	184

3. Projected MW and MWh Savings

3.1. Methodology

3.1.1. Electricity Consumption Savings

The savings calculations are based on establishing the annual electricity consumption savings for each tank/element combination which is then used to derive an average savings per tank based on common customer use patterns.

The annual electricity consumption per tank size and element size are shown below. These values were approved by the OEB during rate submissions in 2000 by THESL. For more information please refer to Appendix B.

These calculations were used to estimate an average tanks consumption of 4,640 kWh for the residential class consumers.

Gallons	Bottom Element Size (Watts)	Top Element Size (Watts)	Annual Consumption (kWh)	Annual Savings (kWh)	Number of Tanks	Total Annual Consumption (MWh)
40	800	800	3,468	694	1,009	3,499
40	1000	1000	4,149	830	110	456
40	1000	3000	4,417	883	2,478	10,944
40	3000	1000	5,524	1,105	751	4,148
40	3000	3000	6,619	1,324	458	3,031
60	1000	3000	4,952	990	710	3,516
				Total	5,516	25,595
				Ave. Cons.	4,640	

As noted previously, the 20.5% savings were applied to the average electricity usage to achieve an average electricity savings per tank of 951 kWh. These savings were then applied to the projected number of conversions to determine the electricity savings. In addition, there are small electricity savings as the result of load control events. The savings are estimated to be 21kWh annually per tank based on 20 activations of 4 hours duration.

3.1.2. Electricity Demand Savings

Demand savings are estimated using American Society of Heating Refrigeration and Air-Conditioning Engineers (ASHRAE) standard profiles and result in a factor of 33.5% of element size being achieved during the summer peak demand period. This result was applied to the tank/element sizes to obtain the savings noted below.

Gallons	Bottom Element Size (Watts)	Top Element Size (Watts)	Annual Consumption (kWh)	Number of Tanks	Peak Load in Class (kW)
40	800	800	3,468	1,009	807
40	1000	1000	4,149	110	110
40	1000	3000	4,417	2,478	2,478
40	3000	1000	5,524	751	2,253
40	3000	3000	6,619	458	1,374
60	1000	3000	4,952	710	710
				Total	7,732
				Average kW/tank	1.39

The calculated electrical demand per tank size is shown below.

Description	Value
Peak Demand (kW)	7,732
Peak Coincidence Factor	33.54%
On Peak Demand (kW)	2,594
Savings (%)	21
Demand Reduction (kW)	532
On Peak Demand Savings (kW/tank)	0.096
Demand Response Savings (kW/tank) ¹	0.375

The savings per tank is 0.096 kW if the system is changed to a metered service. For the demand response savings the peak coincidence factor value is used to calculate the demand response reduction that will be achieved. This value is conservative based on the ASHRAE demand response profiles. Additional details are included in Appendix C.

¹ Demand Response Savings Per Tank = 2594 kW (Estimated on Peak Load)/5516 tanks – 0.096 kW/tank
= 0.375 kW/tank

3.2. Savings Summary

The tables below summarize the net total estimated savings with a free-ridership factor of 30% for the FRWH conversions and 10% for the **peaksaver**® measure. These values are assumed in calculating net savings.

Net MW Reduction					
	2011	2012	2013	2014	Total
Metered Service	0.10	0.20	0.00	0.00	0.30
Demand Response Capacity	0.50	0.99	0.00	0.00	1.49
Net MWh Reduction					
	2011	2012	2013	2014	Total
Metered Service	979	1,959	0	0	2,938
Demand Response	40	79	0	0	119
Cumulative Savings	1,019	4,076	8,153	10,190	10,190

4. Marketing and Sales Plan

4.1. Marketing Strategy

Strategy

Educate and encourage customers to move from an unmetered flat rate hot water heater to a metered solution by taking advantage of the new incentive offer and enrolling in the **peaksaver**® program to support the province's "conservation culture".

Target Market

Based on THESL customer billing information, it is possible to identify the individual customers that are targeted for this program. Single Family Homes will be the primary focus of the program.

Key Program Drivers

- Providing incentives in the market to encourage the mobilization of this type of activity for metered conversion and **peaksaver**® adoption.
- Flat rate water heaters are being phased out. However, normal marketing tactics are saturated and are no longer effective. Incentive inducement is required.
- Customers that convert, can take advantage of off-peak water heating with matched Time-of-Use (TOU) rate opportunities and benefits.
- Meter incentive is scalable based on size and capacity of current water heater.
- A program has been put into place that will provide the customers with a financial incentive to convert to a metered water heater. The incentive is based on the size and capacity of their current water heater.

- Resolving that, “what gets measured, gets managed”
- Participation in the **peaksaver**® program allows customers to help Ontario meet it’s CDM goals

Key Messaging

- Convert to a metered water heater and receive an incentive
- Join the **peaksaver**® program and help keep Ontario green
- Educate customers about TOU rates and the benefits of shifting usage to help manage their electricity bills
- Promote electricity conservation messaging and provide information on how to use electricity wisely

Tactics

- Develop new web pages with detailed information about the program
- Develop a direct mail education package introducing the new program
- Utilize reminder letters to encourage participation
- Utilize Auto dialler messaging to encourage participation
- Deploy on bill messages to encourage participation
- Develop bill inserts to promote the program
- Utilize E Newsletter articles advertising the program
- Utilize Newsletter articles advertising the program
- Work with the DHW tank owner to promote the program

5. Program Rules

5.1. Eligibility

All THESL single family residential customers with a FRWH are eligible for the program incentive.

The applicant must also:

- Warrant that the flat rate bill is being paid directly by the owner or tenant
- Complete the conversion prior to the program end date
- Agree to participate in the **peaksaver**® program for their domestic hot water tank

5.2. Enrolment Process

To participate, the eligible customers will either fill in an online application or contact the THESL Customer Service Group. Ineligible facilities (rental or MURB) will be screened out by the Customer Service Group. The participant will also need to sign up for the **peaksaver**® program, but will not be eligible for **peaksaver**® program incentives.

The client will be notified if the approval has been approved or declined prior to the conversion occurring.

5.3. Incentives

5.3.1. Conversion to Metered Service

Customers who convert their FRWH to metered service will receive an incentive of \$0.20 per kWh saved based on the estimated electricity usage for their respective tank size (see savings table in Section 3.1.1).

5.3.2. Peak Saver Incentives

Customers will **not** be eligible for additional incentives under this program.

5.4. Activation Rules & Requirements

5.4.1. Incentive Application

As part of incentive application, the participant will be required to:

- Warrant that the occupant is responsible for paying the electricity bills.
- Warrant that the service water heater is not located in a MURB property.
- Provide details on the planned replacement and related equipment as required.
- Participate in the program evaluation as required.
- Provide access to THESL contractors or personnel to remove control wiring and other auxiliary equipment that was used for load control.
- Enroll in the **peaksaver**® program.

5.4.2. Incentive Approval

Once the application is approved by THESL, the participant will work with their selected contractor to upgrade the electrical service to convert to a metered service. Once complete, the participant will be required to inform THESL that the conversion is complete and provide documentation on tank and element sizing. THESL subcontractors will then disconnect the control wiring and verify the installation is complete. Based on the site verification the incentive will be processed.

6. Program Evaluation

6.1. Project M&V

Project M&V will be limited to confirming the impact of the conversion on 30 customers per year over the life of the project. The impact of the conversions will be determined using billing analysis.

A savings report will provide results in conformance with IPMVP standards and/or OPA M&V protocols. Refer to Appendix E for a description of M&V methodology.

6.2. Program Evaluation Plan

Program evaluation will be carried out by a certified independent third-party M&V Professional based on the OPA EM&V Protocol. It will focus on the following areas to assess the cost-effective delivery of the program:

- The achieved program gross peak demand (MW) and energy savings (MWh) reductions.
- The net program peak demand reductions and energy savings in consideration of the free-ridership and realization rates to be determined.
- The actual TRC and PAC results based on the achieved savings.
- The effectiveness of the program delivery in terms of marketing/sales activities in signing up participants.
- Program administration and governance effectiveness.

The draft OPA EM&V template is used to outline the evaluation plan as shown in Appendix E, but the eventual evaluation plan will be prepared by the M&V Professional evaluator based on the OPA EM&V protocols. If necessary THESL will follow the OPA's EM&V Protocols for custom measures not included in the OPA's Measures and Assumptions List.

7. Program Budget

The 2011-2012 budgeting plan for the program is summarized in the following table:

Description	2011	2012	Total
Marginal Costs			
Fixed Costs			
Legal Cost	\$9,450	\$7,875	\$17,325
Marketing	\$47,250	\$21,450	\$68,700
Sales	\$0	\$0	\$0
Program EMV	\$15,000	\$15,000	\$30,000
Administrative Costs	\$14,535	\$29,652	\$44,187
Operation Cost	\$2,772	\$13,477	\$16,249
Total Fixed Costs	\$89,007	\$87,454	\$176,461
Variable Costs			
Administrative Costs	\$58,141	\$118,607	\$176,747
Operation Cost	\$11,087	\$13,477	\$24,565
Vendor Cost	\$470,699	\$941,397	\$1,412,096
Total Variable Costs	\$539,926	\$1,073,481	\$1,613,408
Total Marginal Cost	\$628,933	\$1,160,935	\$1,789,869
Total Allocable Cost	\$17,610	\$32,506	\$50,116
Total Program Costs	\$646,544	\$1,193,442	\$1,839,985
Total Incentives	\$279,834	\$559,668	\$839,503
Total Budget	\$926,378	\$1,753,110	\$2,679,488

8. Cost Benefit Analysis

The table below summarizes the results for cost effectiveness tests using the most current OPA model named "Conservation_Program_Resource_Planning_Tool_V3.3". The tests include both Total Resource Cost (TRC) and Program Administrator Cost (PAC)².

Name of Test	Benefits	Costs	Net Benefits	Ratio
TRC	\$ 4,187,405	\$ 2,242,177	\$ 1,945,228	1.9
PAC	\$ 4,229,134	\$ 2,431,191	\$ 1,797,943	1.7

/C

The above tests results are based on the following input assumptions:

- Free ridership : 30% for water heater conversions
: 10% for **peaksaver**®
- Unit incremental equipment costs : \$250
- Operating life : 13 years (OPA standard assumptions)
- Number of participants : 4,431
- Unit peak demand savings : 0.096kW (meter conversion)
- Unit demand response capacity : 0.0375 kW
- Unit annual energy savings : 951 kWh (meter conversion)
: 21 kWh (demand response)
- Program costs : \$1,839,985
- Financial incentive : \$839,503

9. Non-Duplication of OPA-Contracted Provincial Programs

The proposed program will not duplicate any existing OPA programs as there is no current Tier 1 standard measure that is available for the conversion from a flat rate to a metered service.

10. Data Collecting, Tracking and Reporting

Commercially reasonable efforts will be used to ensure that the electricity consumption and demand savings are calculated using best engineering practice. THESL will require supporting data from program participants to substantiate the claimed savings. Documentation archives will be maintained and will be used for governance, reference and audit purposes.

² TRC and PAC calculations are based on annualized savings.

THESL employs a comprehensive financial and work order system to keep track of CDM related expenditures. After validation and verification of participant and third party invoices, payments will be made and recorded in the system. Each invoice will be substantiated by supporting documents.

Internal operational reports will be prepared and reviewed monthly subject to THESL's corporate governance rules and policies, including those established to govern OPA Programs. Annual reports consisting of financial and operational results, energy and demand savings (based on project M&V and program EM&V results from independent third party reports) will be submitted to the OEB.

THESL is committed to delivering CDM programs that has a ratio of benefits to costs greater than one. TRC and PAC calculations will be performed annually and on completion of the program which will be included in the OEB reports.

All data collection efforts will be in conformance with OEB CDM Code as well as any other instruction received.

Appendix A – FRWH Impact on Electricity Consumption

Group	Conv DATE	Average Consumption prior to Conversion-kWh	Average Consumption after Conversion-kWh	Consumption- Increase / Decrease	Priliminary % change	% change	Average Consumption prior to Conversion	Average Consumption after Conversion	Consumption Increase / Decrease	Final % change*
1	FEB 20 2008	2,446	2,197	-250	-10.2%	-10.2%	2,446	2,197	-250	-10.2%
NW	JAN 20 2008	4,516	1,843	-2,673	-59.2%	0.0%	0	0	0	-
1	MARCH 31 2008	1,666	1,454	-213	-12.8%	-12.8%	1,666	1,454	-213	-12.8%
NW	NOV 27 2007	1,179	835	-344	-29.2%	-29.2%	1,179	835	-344	-29.2%
NW	MAY 8 2008	2,487	918	-1,569	-63.1%	0.0%	0	0	0	-
NW	NOV 12 2007	841	892	50	6.0%	6.0%	841	892	50	6.0%
2	OCT 15 2007	1,881	2,215	334	17.8%	17.8%	1,881	2,215	334	17.8%
NW	NOV 12 2007	1,748	1,240	-509	-29.1%	-29.1%	1,748	1,240	-509	-29.1%
2	JUNE 3 2008	1,844	1,415	-429	-23.2%	-23.2%	1,844	1,415	-429	-23.2%
2	JUNE 3 2008	1,633	1,149	-485	-29.7%	-29.7%	1,633	1,149	-485	-29.7%
2	JUNE 16 2008	1,728	1,295	-433	-25.0%	-25.0%	1,728	1,295	-433	-25.0%
2	MARCH 20 2008	635	675	40	6.4%	6.4%	635	675	40	6.4%
NW	OCT 9 2007	777	151	-626	-80.6%	0.0%	0	0	0	-
2	APRIL 23 2008	1,368	906	-462	-33.7%	-33.7%	1,368	906	-462	-33.7%
2	SEPT 8 2008	1,609	1,167	-442	-27.5%	-27.5%	1,609	1,167	-442	-27.5%
2	JUNE 23 2008	2,082	1,634	-449	-21.5%	-21.5%	2,082	1,634	-449	-21.5%
2	JUNE 23 2008	1,588	1,182	-406	-25.6%	-25.6%	1,588	1,182	-406	-25.6%
1	JUNE 23 2008	3,295	3,378	83	2.5%	2.5%	3,295	3,378	83	2.5%
2	JULY 8 2008	1,786	1,037	-749	-42.0%	-42.0%	1,786	1,037	-749	-42.0%
NW	APRIL 4 2008	1,418	297	-1,122	-79.1%	0.0%	0	0	0	-
NW	NOV 30 2007	999	108	-891	-89.2%	0.0%	0	0	0	-
2	FEB 22 2008	1,535	410	-1,125	-73.3%	0.0%	0	0	0	-
NW	FEB 21 2008	2,547	1,342	-1,205	-47.3%	-47.3%	2,547	1,342	-1,205	-47.3%
NW	FEB 21 2008	849	247	-602	-70.9%	0.0%	0	0	0	-
2	MAY 30 2008	947	652	-295	-31.1%	-31.1%	947	652	-295	-31.1%
2	JUNE 6 2008	1,718	1,070	-649	-37.7%	-37.7%	1,718	1,070	-649	-37.7%
1	JULY 15 2008	1,697	1,348	-349	-20.5%	-20.5%	1,697	1,348	-349	-20.5%
1	JUNE 24 2008	2,302	630	-1,672	-72.6%	0.0%	0	0	0	-
2	JUNE 25 2008	940	449	-492	-52.3%	0.0%	0	0	0	-
NW	MAY 1 2008	4,433	1,012	-3,421	-77.2%	0.0%	0	0	0	-
2	APRIL 17 2008	1,264	591	-673	-53.3%	0.0%	0	0	0	-
2	APRIL 1 2010	2,275	2,027	-248	-10.9%	-10.9%	2,275	2,027	-248	-10.9%
2	JUNE 25 2008	1,661	667	-994	-59.8%	0.0%	0	0	0	-
1	SEPT 15 2006	2,655	1,843	-812	-30.6%	0.0%	0	0	0	-
2	JUNE 15 2008	1,879	1,665	-215	-11.4%	-11.4%	1,879	1,665	-215	-11.4%
NW	OCT 15 2007	1,823	1,608	-215	-11.8%	-11.8%	1,823	1,608	-215	-11.8%
2	JUNE 26 2008	1,188	833	-355	-29.9%	-29.9%	1,188	833	-355	-29.9%
2	JUNE 25 2008	1,360	978	-383	-28.1%	-28.1%	1,360	978	-383	-28.1%
NW	APRIL 18 2008	2,664	1,845	-819	-30.7%	-30.7%	2,664	1,845	-819	-30.7%
NW	DEC 4 2007	2,962	2,914	-48	-1.6%	-1.6%	2,962	2,914	-48	-1.6%
NW	JUNE 9 2008	1,706	906	-800	-46.9%	-46.9%	1,706	906	-800	-46.9%
1	JUNE 3 2008	1,014	451	-563	-55.5%	0.0%	0	0	0	-
NW	JUNE 3 2008	1,854	733	-1,122	-60.5%	0.0%	0	0	0	-
3	JUNE 26 2008	1,772	1,115	-657	-37.1%	-37.1%	1,772	1,115	-657	-37.1%
NW	MAY 29 2008	857	650	-207	-24.2%	-24.2%	857	650	-207	-24.2%
NW	MAY 8 2008	2,487	1,198	-1,289	-51.8%	0.0%	0	0	0	-
2	JULY 1 2008	2,321	2,230	-92	-4.0%	-4.0%	2,321	2,230	-92	-4.0%
2	JULY 4 2008	1,177	717	-461	-39.1%	-39.1%	1,177	717	-461	-39.1%
2	JULY 7 2008	2,051	1,718	-333	-16.2%	-16.2%	2,051	1,718	-333	-16.2%
2	JULY 8 2008	1,681	1,361	-320	-19.1%	-19.1%	1,681	1,361	-320	-19.1%
		91,149	59,192	-31,957	-35.1%	0.0%	59,957	47,645	-12,312	-20.5%
Notes:		tanks that converted to natural gas were removed from the analysis								
		data reflects equivalent pre and post metering periods and is not annual data								
		addresses and customer numbers have been removed								

Appendix B – OEB Consumption Calculations

TORONTO HYDRO-ELECTRIC SYSTEM LIMITED SCHEDULE OF RATES EFFECTIVE DECEMBER 1, 2000

WATER HEATER SERVICE

Water Heater Equipment Rental (NOTE: Unregulated Rates)

All offices except Toronto (Effective Until Electricity Market Opening)

Rental:	Gallons	Monthly Rental Charge
	40	\$4.60
	50	\$5.00
	60	\$5.30
	100	\$11.25
	Heavy Duty 100	\$15.43

Toronto Office Only (Effective Until Electricity Market Opening)

Rental:	Gallons	Monthly Rental Charge
	30	\$4.45
	40	\$5.51
	60	\$6.11
	Light Duty 80	\$8.33
	80	\$11.25
	100	\$11.92
	Heavy Duty 100	\$15.43
	120	\$18.22

Flat Rate Water Heater Schedule

(NOTE: This service, and allowance for controlled metered water heaters, will be discontinued upon the opening of the electricity market and is currently available only to customers subscribing to this service as of December 1, 2000.)

Allowance for Controlled Metered Water Heaters \$4.30

Element Size			Monthly Energy Charge		
Bottom	Top	Gallons	w/o Allowance	w Allowance	kWh
400	400	30	\$11.65	\$ 7.35	155.8
500	500	30	\$14.57	\$10.27	194.8
600	600	30	\$17.47	\$13.17	233.7
700	700	30	\$19.48	\$15.18	260.4
800	800	40	\$21.62	\$17.32	289.1
900	900	40	\$23.76	\$19.46	317.6
1000	1000	40	\$25.89	\$21.59	346.1
1000	2000	40	\$27.52	\$23.22	367.8
1000	3000	40	\$27.52	\$23.22	367.8
1000	3000	60	\$30.85	\$26.55	412.3
1250	1250	60	\$32.37	\$28.07	432.7
1500	1500	60	\$38.84	\$34.54	519.2
1500	2000	60	\$41.27	\$36.97	551.7
1500	3000	60	\$41.27	\$36.97	551.7
1500	4500	60	\$41.27	\$36.97	551.7
1500	4500	80	\$46.34	\$42.03	619.4
2000	2000	60	\$41.27	\$36.97	551.7

Appendix C – Demand Savings Analysis

ASHRAE METHODOLOGY

Peak Hourly Load	Average Usage	% of Peak
1	28.0	2.50%
2	26.0	2.33%
3	17.0	1.52%
4	28.0	2.50%
5	29.0	2.59%
6	86.0	7.69%
7	428.0	38.28%
8	880.0	78.71%
9	1118.0	100.00%
10	960.0	85.87%
11	659.0	58.94%
12	327.0	29.25%
13	375.0	33.54%
14	383.0	34.26%
15	409.0	36.58%
16	501.0	44.81%
17	574.0	51.34%
18	420.0	37.57%
19	541.0	48.39%
20	707.0	63.24%
21	673.0	60.20%
22	536.0	47.94%
23	396.0	35.42%
24	159.0	14.22%

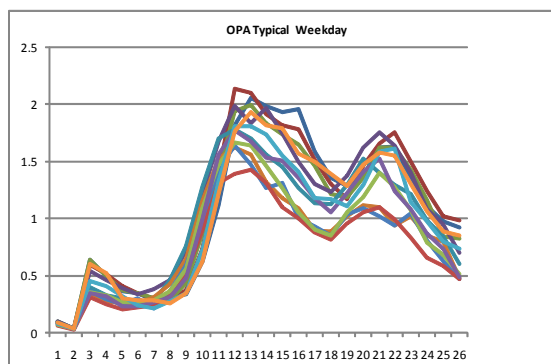
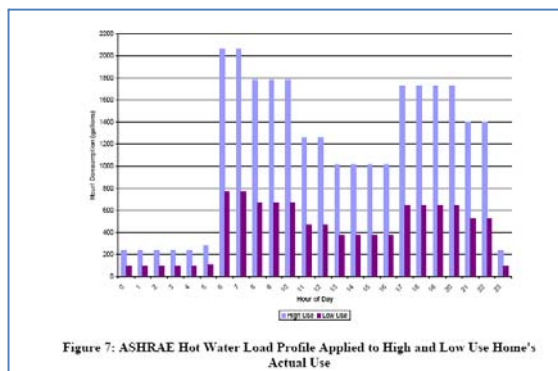
FRWH Peak Load-kW 7,732 Total element load 5516 tanks

Coincidence Factor 33.54% Used lowest afternoon hour

FRWH On Peak Load 2,594 kW

FRWH Metered Demand 532 kW
0.096 kW/tank

FRWH Metered Demand 2,594 kW
0.470 kW/tank



Appendix D – CDM Code Requirement Cross Reference

This section documents that this program application is compliant under Section 3.1.4 of the “Conservation and Demand Management Code for Electricity Distributors”, requiring that a distributor's application for a proposed Board-Approved CDM Program must include the following:

CDM Code Reference	CDM Code Requirement	Section Addressing Requirement
3.1.4 (a)	a program evaluation plan, based on the OPA's EM&V Protocols, for each program;	6.2
3.1.4 (b)	a benefit-cost analysis of each program which shall be completed by using the OPA's Cost Effectiveness Tests;	8
3.1.4 (c)	a detailed explanation of the program's objective(s) and method of delivery;	1.2, 1.3
3.1.4 (d)	the types of customers targeted by the program;	2.1
3.1.4 (e) ₁	a forecasted number of participants that the distributor expects will participate in the program;	2.2
3.1.4 (e) ₂	the total projected peak demand savings (kW) and electricity savings (kWh) per year, or if the program is for less than one year, the total projected peak demand savings (kW) and electricity savings (kWh) for the duration of the program;	3
3.1.4 (f)	a complete projected annual budget for each of the distributor's CDM Programs, including the following information:	7
3.1.4 (f) (i)	projected expenditures incurred on an annual basis, for each year of the CDM Programs, separated into customer incentive costs and program costs;	7
3.1.4 (f) (ii)	a division of program costs into Marginal Costs and Allocable Costs incurred as a result of program implementation;	7
3.1.4 (f) (iii)	information on the allocation of total expenditures incurred by targeted customer types for each direct projected expenditure; and	7
3.1.4 (f) (iv)	total projected expenditures for each program evaluation conducted; and	7
3.1.4 (g)	a statement that confirms that the distributor has used the OPA's Measures and Assumptions Lists or if the distributor has varied from the OPA's Measures and Assumptions Lists, the distributor must:	1.5
3.1.4 (g) (i)	appropriately justify the reason for varying from the OPA's Measures and Assumptions Lists in the application;	1.5
3.1.4 (g) (ii)	provide the technical assumptions and substantiating data that the distributor used; and	3
3.1.4 (g) (iii)	Provide a statement that the distributor has followed the OPA's EM&V Protocols for custom measures not included in the OPA's Measures and Assumptions Lists.	6.2

Appendix E – Program Evaluation Plan

Program Description	As described in this application document
Conservation Measures	Section 6
Evaluation Goals and Objectives	<p>Evaluation Goals and Objectives</p> <ul style="list-style-type: none"> • Process Design Effectiveness • Program Administration Effectiveness • Measures and Assumptions Review • Establish gross and net energy savings and demand reductions achieved • Estimate Program Cost Effectiveness • Ensure Level of Customer Satisfaction
Evaluation Deliverables	<p>Evaluation Deliverables</p> <p>Draft Evaluation Plan</p> <p>Final Program Evaluation Plan</p> <p>Annual Report – Elements</p> <p>Final Report</p>
Evaluation Description	<p>The evaluation elements of the Evaluation Goals and Objectives are anticipated to include (but are not limited to) those listed in the corresponding sections below. It is expected that these elements will be reviewed, discussed, evaluated or analyzed as appropriate and according to the OPA's EM&V Protocols to ensure that they meet the Program Evaluation Goals and Objectives during the Draft Evaluation Plan development phase. Review of these elements will assist THESL in determining and/or validating the appropriateness of the program design, administration and measures assumption elements and whether adjustments are necessary in order to successfully deliver the Initiative and to achieve the anticipated goals and objectives and estimated participation and results.</p> <p>Within the above overall EM&V process, the nature of this program will require specific attention to the assessment of savings delivered and sustained, given the program reliance on changes in participants' operational procedures and staff behaviour instead of equipment efficiency implementation. Program evaluation will be end-to-end, from program design, through delivery, to the final financial settlement of each project completed.</p>
Evaluation Elements	<p>i) Program Process Design Effectiveness - Evaluation criteria:</p> <ul style="list-style-type: none"> • Goals of program • Staffing and training • Program timing and timelines • Incentives and motivation for participation • Participant satisfaction feedback • Non participant feedback back – participant satisfaction • Monitoring and tracking procedures • Reporting procedures

	<p>ii) Program Administration Effectiveness - Evaluation Criteria:</p> <ul style="list-style-type: none"> • Program statistics – including participants, calculations of energy and demand reductions etc. • Program Impact Evaluation • Pre and post Project Analysis Assessment • Marketing Effectiveness Assessment • Actual versus Budget Reporting • Market Participant review <p>iii) Measures and Performance Assumptions Review:</p> <ul style="list-style-type: none"> • Custom Measures Assumptions Review • Behavioural and Performance Assumptions Review <p>iv) Gross and Net Energy Savings and Demand Reductions Achieved: (To be performed by a 3rd party based on the OPA's EM&V protocols)</p> <ul style="list-style-type: none"> • Measurement and verification of program weather or production normalized energy and demand savings achieved • Net to Gross ratio (including free rider rate) • Audit and Verification of project completion <p>v) Program Cost Effectiveness:</p> <ul style="list-style-type: none"> • Verification of program expenditures versus budget • Verification of incurred payments
Special Provisions	N/A
Data Collection Responsibilities to Support Program Evaluation	This will be completed with the assistance of a third party EM&V expert to ensure complete and appropriate collection of data to support Program evaluation.
Evaluation Schedule & Budget	Schedule will be established by the Third-Party certified M&V consultant in conjunction with THESL. Budget estimate is indicated in section 8 of this document
Evaluation Team	Third-Party certified M&V consultant team with support from THESL CDM personnel

Toronto Hydro-Electric System Limited

**Conservation and Demand Management
Program Application:**

**Greening Greater Toronto Commercial Building Energy Initiative
("CBEI")**

Submitted for Board Approval

**Submitted to:
Ontario Energy Board**

Submitted on January 10, 2011

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Executive Summary

Toronto Hydro-Electric System Limited (THESL) has identified an opportunity to deliver a Conservation and Demand Management (CDM) education program and seeks to respond to this need by submitting the Greening Greater Toronto “Commercial Building Energy Initiative” (CBEI) program application.

This submission is in conformance with the requirements of Section 4.3.2 of the CDM Code for Electricity Distributors. The specific requirements for an OEB Board Approved Program are found throughout this document and have been summarized in Appendix B for convenience.

THESL is seeking approval from the Ontario Energy Board (OEB) to expend \$295 thousand to sponsor Greening Greater Toronto (GGT), an arm of the Greater Toronto CivicAction Alliance (CivicAction)¹, to deliver the program between the periods January 1, 2011 and December 31, 2011.

The CBEI educational initiative targets large commercial building tenants, building managers and landlords. The intent is to increase stakeholder knowledge and awareness of energy efficiency opportunities and foster a productive dialogue leading to the pursuit of energy projects. Otherwise, this level of cooperation does not normally exist, especially in areas where both tenant and building management spheres of control overlap.

This will be accomplished by hosting special kick-off events at subject buildings where tenants and building management representatives can interact to launch energy efficiency working teams. In addition, stakeholders will have the opportunity to engage in the “Corporate Challenge” whereby individual office buildings will compete to improve energy efficiency of the building.

The objectives of this educational program are to:

- Sponsor a measurement standard for building energy efficiency to facilitate energy performance efforts
- Gather information and disseminate business cases to educate and encourage other participants to follow
- Improve the level of communication and cooperation between tenants and building owners to enable launching efficiency initiatives especially in areas with overlapping interests
- Improve the overall awareness and knowledge of stakeholders about building energy efficiency opportunities.

¹ Formerly known as the Toronto Summit Alliance.

1. Program Description

1.1. Program Rationale

As an initiative of the Toronto City Summit Alliance and supported by THESL, GGT launched the Commercial Building Energy Initiative (CBEI) in 2010 to improve the energy efficiency of the building stock in the GTA through education and outreach by addressing the following barriers to improved energy efficiency:

- The lack of a measurement standard for building energy performance
- Difficulty in acquiring data to build business cases for the justification of energy efficiency projects
- Ineffective communication between tenants and building owners leading to slow adoption of energy efficiency initiatives
- Lack of broader education about energy efficiency especially amongst building occupants

The relationship between tenants and landlords is governed through formal lease agreements, which clearly articulate and separate the duties and responsibilities of each party. Within this segregated environment, cooperative undertakings like jointly sponsored and mutually beneficial energy efficiency initiatives require an outside catalyst.

This initiative supports three main efforts to increase the knowledge level and awareness amongst the stakeholders:

- Facilitating the start of Owner/Tenant Working Groups within commercial buildings with the intent of undertaking new energy efficiency initiatives by instigating a level of conversation that typically does not happen without help.
- Hosting building-specific “Greening Our Workplaces Tenant Series” of events to showcase recent commercial tenant-led energy efficiency initiatives with some tenants for the benefit of neighbouring tenants within the same building.
- Conducting a Corporate Challenge whereby individual office buildings will compete to improve energy efficiency within the building. The Challenge Team within each building will be comprised of building management and building tenants. The Challenge will track progress and reward success for participation, collaboration, innovation and actual energy efficiency improvements.
- Create case studies promoting energy efficiency best-practices as an experience base.

1.2. Program Objectives

An initiative of the Toronto City Summit Alliance and supported by THESL, Greening Greater Toronto has launched the CBEI to improve the energy efficiency of the commercial-institutional building stock in the GTA by addressing the following barriers:

- Sponsoring a measurement standard for building energy efficiency to facilitate energy performance efforts
- Gathering information and disseminate business cases to educate and encourage other participants to follow
- Improving the level of communication and cooperation between tenants and building owners to enable launching efficiency initiatives especially in areas with overlapping interests
- Improving the overall awareness and knowledge of stakeholders about building energy efficiency opportunities.

1.3. Program Details

GGT aims to achieve these objectives through education and by fostering greater dialogue through the unique interactions at events involving groups within a common commercial building environment that do not ordinarily communicate about energy efficiency.

This educational initiative will support the existing Greening Greater Toronto (GGT) organization assuring the continuation of its CBEI program. This program submission to the OEB covers a 12-month period commencing in 2011. Through the Toronto City Summit Alliance, the GGT membership is comprised of senior executives from leading real estate organizations for the express purpose of educating and advancing the cause of energy efficiency.

This educational initiative is not targeted at specific measures as it will broadly support all “Commercial-Institutional” programs and will apply across a wide spectrum of energy saving applications addressed within those programs.

Challenge Teams within each building will be comprised of building management and leading building tenants. Each team will be provided with a broad list of potential efficiency initiatives for consideration along with supporting educational information. This documentation is intended only as a guide as the expectation is that teams will develop solutions specific to their own circumstances. Information provided will also highlight available CDM programs. Teams will also be encouraged to include innovative initiatives that are not included in the list. From this list the Challenge Teams will develop their plans for improving energy efficiency.

The organization is led by a volunteer Leadership Council which is comprised of a peer group of 48 senior executives representing leading real estate organizations.

1.4. Value Proposition

Landlord and tenant participants will see the following benefits from the program by:

- Launching energy efficiency initiatives as a direct result of the interaction between tenants, building operators, and landlord to achieve a common goal
- Improving their understanding of the potential for energy efficiency initiatives within their properties and workplaces by meeting to socialize objectives, share experiences and ideas with other stakeholders in the building
- Benefitting from reduced energy costs
- Reducing their environmental footprint and demonstrating good corporate social responsibility

1.5. Conformance with OPA Program Measures

Under Section 4.3 of the Code, a distributor is allowed to apply to the Board for approval of CDM education program.

1.6. Conformance with CDM Code Requirements

This submission is compliant under Section 4.3.2 of the “Conservation and Demand Management Code for Electricity Distributors”, which specifies the requirements for a distributor's application for a proposed Board-Approved CDM Program and is documented under Appendix B.

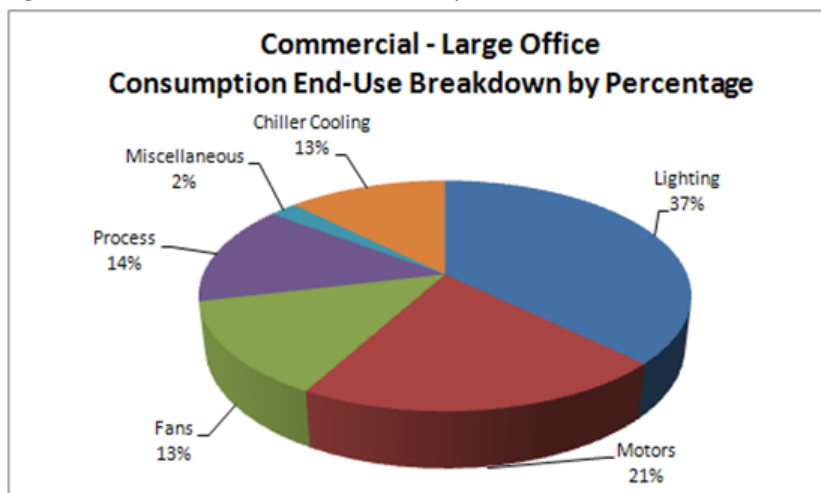
2. Target Market

2.1. Sector Analysis

The commercial sector represents 31% of THESL's annual electricity consumption. Within that sector, large commercial office space (defined as greater than 1,000 kW) represents 27% of the electricity consumption spread across 108 accounts. By way of comparison, the intermediate group (defined as accounts between 50kW and 1,000 kW) represents only 23% of that sector's electrical consumption across a more substantial customer base of 1,441 accounts.

Figure 1 illustrates the breakdown of end-use electrical consumption within large commercial office space. It illustrates that lighting and process/equipment comprise 37% and 14% of consumption, respectively.² Consequently, it is evident that in total about half of large commercial office building's electrical consumption impinges directly on tenant space and is either entirely controlled by the tenant or shared with the landlord.

Figure 1 – THESL Commercial Sector by Account



² This finding is consistent with medium-sized commercial office space as well.

2.2. Market Penetration

This educational initiative will target all major office landlords, building owners and property managers both in the private and public sectors within the “Commercial-Institutional” sector for Large Businesses.

2.3. Projected Number of Participants

Participation is driven through membership in GGT. The current membership of the Leadership Council of GGT includes landlords that own and or manage approximately 40% of the commercial office space and tenants that occupy approximately 40% of the commercial office space in the GTA.

With the Corporate Challenge moving to involve all the tenants of our landlord member buildings, the tenant participation will continue to expand far beyond the current GGT membership.

GGT will also continue to actively reach out to other landlords in the GTA to take up the Challenge using the profile and influence of the existing membership as leverage.

3. Projected MW and MWh Savings

As an education program, savings will manifest indirectly as energy reduction projects are undertaken by tenants and building owners as separate initiatives downstream of the engagement sponsored under this program.

The Leadership Council for the GGT, representing its constituent organizations, has agreed to an initial target of 10% energy reduction from 2009 levels by end of 2014 across its membership base as part of its mandate. GGT will track results as reported by its members.

4. Marketing and Sales Plan

4.1. Marketing and Communications

The primary marketing strategy for the CBEI is to promote improved energy efficiency in the commercial building stock through tenant and landlord dialogue and collaboration on mutually developed energy savings initiatives supported at a grassroots level. This will be underpinned by direct person-to-person contact at local building community events and meetings, organized and facilitated by GGT.

The program is built upon GGT's core platforms which include the "Living Library" of case studies, the "Greening Our Workplace Tenant-Landlord Collaboration" series and the "Corporate Challenge", as described in Section 1.

Marketing efforts will leverage the strategic influence of the GGT's senior Leadership Council members' standing within the Toronto real estate establishment to encourage other organizations to join and commit to goals.

Communication elements will include:

- Engaging the CBEI Leadership Council members, which includes landlords, tenants, industry associations and industry related service providers as active participants in energy efficiency initiatives and events.
- Sponsoring events within the real estate portfolios of member organizations.
- Reaching out to the broader Toronto City Summit Alliance member organizations and partnerships, which comprise a very large number of tenants (many of the members are represented at the highest level of leadership within their respective organizations)
- Working with related landlord and tenant industry organizations (BOMA³, REALpac⁴, NAIOP⁵, CaGBC⁶, IFMA⁷, CoreNet⁸, etc.) to promote participation beyond the GGT membership.
- Working with the industry service providers (facility managers, real estate brokerages, consultants in design, energy management, engineering, and sustainability) to promote participation beyond the GGT membership.
- Seeking endorsement by municipal leaders of the programs within the Greater Toronto Region.

³ Building Owners and Managers Association

⁴ Real Property Association of Canada

⁵ National Association of Industrial and Office Properties (also known as the Commercial Real Estate Development Association)

⁶ Canadian Green Building Council

⁷ International Facility Management Association

⁸ Corenet Global

GGT will also work with other partner organizations to improve penetration into the Commercial Institutional sector including working with the Toronto and Region Conservation Authority and Partners in Project Green to promote growth and more widespread participation.

4.1.1. Marketing Objectives

- Build awareness of CBEI programs
- Drive participation in the programs

4.1.2. Primary Target Market

- Building Owners & Landlords
- Building Operators includes Property Managers and Facility Management Organizations
- Major or anchor building tenants

4.1.3. Secondary Market

- Minor tenants
- Commercial and institutional trade associations

4.2. Collaboration with other LDC's

Recognizing that the reach of the GGT extends beyond Toronto and into the GTA, THESL will introduce other regional Local Distribution Companies (LDCs) to GGT and work with them to drive participation and increase membership in those jurisdictions.

4.3. Take-to-Market Approach

- Engage the Real Estate brokerage community to reach out to the broad spectrum of landlords
- Leverage relationships with professional and industry organizations to promote the program to their membership
- Utilize third party endorsements to demonstrate product features and benefits
- Leverage GGT's membership of large landlords to reach out to their tenants to participate in joint programs
- Leverage GGT's membership of large, multi-location tenants to reach out to their landlords to participate in joint programs
- Key account management, customers, associations and education

4.4. Tactics

- Develop a new webpage to provide a one-stop hub of information including supporting resources, links to additional information, enrolment/application and reporting on implementation and performance
- Develop promotion sheet, FAQ, scripts to be used by staff, members and partners
- Create customer testimonials and case studies for print and web
- Utilize third party communication channels (newsletters and websites) to communicate program
- Utilize participants' communications vehicles, including building landlords' print, online and lobby/elevator screen vehicles
- Promote through/to associations and relevant stakeholders
- E-marketing blast customer list and association members
- Issue media release to targeted media outlets within the industry (municipal, commercial, etc) to launch challenge and announce milestones over time
- Targeted advertisements and editorial in trade journals and online sites

4.5. Key Messaging

- The Corporate Challenge is a four-year program aiming to reduce total energy usage in commercial offices in the Toronto Region by a nominal 10 per cent.
- The initiative recognizes and celebrates landlord and tenant collaboration and innovation in realizing economic and environmental benefits.
- We are encouraging smart energy use that results in reduction, conservation and efficiency
- Anyone can participate in the challenge. It doesn't matter how a building is performing right now – it's about building knowledge and awareness, working together, and planting the seeds for greater resource efficiency
- The challenge leverages the priority tenants are placing on green buildings and motivates landlords to take the lead in increasing their building's sustainability.

5. Program Evaluation

5.1. Program Evaluation Plan

Program evaluation will be carried out by a certified independent third-party M&V Professional based on the OPA EM&V Protocol, as applicable. It will focus on the following areas to assess the cost-effective delivery of the program:

Evaluation Objectives	Evaluation Goals
Process Design Effectiveness	<ul style="list-style-type: none"> • Participation rates • Perceived value of time invested
Program Administration Effectiveness	<ul style="list-style-type: none"> • Perceived effectiveness of the training delivery and program organization
Estimate Program Cost Effectiveness	<ul style="list-style-type: none"> • Effectiveness of the program delivery in terms of marketing/sales activities in signing up future participants
Ensure Level of Customer Satisfaction	<ul style="list-style-type: none"> • Perceived importance of information received

The draft EM&V template is used to represent the evaluation plan as shown in Appendix A, but the eventual evaluation plan will be prepared by the independent evaluator.

6. Program Budget

The financial contribution requested for the 2011 CBEI program is summarized in the following table:

Description	2011	2012	2013	2014	Total
Marginal Costs					
Fixed Costs					
Legal Cost	\$10,000				\$10,000
Marketing	\$4,129				\$4,129
Administrative Costs	\$20,000				\$20,000
Operation Cost	\$2,078				\$2,078
EM&V	\$1,445				\$1,445
Total Fixed Costs	\$37,653				\$37,653
Variable Costs					
Operation Cost	\$250,000				\$250,000
Total Variable Costs	\$250,000				\$250,000
Total Marginal Cost	\$287,653				\$287,653
Total Allocable Cost	\$8,054				\$8,054
Total Program Cost	\$295,707				\$295,707
Total Incentives	\$0				\$0
Total Budget	\$295,707				\$295,707

GGT receives funding from other organizations in support of its various programs. GGT may solicit additional support financially, or in kind, to assist, enhance or extend the reach of the CBEI program from other LDCs and/or gas utilities. The amounts solicited in this application are not expected to constitute the entirety of the CBEI program budget for 2011.

7. Cost Benefit Analysis

Under Section 4.1.2 of the Code, a distributor is allowed to bypass the Cost-Effectiveness Test when submitting a CDM program designed for educational purposes for Board approval where Cost-Effectiveness cannot be demonstrated.

8. Non-Duplication of OPA-Contracted Provincial Programs

The OPA-Contracted programs do not provide an initiative similar to the CBEI program.

9. Data Collecting, Tracking and Reporting

Documentation archives will be maintained and will be used for governance, reference and audit purposes.

THESL employs a comprehensive financial and work order system to keep track of CDM related expenditures. After validation and verification of participant and third party invoices, payments will be made and recorded in the system. Each invoice will be substantiated by supporting documents.

Internal operational reports will be prepared and reviewed monthly subject to THESL's corporate governance rules and policies, including those established to govern OPA Programs. Annual reports consisting of financial and operational results will be submitted to the OEB.

All data collection efforts will be in conformance with OEB CDM Code as well as any other instruction received.

Appendix A - Program Evaluation Plan based on Draft OPA Template

Program Description	As described in Section 3 of this application document.
Evaluation Goals and Objectives	<p>The Evaluation objectives are:</p> <ol style="list-style-type: none"> Process Design Effectiveness Program Administration Effectiveness Estimate Program Cost Effectiveness Ensure Level of Customer Satisfaction <p>The Evaluation goals are:</p> <ol style="list-style-type: none"> Participation rates Perceived value of time invested Perceived effectiveness of the training delivery and program administration organization Effectiveness of the program delivery in terms of marketing/sales activities in signing up future participants Perceived importance of information received
Evaluation Deliverables	<ul style="list-style-type: none"> • Draft Evaluation Plan • Final Program Evaluation Plan • Annual Report - Elements • Final Report
Evaluation Description	<p>The evaluation elements of the Evaluation Goals and Objectives are anticipated to include (but are not limited to) those listed in the corresponding sections below.</p> <p>It is expected that these elements will be reviewed, discussed, evaluated or analyzed as appropriate to ensure that they meet the Program Evaluation Goals and Objectives during the Draft Evaluation Plan development phase.</p> <p>Review of these elements will assist THESL in determining and/or validating the appropriateness of the program design, administration and assumptions, and whether adjustments are necessary in order to successfully deliver the initiative and to achieve the anticipated goals and objectives and estimated participation and results.</p>
Evaluation Elements	<p>The cross elements against which the goals will be assessed, as applicable, are:</p> <ol style="list-style-type: none"> Program Process Design Effectiveness - Evaluation criteria: <ul style="list-style-type: none"> • Alignment with goals and objectives of program • Staffing and training

	<ul style="list-style-type: none"> • Tools and processes • Participant and non-participant satisfaction reporting • Reporting procedures <p>ii) Program Administration Effectiveness - Evaluation Criteria:</p> <ul style="list-style-type: none"> • Program statistics • Program Impact Evaluation • Marketing Effectiveness Assessment • Actual versus Budget Reporting • Market Participant review <p>iii) Program Cost Management:</p> <ul style="list-style-type: none"> • Verification of program expenditures versus budget • Verification of incurred payments
Data Collection Responsibilities to Support Program Evaluation	This will be completed with the assistance of an independent third party to ensure complete and appropriate collection of data to support program evaluation.
Evaluation Schedule & Budget	Report anticipated end of first quarter of the following year. Estimated Program evaluation budget is \$20,000.

Appendix B – CDM Code Requirements

This section documents that this program application is compliant under Section 4.3.2 of the “Conservation and Demand Management Code for Electricity Distributors”, requiring that a distributor’s application for a proposed Board-Approved CDM Education Program must include the following:

CDM Code Reference	CDM Code Requirement	Section Addressing Requirement
4.3.2 (a)	identify the customer type(s) that will be targeted;	2.1
4.3.2 (b)	specify the number of participants that will be targeted;	2.1, 2.3
4.3.2 (c)	explain why the educational CDM program is needed (i.e., why there is a need to educate the specified customer type(s) on the specified energy issues);	1.1
4.3.2 (d)	articulate the educational approaches that will be utilized by the distributor (i.e., brochures, seminars, etc.);	1.1, 1.3, 4
4.3.2 (e)	provide estimates of costs of the educational CDM program; and	7
4.3.2 (f)	describe the anticipated benefits of the educational CDM program	1.2, 1.4

Toronto Hydro-Electric System Limited

**Conservation and Demand Management
Program Application:**

Hydronic System Balancing Program (“HSBP”)

**Submitted to:
Ontario Energy Board**

Submitted on January 10, 2011

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Executive Summary

Toronto Hydro-Electric System Limited (THESL) has identified a gap within the OPA's Province-Wide Conservation and Demand Management (CDM) programs and seeks to respond to this need by submitting the Hydronic System Balancing Program (HSBP) application for approval. The HSBP program is aimed at identifying common hydronic system over sizing issues and providing incentives to encourage participants to make the required system changes.

THESL is seeking approval from the Ontario Energy Board (OEB) to expend \$4.7 million to achieve 62 GWh of net cumulative energy savings, and 3.4 MW of net summer peak demand reduction. The anticipated Total Resource Cost (TRC) benefit to cost ratio for this program is 2.2. The anticipated Program Administrator Cost (PAC) benefit to cost ratio for this program is 4.7.

The program will operate between program approval and December 31, 2014. Refer to the table below for program summary.

	2011	2012	2013	2014	Total
Cumulative Energy Savings (GWh)	1.38	11.02	34.45	62.00	62.00
Peak Demand Savings (MW)	0.2	1.0	1.7	0.5	3.4
Budget (000's)	\$581	\$1,430	\$1,976	\$733	\$4,720

Note: Savings are net. Budget includes all program costs and incentive costs.

In addition to the energy savings contribution from the program, the HSBP will also:

- Popularize hydronic balancing measures and promote improved hydronic system operation and design.
- Serve as an enabler for OPA province-wide programs by identifying other potential projects.
- Develop a trained network of hydronic system balancers that can support market transformation and sustain the program beyond the 2014 end date.
- Transform operational behaviour and reinforce a culture of conservation.

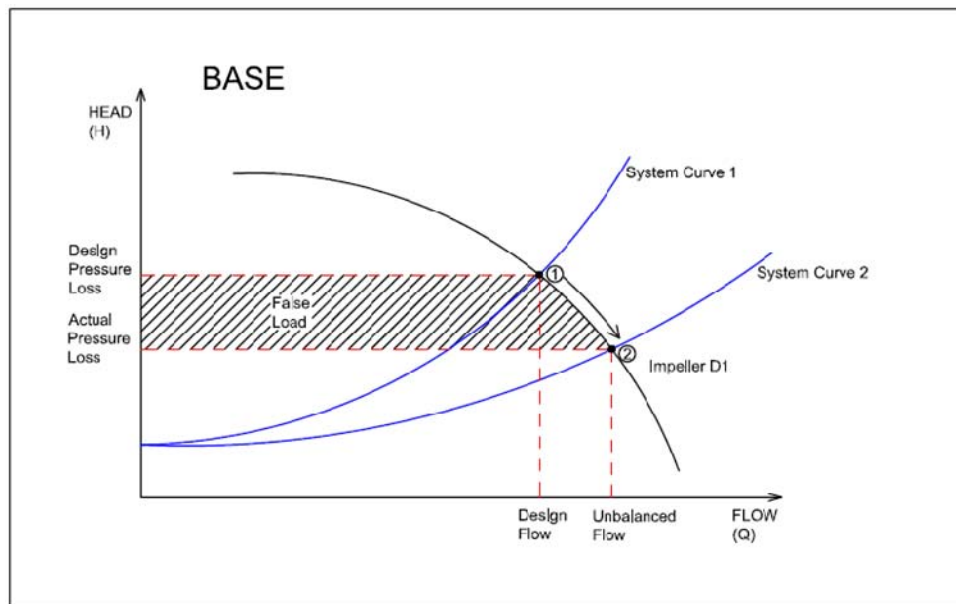
This submission is in conformance with the requirements of Section 3.1.4 of the CDM Code. The specific requirements for an OEB Board Approved Program are found throughout this document and have been summarized in Appendix C for convenience.

1. Program Description

This program is aimed at reducing the hydronic system pump load and consumption in the office, institutional, multi-residential and hospitality sectors within the City of Toronto. The estimated summer pump peak load, in the identified market segments, is approximately 164.8 MW. The corresponding electricity consumption is estimated to be 1,014 GWh. This is a significant load that is not effectively targeted under the Province-Wide Commercial and Industrial (C&I) sector programs.

1.1. Program Rationale

The basis of the HSBP program is the assertion that most hydronic systems and Domestic Cold Water (DCW) booster pumps are oversized and operating against balancing valves that throttle flow and unnecessarily increase energy consumption. It is not uncommon to find pumps with balancing valves installed on their discharge side needlessly consuming 30% more electricity when compared with actual requirements. The figure below illustrates the typical operating state of the majority of hydronic systems. This is further illustrated in the Appendices.



The rationale for this program is that it provides a simple, low risk measure across a significant load that will provide initial stimulus and success for customers wishing to promote energy efficiency within their organizations. It is expected that the HSBP program will also be an enabler for the Province-wide C&I programs as the initial balancing assessment will identify additional measures for implementation through the OPA's Tier 1 Energy Replacement Incentive Program (ERIP).

The opportunity to reduce pump energy through impeller changes or the application of variable frequency drives (VFD) is a well recognized, but rarely implemented means of reducing pumping energy consumption. At the building design stage, pump capacity is typically oversized often as a result of compounding design safety factors. Evidence of the energy saving opportunity is identified in many references including the US Department of Energy's (DOE) "Improving Pump System Performance" and is a standard measure in guidelines for many industries, for example, data centres¹.

A sample of some of the results achieved in the United States and the United Kingdom are shown below:

Type of Facility	Location	Measure Completed	Simple Payback (years)	Reduction Demand/Consumption
Hospital ²	California	Condenser Pumps	1.0	11kW/44,700kWh*
Hotel ³	California	HVAC Pumps	<1.0	400,000kWh*
Office ⁴	Oregon	Condenser Pumps	0.8	25.8kW*/103,053kWh
Hotel ⁵	UK	HVAC Pumps	2.2	57,000kWh

*estimated from cost savings

1.2. Program Objectives

The objective of the HSBP is to permanently reduce electrical load and consumption for both the heating and cooling hydronic systems and also for booster pumps in the C&I market. The program is expected to achieve 62 GWh in savings and 3.4 MW in summer demand reduction, which will make a significant contribution towards THESL's savings target.

The following considerations are key program drivers:

- Popularizing hydronic balancing measures and promote improved hydronic system operation and ultimately re-define design practices.
- Developing a business opportunity for balancing contractors to focus on energy efficiency

Additional objectives of the HSBP are to:

¹ U.S Department of Energy, Energy Efficiency and Renewable Energy (EERE). (2008) *Save energy now – data assessment tool*

² Haasl, T., Potter, A., Irvine, L., & Luskay, L., (2007) Retrocommissioning's greatest hits. *Energy Systems Laboratory – Texas A&M University*

³ Friedman, H. California Public Utilities Commission, Portland Energy Conservation Inc. (PECI) (2006) *Retrocommissioning case study –San Diego Marriott Hotel & Marina*. San Diego Retrocommissioning Program.

⁴ Portland Energy Conservation Inc (PECI). *Example Retrocommissioning measure – opening throttled discharge valves*. 2008

⁵ Veness, J. (2007) *Pump energy reduction – a systems approach*. Pro-Ven Solutions Ltd. UK.

- Provide participating organizations with a low risk and effective energy efficiency measure that identifies future potential projects.
- Train and enable the hydronic and air balancing community to effectively and sustainably assess the opportunities.
- Promote better technology applications and promote variable flow systems.
- Raise the level of awareness of this energy saving opportunity and encourage pumping system assessments as a common measure to examine and implement.

1.3. Program Details

1.3.1. Incentives

The program includes two incentive elements – one for assessing the site for opportunities, and the second for implementing the identified measures within a specified time period.

The site assessment incentive is to cover an on-site assessment by a program approved National Environmental Balancing Bureau (NEBB) qualified water auditing and balancing professional. The objective of the assessment is to identify the potential for:

- Applying variable frequency drives or trimming impellers on the chilled/hot water main circulation pumps.
- Retrofitting the booster pumps with multistage pumps and/or variable frequency drives.
- Identifying mechanical deficiencies associated with the distribution systems.

The balancing assessment incentive is limited to the cost of the audit up to a maximum of \$1,500/facility.

The second element of proposed incentives is to support customer investment in the identified measures. Customers that act on the assessment recommendations, and implement the proposed measures, will be eligible for an incentive of \$0.10 per kilowatt hour of annual savings. The typical expected pay-back on this investment is approximately 2 years.

1.3.2. Program Scope

The program scope will include:

1) Assessment Contractor Training

- a) THESL will provide training sessions for already NEBB qualified contractors to focus on the scope and reporting required under the program. These training sessions will be a pre-requisite for contractors to participate in the program and become a program approved hydronic system balancing contractor (assessment contractor).

- b) Annual refresher courses will be conducted for participating assessment contractors during the life of the program.

2) Pre-Application (Assessment) Stage

- a) Participants will select a program approved NEBB assessment contractor to conduct a hydronic system assessment. The assessment will include:
 - i) Identification of applicable pumping systems and equipment
 - ii) Confirmation of existing flow control devices and flow configuration to determine project viability
 - iii) Identification of suitable energy saving measure(s)
Calculation of potential costs and savings
- b) An assessment performed by a program approved contractor by will be eligible for an incentive up to the maximum allowable amount.

3) Application Stage

- a) Program participants will fill out the appropriate application forms through the program website with the help of the program approved assessment contractor.
- b) Applications will be reviewed and approved by THESL' technical engineering staff for conformance and technical due diligence.

4) Initial Balancing Stage

- a) The participant's chosen assessment contractor will undertake an audit of the main hydronic systems and DCW booster pumps.
- b) The approved contractor will prepare an opportunity report indicating the savings and potential costs.
- c) This report will be forwarded to the owner and THESL for review.
- d) THESL will approve the incentive, provided the report criteria have been met.

5) Pre-Implementation Stage

- a) Participant will fill out a project implementation form outlining the measures that are to be completed for THESL's approval.
- b) THESL will review proposed measures to approve incentives providing all program rules / eligibility have been satisfied (see Section 6).

6) Implementation Stage

- a) Physical modifications to pumping systems or controls are undertaken. Customer manages vendor/service providers completing the work.
- b) Service providers will offer installations and training.
- c) Balancing or assessment contractor will perform post-installation measurements and prepare an actual savings report.

7) Post-Implementation Stage

- a) Participant will submit a post implementation report outlining the achieved savings to THESL.
- b) THESL will review post-implementation reports and provide incentives. Follow-up inspections will occur at a representative sampling of sites to ensure program veracity.

1.4. Value Proposition

Participants will experience the following benefits by implementing the HSBP program:

- Reduced energy costs, which will reduce facility operating budgets and potentially fund additional energy efficiency measures.
- Reduced greenhouse gas emissions.
- Lower maintenance costs for pump motors due to closer design match for pump loads.

1.5. Conformance with OPA Program Measures

The measures proposed by and implemented under the HSBP are consistent with OPA program measures.

1.6. Conformance with CDM Code Requirements

This submission is compliant under Section 3.1.4 of the “Conservation and Demand Management Code for Electricity Distributors”, which specifies the requirements for a distributor's application for a proposed Board-Approved CDM Program and is documented under Appendix B.

2. Target Market

2.1. Sector Analysis

The HSBP is targeted at facilities with either a hydronic heating and cooling system and/or a DCW booster pump system. As there is no accurate breakdown of the number of facilities within the Toronto Hydro service area that have hydronic heating and cooling systems and/or a DCW booster pump systems, we have made a determination of the potential target market by segregating the various sectors and applying assumptions based on monthly billed demand and typical design practices. The criteria used are outlined in the following table:

Sector	Monthly Billed Demand Criteria		Notes:
	For Hydronic Systems	For Booster Pumps	
Office	>500kW	>500kW	Facilities larger than 10,000 m ² typically use hydronic heating and cooling systems and DCW booster pumps. The demand criteria of 500kW targets this threshold.
Hospitality – Hotels	>100kW	>250kW	The demand criteria eliminates smaller hotel/motels that typically use unitary heating and cooling.
Hospitality - Entertainment	>500kW	>500kW	Most of these facilities utilize packaged HVAC equipment with only the largest facilities using hydronic systems. To eliminate the smaller facilities a 500 kW minimum threshold was used.
Multi-Residential	>100kW	>200kW	Virtually all of the buildings in this sector have hydronic systems. A lower threshold criterion of 100kW is appropriate. Booster pump kW criterion is higher to eliminate smaller low-rise facilities that typically do not have large booster pumps.
Institutional	>250kW	>250kW	Many institutional facilities have hydronic systems. The criterion is to eliminate smaller facilities where the program will be ineffective.

Based on these rules, the number of facilities and pump load identified for the purposes of this program is shown below.

Sector	No. of Hydronic Facilities	No. of Booster Pump Sites	Estimated Pump Load (MW)	Estimated Pump Consumption (GWh)
Office	227	227	30.6	495
Hospitality	61	61	8.5	66
Multi-Residential	1,460	436	95.9	423
Institutional	236	236	29.8	30
Total	1,984	960	164.8	1014

Source: THESL billing, Customer Information System and market analysis

Estimated pump load and consumption figures employed above are based on typical operating criteria using normal engineering design practice for the market sector.

2.2. Market Penetration

As there are two distinct phases to the program, estimates for the audit and then implementation are discussed separately.

2.2.1. Market Penetrations – Site Assessments

THESL's expectation is that 25% of the target market will participate in the initial audit program or site assessment. The estimate is based on THESL's Power Saver Blitz (PSB) program that offered free lighting audits to over 44,000 customers with a resulting uptake of 74%. Although this marketing approach for this program also involves a vendor-driven "blitz" approach similar to PSB, the higher technical requirement and limited industry capacity suggest that a downgraded expected penetration of 25% is more appropriate.

2.2.2. Market Penetration – Implementation

When establishing the projections we have relied upon the experience from other jurisdictions with programs similar in scope. We have also placed some importance in evaluating the different investment criteria used by the market segments for general energy efficiency projects. A key criterion for evaluating investment is simple payback. When evaluating the HSBP program penetration we employed costing estimates from several suppliers and our own multiple installation experience as an energy service company in Toronto. The typical average project retrofit cost used for the analysis is:

Type	Estimated System Cost ⁶ (\$)	Estimated System Savings (\$)	Simple Payback (years)
Heating/Cooling	\$18,107	\$9,623	1.9
Booster Pumps	\$39,616	\$7,861	5.0

The anticipated commercial/institutional market penetration rates are based on the following observations:

- The retro-commissioning market, which has similar paybacks and goals as this program, has been evaluated in California and shows an annual 5.1%⁷ penetration rate within a much more established conservation market.
- At the same time, 80% of organizations will consider proceeding with projects having a payback of less than 1.9 years in the commercial sector⁸.
- Studies have found that higher energy costs lead to a greater adoption of energy savings measures⁹, which is important as electricity prices are expected to rise 46%¹⁰ over the next five years.
- Evaluation of energy efficiency measures completed under the IAC program¹¹ in the United States yielded a predictive model¹² that indicates, for the paybacks noted below, an adoption rate of 50% for the heating/cooling retrofits and 40% for the booster pump upgrades.

⁶ Estimated system costs exclude scope of work associated with stand-by pumping systems.

⁷ PECO and Summit Building Engineering. California Commissioning Collaborative, (2007). California retro-commissioning market characterization

⁸ DeCanio, Stephen. (1993). Barriers within firms to energy-efficient investments. Energy Policy, 21, 906-914.

⁹ Anderson, S.T., & Newell, R.G. (2004). Information programs for technology adoption: the case of energy-efficiency audits. Resource and Energy Economics, 26, 27-50.

¹⁰ Leslie, Keith. (2010, November 21). Huge investments to update power system, plus green energy, behind rate hikes. The Canadian Press.

¹¹ The Industrial Assessment Center (IAC) at the University of Massachusetts. The IAC identifies and evaluates, through visits to industrial facilities, opportunities for energy conservation. The program is funded by the U.S. DOE through Rutgers, the State University of New Jersey.

¹² Anderson, S.T., & Newell, R.G. (2004). Information programs for technology adoption: the case of energy-efficiency audits. Resource and Energy Economics, 26, 27-50.

Based on the information noted above and the program design elements, the expected implementation rate for those that will have participated in the audit portion of the program is noted in the table below.

Segment	Number of Facilities	Audit Penetration Rate (%)	Number of Audits	Htg./Clg. Pump Implement. Rate (%)	Number of Htg./Clg. Pump Projects	Booster Pump Penetration Rate (%)	Number of Booster Pump Projects
Offices	227	25%	57	50%	28	30%	17
Hospitality	61	25%	15	50%	8	30%	5
Multi-residential	1,460	25%	365	50%	183	30%	110
Institutional	236	25%	59	50%	30	30%	18
Total	1,984	25%	496	50%	248	30%	149

3. Projected MW and MWh Savings

The expected savings for both heating / cooling and DCW booster pump modifications are projected to be 30%. The expected savings for heating / cooling pumps are consistent with a study conducted on 14 commercial buildings in Wisconsin¹³ where the demand/consumption savings were on average around 35%. The expected savings for DCW booster pumps are consistent with a Canadian Housing and Mortgage Corporation pilot program conducted at 7 residential high-rise buildings in Toronto¹⁴ where demand and consumption savings were 51% and 30% respectively.

¹³ Sing, G. & Mitchell, J., (1998). Energy Savings From Pump Impeller Savings, ASHRAE Journal.

¹⁴ Canada Mortgage and Housing Corporation, Research Highlights – Technical Series 01-108, Domestic Cold Water Booster Pump Control Monitoring Pilot Program. 08-11-07.

The tables below summarize the net total estimated savings with a free-ridership factor of 30%¹⁵ assumed in calculating net savings. Evaluation, Measurement and Verification (EM&V) will determine actual results.

Net MW Reduction					
	2011	2012	2013	2014	Total
Heating/Cooling	0.2	1.0	1.7	0.5	3.4
Booster Pumps	0.1	0.5	0.8	0.2	1.5
Total	0.2	1.0	1.7	0.5	3.4
Cumulative Net MWh Reduction					
Heating/Cooling	925	7397	23116	41610	41,610
Booster Pumps	453	3626	11330	20394	20,394
Total	1,378	11,023	34,447	62,004	62,004

4. Marketing and Sales Plan

4.1. Marketing and Communications

THESL's marketing strategy for the HSBP Program is intended to transform the industry's approach to hydronic heating and cooling and DCW booster systems, and ultimately establish "right-sizing" as common practice in building design of the future.

THESL's efforts are aimed at educating hydronic balancing contractors, and building owners and managers within the target market by demonstrating "right-sizing" practices through the HSBP Program successes and helping to build the infrastructure and knowledge base to sustain a future industry.

These stakeholders will be receptive to practical system design and operational building improvements that represent innovation while reducing operating costs and improving building efficiency benchmarks. THESL's sales forces will engage this community to emphasize the alignment between this program and their design responsibility and building management objectives.

Using a strategy similar to the PSB, THESL will educate and leverage the contractor and testing-balancing community as channel partners to reach out to potential customers to participate in the program.

¹⁵ This is the default free-rider factor for custom projects as noted in OEB Decision and Order, EB-2007-0096 (Page 9).

4.1.1. Marketing Objectives

Introduce THESL's HSBP program to approximately 2,000 prospective customers by the end of 2011 with a take up rate of 500 customers by the end of 2014.

4.1.2. Primary Target Market

- Facilities and Building Managers
- Chief Building Operators
- Hydronic Systems Balancing Companies
- Mechanical Engineering Consultants and Designers

4.1.3. Secondary Market

- Commercial, institutional and hospitality trade associations
- Pump manufacturers, distributors, and maintenance vendors

4.1.4. Goals

- Build awareness and understanding of energy saving principles underlying the HSBP Program and drive participation in the program
- Integrate HSBP into the CDM suite of services and marketing plans for co-promotion (economies of scale)
- Create unique targeted opportunities to promote HSBP
- Utilize a variety of channels, ally network partners and stakeholders

4.2. Collaboration with other LDC's

For those LDC's that would like to deploy the HSBP or a similar program, THESL will work closely with other LDCs to ensure the programs are consistent and optimized for efficiency and cost effectiveness.

4.3. Take-to-Market Approach

- Utilize THESL and Channel Partners as direct sales channels.
- Develop ally partnerships with Hydronic Balancing companies to help reach targeted customer base and provide training for balancing contractors that will be providing services through the program.
- Leverage relationships with professional and industry based organizations and associations to promote program to their membership.
- Utilize third party endorsements to demonstrate product features and benefits.
- Develop integrated sales plan with single customer touch points ensuring all customer specific applicable CDM programs are offered as a full suite of services

- Key account management and education to key stakeholder groups including facility managers, property managers, and building operation managers.

4.4. Tactics

- Develop new webpage to provide a one-stop hub of information including and enrolment/application
- Develop sell sheet, FAQ, scripts to be used by channel partners, sales staff
- Create customer testimonials and case studies for print and web
- Direct mail package to vendors (hydronic balancing companies)
- Sell through/to associations and relevant stakeholders
- Issue media release to targeted media outlets within the industry
- Targeted advertisements and editorial in trade journals and online sites
- Outreach and education sessions

4.5. Key Messaging

- HSBP is a simple program that provides sustained energy savings
- Improves building's energy efficiency
- Provides two incentives: free assessment and performance payments
- THESL and channel partners are honest brokers with expertise to provide a full suite of CDM solutions
- Experienced staff providing guidance throughout the process
- Results provide sustainable, measurable and verifiable electrical savings
- Helps to meet social corporate responsibility targets (reduced environmental footprint)
- Provides a lead-in to other CDM initiatives

5. Program Rules

The following program rules have been vetted against the OEB's CDM Code to ensure compliance including but not limited to program Measurement & Verification (M&V), cost effectiveness, measures and assumptions, TRC and PAC.

5.1. Eligibility

To be eligible for this program the participant must meet the following criteria:

- be an active THESL customer and own the property or get permission from owner to participate in the program
- have a domestic cold water booster pump(s) sized no smaller than 10 HP
- have a main chilled or hot hydronic water supply pump sized no smaller than 10 HP

The customer must commit to completing HSBP measures identified in the assessment that have a simple payback, including incentives, of less than one year within 12 months of assessment completion.

5.2. Incentives

The proposed HSBP Program offers financial incentives at the assessment and implementation stage.

5.2.1. Assessment Incentives

The incentive will be 100% of the assessment cost up to a maximum of \$1,500 per facility.

5.2.2. Implementation Incentives

The second incentive follows the implementation of some, or all of the recommendations from the balancing report. The implementation incentive will be provided to the customer at \$0.10 per kWh up to 50% of project cost. The incentives will be based on a pre and post installation measurements that will be the responsibility of the participant to provide and completed by the approved balancing contractor that completed the initial assessment. The participant is only eligible for incentives via this program for measures completed within 18 months of the balancing report completion.

5.3. Activation Rules & Requirements

5.3.1. Assessment Application

As part of incentive application, the participant will be required to:

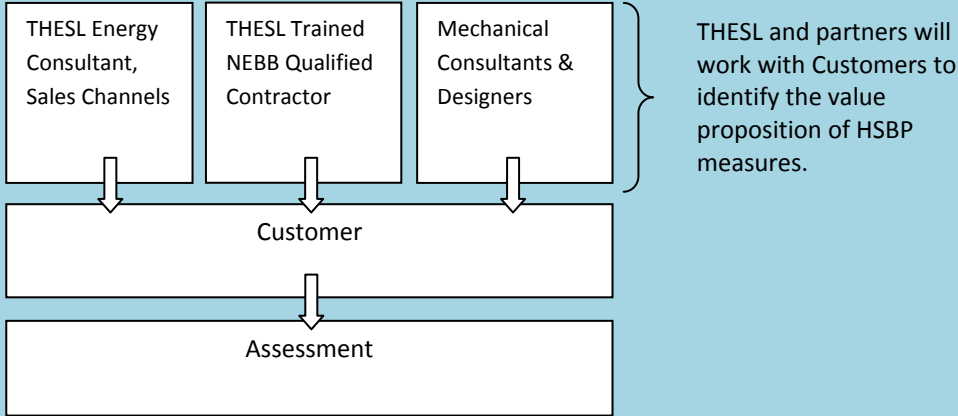
- Submit an application for approval to THESL.
- Proceed with a program approved NEBB balancer to complete the site assessment.
- Provide invoicing and report to THESL to process incentive.

5.3.2. Incentive Approval

Once the application is approved by THESL, the participant will work with their chosen contractor to:

- Submit an application for approval to THESL.
- Proceed with implementation.
- Provide invoicing and savings verification reports to THESL (savings verification report to be completed by the original balancing contractor and paid for by the participant).
- Release the incentive.

The overall process is illustrated below for greater clarity:

	Activity	Applicant Commitment	Responsibility	Financial Support
Pre-Application (Assessment) Stage		Not Applicable	Shared	None
Application Stage	- Participant completes program application form (with assistance from program approved contractor)	Participant Agreement	Applicant (prime) in association with program approved contractor	None

Initial Balancing Stage	<p>Program approved contractor activities include:</p> <ul style="list-style-type: none"> i) Identification of applicable pumping systems and equipment ii) Confirmation of existing flow control devices and flow configuration to determine project viability iii) Identification of suitable energy saving measure(s) iv) Calculation of potential costs and savings v) Produce Opportunity report for customer and THESL submission 	Cost of balancing work to produce Opportunity report	Applicant (prime) sub-contracted to program approved contractor	As approved
	<ul style="list-style-type: none"> - Review of Opportunity report - Approval of Assessment Incentive payment 	Not Applicable	THESL	Assessment incentive paid
Pre-Implementation Stage	<ul style="list-style-type: none"> - In-depth investigation & audit of pumping systems by approved balancing contractor - Completion of Project Implementation Form outlining measures to be completed. (Note that customer must commit to completing HSBP measures identified in the assessment that have a simple payback, including incentives, of less than one year) 	<p>Project & vendor management</p> <p>Full project cost</p>	Applicant (prime) in association with program approved contractor	None
	-Review of Project Implementation Form and approval of Implementation Incentives	Not Applicable	THESL	None
Implementation Stage	<ul style="list-style-type: none"> - Physical modifications to pumping systems and controls - Approved balancing contractor performs post-installation measurements and prepares an actual savings report - Approved balancing or assessment contractor will perform post-installation measurements and prepare an actual savings report. 	Project & vendor management	<p>Applicant (prime)</p> <p>Potential contracts with:</p> <ul style="list-style-type: none"> - Engineer - Mechanical / Electrical contractor - Controls vendor 	None

Post-Implementation Stage	- Participant will submit a post implementation report outlining the achieved savings to THESL.	Project & vendor management	Applicant (prime) in association with program approved contractor	As approved
	- Review post-implementation report and provide Implementation Incentive payment approval	Identify other CDM initiatives	THESL	Implementation Incentive paid

6. Program Evaluation

6.1. Project M&V

Project M&V will be based on standard industry accepted International Performance Measurement & Verification Protocol (IPMVP) M&V practices and will be completed on each job by the balancing contractor. The savings will be tabulated and THESL will spot check a representative sampling to verify each balancing contractor's submissions.

Savings report will provide savings results in conformance with IPMVP standards and/or OPA M&V protocols.

6.2. Program M&V Evaluation Plan

Program evaluation will be carried out by a certified independent third-party M&V Professional based on the OPA EM&V Protocol. It will focus on the following areas to assess the cost-effective delivery of the program:

- The achieved program gross peak demand (MW) and energy savings (MWh) reductions
- The net program peak demand reductions and energy savings in consideration of the free-ridership and realization rates to be determined
- The actual TRC and PAC results based on the achieved savings
- The effectiveness of the program delivery in terms of marketing/sales activities in signing up participants
- Program administration and governance effectiveness

The draft OPA EM&V template is used to outline the evaluation plan as shown in Appendix A, but the eventual evaluation plan will be prepared by the M&V Professional evaluator based on the OPA EM&V protocols.

Program evaluation will be end-to-end, from program design, through delivery, to the final financial settlement of each project completed.

7. Program Budget

The 2011-2014 budgeting plan for the program is summarized in the following table:

Description	2011	2012	2013	2014	Total
Marginal Costs					
Fixed Costs					
Legal Cost	\$26,250	\$5,775	\$5,775	\$5,775	\$43,575
Marketing	\$47,250	\$21,450	\$21,450	\$21,450	\$111,600
Sales	\$6,710	\$6,844	\$6,981	\$6,710	\$27,245
Program EMV	\$25,000	\$25,000	\$25,000	\$25,000	\$100,000
Administrative Costs	\$1,192	\$3,542	\$3,404	\$3,404	\$11,542
Operation Cost	\$37,786	\$42,551	\$46,278	\$20,962	\$147,577
Total Fixed Costs	\$22,500	\$7,500	\$7,500	\$7,500	\$45,000
Variable Costs	\$166,688	\$112,663	\$116,388	\$90,801	\$486,539
Administrative Costs	\$4,767	\$14,168	\$17,020	\$7,151	\$43,106
Operation Cost	\$151,144	\$170,206	\$231,388	\$104,809	\$657,547
Total Variable Costs	\$155,912	\$184,374	\$248,408	\$111,960	\$700,653
Total Marginal Cost	\$322,600	\$297,036	\$364,796	\$202,761	\$1,187,193
Total Allocable Cost	\$9,033	\$8,317	\$10,214	\$5,677	\$33,241
Total Program Costs	\$331,632	\$305,353	\$375,010	\$208,438	\$1,220,434
Total Incentives	\$249,387	\$1,124,320	\$1,601,067	\$524,960	\$3,499,734
Total Budget	\$581,019	\$1,429,673	\$1,976,077	\$733,398	\$4,720,167

8. Cost Benefit Analysis

The table below summarizes the results for cost effectiveness tests using the most current OPA model named "Conservation_Program_Resource_Planning_Tool_V3.3". The tests include both Total Resource Cost (TRC) and Program Administrator Cost (PAC)¹⁶.

Name of Test	Benefits	Cost	Net Benefit	Ratio
TRC	\$15,804,126	\$7,220,795	\$8,583,331	2.2
PAC	\$15,804,126	\$3,379,051	\$12,425,075	4.7

The above tests results are based on the following input assumptions:

- Free ridership : 30%¹⁵
- Unit incremental equipment costs : \$41,877 (weighted average)
- Operating life : 10 years
- Number of participants : 496 audits
- : 248 hydronic system retrofits
- : 149 booster pump retrofits
- Demand Reduction : 6.5 kW (weighted average)
- Consumption Reduction : 143,396 kWh (weighted average)
- Program costs : \$1,220,434
- Financial incentive : \$3,499,734

As a sensitivity analysis, the table below shows the test results if savings are reduced by 25%.

Name of Test	Benefits	Cost	Net Benefit	Ratio
TRC	\$11,853,094	\$7,220,795	\$4,632,300	1.6
PAC	\$11,853,094	\$3,379,051	\$8,474,044	3.5

¹⁶ TRC and PAC calculations are based on annualized savings.

9. Non-Duplication of OPA-Contracted Provincial Programs

The proposed program will not duplicate any existing OPA programs as there are no provisions within the Province-wide Programs for a targeted assessment of hydronic systems.

10. Data Collecting, Tracking and Reporting

Commercially reasonable efforts will be used to ensure that kWh and kW savings are calculated using best engineering practice. THESL will require supporting data from program participants to substantiate the claimed savings. Documentation archives will be maintained and will be used for governance, reference and audit purposes.

THESL employs a comprehensive financial and work order system to keep track of CDM related expenditures. After validation and verification of participant and third party invoices, payments will be made and recorded in the system. Each invoice will be substantiated by supporting documents.

Internal operational reports will be prepared and reviewed monthly subject to THESL's corporate governance rules and policies, including those established to govern OPA Programs. Annual reports consisting of financial and operational results, energy and demand savings (based on project M&V and program EM&V results from independent third party reports) will be submitted to the OEB.

THESL is committed to delivering CDM programs that have a ratio of benefits to costs greater than one. TRC and PAC calculations will be performed annually and on completion of the program which will be included in the OEB reports.

All data collection efforts will be in conformance with the OEB CDM Code as well as any other instruction received.

Appendix A - Program Evaluation Plan based on Draft OPA Template

Program Description	As described in this application document
Conservation Measures	Section 6
Evaluation Goals and Objectives	<p>Evaluation Goals and Objectives</p> <ul style="list-style-type: none"> • Process Design Effectiveness • Program Administration Effectiveness • Measures and Assumptions Review • Establish gross and net energy savings and demand reductions achieved • Estimate Program Cost Effectiveness • Ensure Level of Customer Satisfaction
Evaluation Deliverables	<p>Evaluation Deliverables</p> <p>Draft Evaluation Plan</p> <p>Final Program Evaluation Plan</p> <p>Annual Report – Elements</p> <p>Final Report</p>
Evaluation Description	<p>The evaluation elements of the Evaluation Goals and Objectives are anticipated to include (but are not limited to) those listed in the corresponding sections below. It is expected that these elements will be reviewed, discussed, evaluated or analyzed as appropriate and according to the OPA's EM&V Protocols to ensure that they meet the Program Evaluation Goals and Objectives during the Draft Evaluation Plan development phase. Review of these elements will assist THESL in determining and/or validating the appropriateness of the program design, administration and measures assumption elements and whether adjustments are necessary in order to successfully deliver the Initiative and to achieve the anticipated goals and objectives and estimated participation and results.</p> <p>Program evaluation will be end-to-end, from program design, through delivery, to the final financial settlement of each project completed.</p>
Evaluation Elements	<p>i) Program Process Design Effectiveness - Evaluation criteria:</p> <ul style="list-style-type: none"> • Goals of program • Staffing and training • Program timing and timelines • Incentives and motivation for participation • Participant satisfaction feedback • Non participant feedback back – participant satisfaction • Reporting procedures <p>ii) Program Administration Effectiveness - Evaluation Criteria:</p>

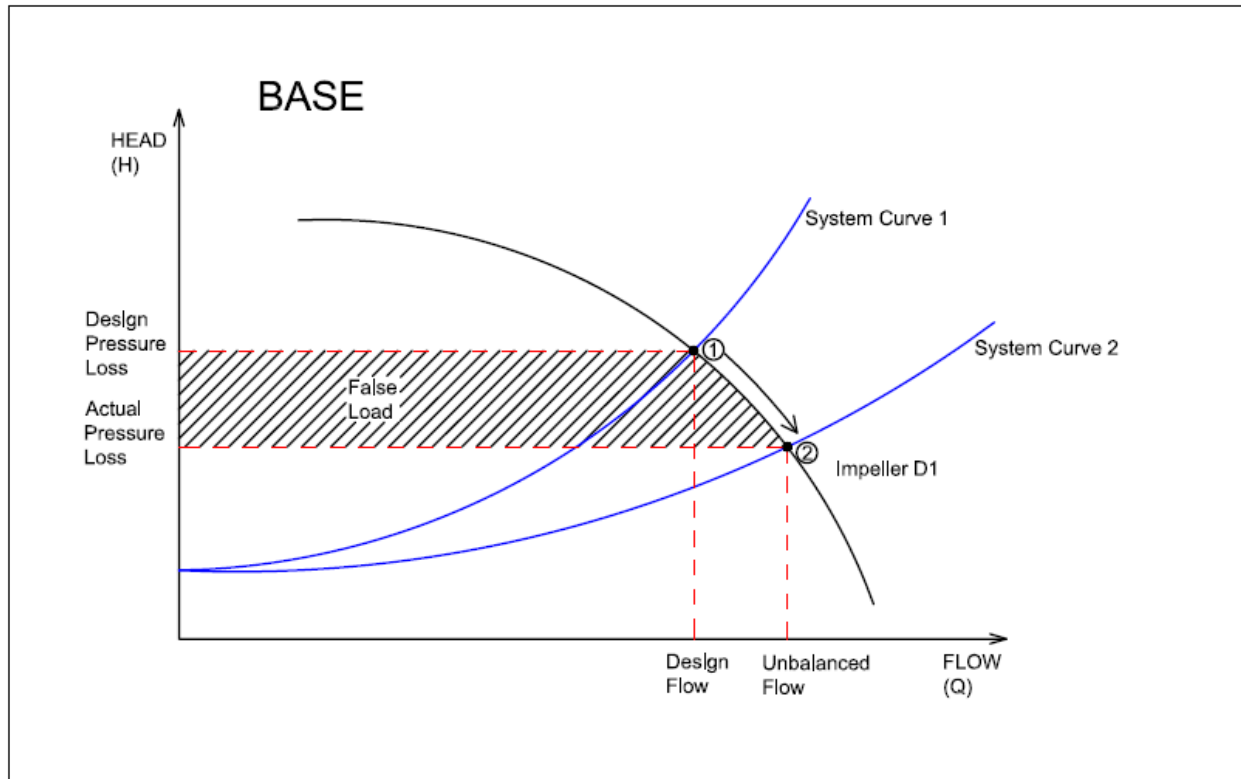
	<ul style="list-style-type: none"> • Program statistics – including participants, calculations of energy and demand reductions etc. • Program Impact Evaluation • Pre and post Project Analysis Assessment • Marketing Effectiveness Assessment • Actual versus Budget Reporting • Market Participant review <p>iii) Measures and Performance Assumptions Review:</p> <ul style="list-style-type: none"> • Custom Measures Assumptions Review • Behavioural and Performance Assumptions Review <p>iv) Gross and Net Energy Savings and Demand Reductions Achieved: (To be performed by a 3rd party based on the OPA's EM&V protocols)</p> <ul style="list-style-type: none"> • Measurement and verification of program weather or production normalized energy and demand savings achieved • Net to Gross ratio (including free rider rate) • Audit and Verification of project completion <p>v) Program Cost Effectiveness:</p> <ul style="list-style-type: none"> • Verification of program expenditures versus budget • Verification of incurred payments
Special Provisions	N/A
Data Collection Responsibilities to Support Program Evaluation	This will be completed with the assistance of a third party EM&V expert to ensure complete and appropriate collection of data to support Program evaluation.
Evaluation Schedule & Budget	Schedule will be established by the Third-Party certified M&V consultant in conjunction with THESL. Budget estimate is indicated in section 8 of this document
Evaluation Team	Third-Party certified M&V consultant team with support from THESL CDM personnel

Appendix B – CDM Code Requirements

This section documents that this program application is compliant under Section 3.1.4 of the “Conservation and Demand Management Code for Electricity Distributors”, requiring that a distributor's application for a proposed Board-Approved CDM Program must include the following:

CDM Code Reference	CDM Code Requirement	Section Addressing Requirement
3.1.4 (a)	a program evaluation plan, based on the OPA's EM&V Protocols, for each program;	6.2
3.1.4 (b)	a benefit-cost analysis of each program which shall be completed by using the OPA's Cost Effectiveness Tests;	8
3.1.4 (c)	a detailed explanation of the program's objective(s) and method of delivery;	1
3.1.4 (d)	the types of customers targeted by the program;	2.1
3.1.4 (e) ₁	a forecasted number of participants that the distributor expects will participate in the program;	2.2
3.1.4 (e) ₂	the total projected peak demand savings (kW) and electricity savings (kWh) per year, or if the program is for less than one year, the total projected peak demand savings (kW) and electricity savings (kWh) for the duration of the program;	3
3.1.4 (f)	a complete projected annual budget for each of the distributor's CDM Programs, including the following information:	7
3.1.4 (f) (i)	projected expenditures incurred on an annual basis, for each year of the CDM Programs, separated into customer incentive costs and program costs;	7
3.1.4 (f) (ii)	a division of program costs into Marginal Costs and Allocable Costs incurred as a result of program implementation;	7
3.1.4 (f) (iii)	information on the allocation of total expenditures incurred by targeted customer types for each direct projected expenditure; and	7
3.1.4 (f) (iv)	total projected expenditures for each program evaluation conducted; and	7
3.1.4 (g)	a statement that confirms that the distributor has used the OPA's Measures and Assumptions Lists or if the distributor has varied from the OPA's Measures and Assumptions Lists, the distributor must:	1.5
3.1.4 (g) (i)	appropriately justify the reason for varying from the OPA's Measures and Assumptions Lists in the application;	Not Applicable
3.1.4 (g) (ii)	provide the technical assumptions and substantiating data that the distributor used; and	Not Applicable
3.1.4 (g) (iii)	provide a statement that the distributor has followed the OPA's EM&V Protocols for custom measures not included in the OPA's Measures and Assumptions Lists.	6.2

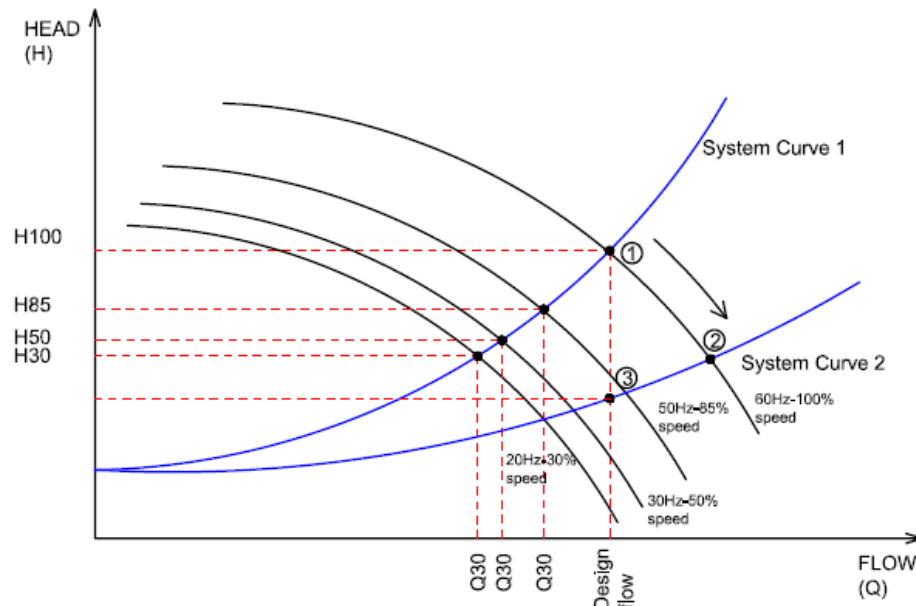
Appendix C – Pump Savings Explanation



Original Operating Point

Hydronic system losses are typically overestimated and result in the system operating at the intersection of System Curve 1 and the pump curve (Point 1). To achieve the desired operating conditions (Point 2) the pump and/or system balancing valves are closed to add additional resistance to the system resulting in System Curve 2. This false load is analogous to operating a car with the parking brake on. The additional load represents a continuous waste of energy whenever the pumps are operating.

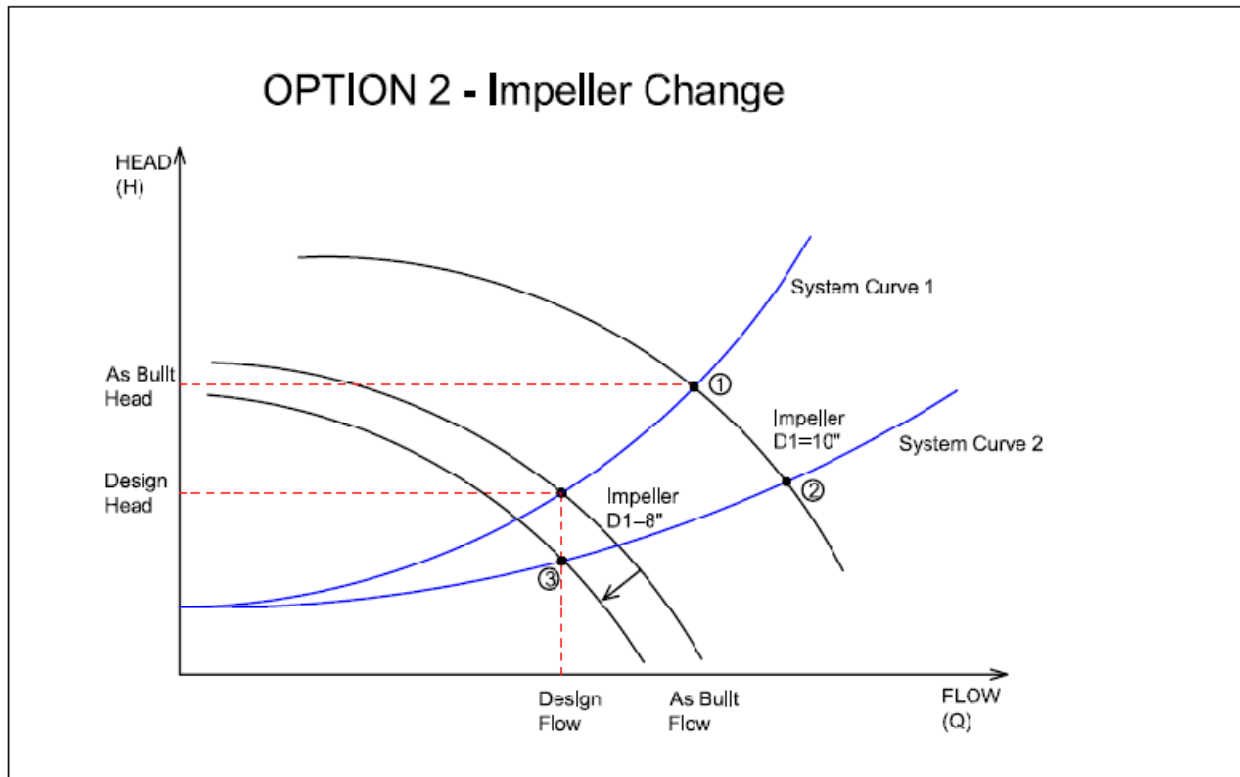
OPTION 1 - Variable Frequency Drive



Load matching using Variable Frequency Drive

This is a typical conversion of constant speed system to variable speed conversion. By removing or opening the balancing valves the hydronic system will operate on System Curve 1 and intersect the pump curve at Point 1. To achieve the desired design flow the pump speed can be slowed and the system curve will intersect the pump curve at Point 3. For this example we have estimated a pump speed of 50%. This results in significant pumping energy reductions.

$$\begin{aligned}
 \text{Pump Demand (kW)} &= (\text{New Speed}/\text{Original Speed})^3 \times \text{Original Pump Demand (kW)} \\
 &= (0.50)^3 \times \text{Original Pump Demand} \\
 &= 0.125 \times \text{Original Pump Demand i.e. a reduction of 87\%}
 \end{aligned}$$



Load matching by trimming the impeller

In a constant flow system, matching the building load can be achieved by trimming the existing impeller to obtain the desired flow and head. This operation is done by the pump manufacturer or specialist contractor and it is an iterative process. This method is very cost effective for large pumping systems.

$$\begin{aligned}
 \text{Pump Demand (kW)} &= (\text{New Diameter}/\text{Original Diameter})^3 \times \text{Original Pump Demand (kW)} \\
 &= (0.8)^3 \times \text{Original Pump Demand} \\
 &= 0.512 \times \text{Original Pump Demand i.e. a reduction of 57\%}
 \end{aligned}$$

Toronto Hydro-Electric System Limited

**Conservation and Demand Management
Program Application:**

Multi-Unit Residential Demand Response (“MURB DR”)

**Submitted to:
Ontario Energy Board**

Submitted on January 10, 2010

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Executive Summary

Toronto Hydro Electric System Limited (THESL) is seeking approval from the Ontario Energy Board (OEB) to expend \$19.9 million to achieve 11.7 MW of summer peak demand reduction with 467 MWh of cumulative energy savings through the Multi-Unit Residential Building Demand Response (MURB DR) Program between program approval and December 31, 2014.

The MURB DR program is modelled after the Residential and Small Commercial **peaksaver**® program that controls and cycles air conditioning units during hot summer days when the demand for electricity is at its highest. Similarly, in the case of multi-residential unit buildings, cooling loads associated with central chillers and non-essential equipment can be turned off or controlled in a similar manner, helping to relieve the strain on Ontario's electricity system.

With this program in place, THESL will be able to offer DR programming across its entire residential customer base, while utilizing and leveraging synergies with existing **peaksaver**® infrastructure and marketing.

This program takes advantage of the new technologies that are now available to effectively control cooling loads in MURB facilities and extends the concept of load control to a sector that contributes a significant and increasing portion of THESL's summer peak demand (approximately 22% of the peak cooling load). The cooling load contributed by this sector will not be addressed by the province-wide programs and the **peaksaver**® program has not been targeted at this sector specifically.

THESL proposes to install the necessary devices, (thermostats and/or switches) enabling cooling devices and non-essential electrical loads to receive a signal that will automatically cycle them down for short periods of time. THESL will launch a full scale marketing and implementation effort across the entire MURB sector.

Participants enrolling in the program will receive financial incentives for signing-up and an annual payment for their continued participation throughout the term of the program.

The following table summarizes the potential participation, saving and costs of the proposed program:

	2011	2012	2013	2014	Total
Peak Demand Savings (MW)	0.1	2.9	4.1	4.6	11.7
Cumulative Energy Savings (MWh)	2.5	67.0	218.4	466.5	466.5
Budget (000's)	\$704	\$4,905	\$6,774	\$7,532	\$19,915

Note: Savings are net. Budget includes fixed and variable incentive budget.

The anticipated Total Resource Cost (TRC) benefit to cost ratio for this program is 1.8. The anticipated Program Administrator Cost (PAC) benefit to cost ratio for this program is 1.0.

Objectives of the program include:

- Provide a cost effective program targeting a market that has been largely overlooked by OPA Contracted conservation programs
- Achieve significant cost effective peak demand reduction and energy savings
- Help to reduce the need to build expensive “peaking” electricity generating plants.
- Promote a culture of conservation in a market that has little opportunity for conventional energy efficiency measures at the suite level
- Contribute towards THE5L’s conservation targets with 337 MWh in cumulative net electricity savings and 11.7 MW in summer demand response capacity
- Provide condominium owners and corporations with a tool to reduce the electricity and natural gas component of their monthly maintenance fees

1. Program Description

The MURB DR program is modelled after the OPAs' *peaksaver*® program. The program is targeted at the multi-residential sector (both individually and bulk-metered buildings) and is designed to allow cooling units in the common areas and owner / tenant suites to have their temperature set points increased to reduce the total centralized cooling load in the facility. Non-essential loads in the common areas will also be turned off during system peak load events. The reduction in these loads will also reduce the facilities electricity demand. This will include an intensive sales/marketing effort coupled with vendor selection and program roll-out.

1.1. Program Rationale

The program is designed to reduce the summer peak demand load attributable to the MURB sector. The MURB sector is a significant contributor to the peak summer demand and is one of the sectors that are experiencing electrical load growth in the THESL service territory. The table below shows the significance of this sector.

Sector	Total Sector Demand (MW)	Total Sector Consumption (GWh)	Estimated Cooling Demand	Estimated Cooling Consumption
Rental	188	1,035	63.7	200.9
Condos - Sub-metered	41	238	14.1	48.0
Condos - Non Sub-metered	371	2,128	125.7	412.9
MURB Total	600	3,401	203.5	661.8
THESL Total	4,592	24,049	944.9	2,540.3
Percent of Total	13%	14%	22%	26%

This load will not be adequately addressed under the OPA-Contracted Province-Wide programs for the following reasons:

- Condominiums are predominantly cooled via a central chiller plant. Reducing the peak summer demand of the facilities would require upgrading the efficiency of the chiller and ancillary equipment. However, these changes have already occurred over the last five years to comply with the requirement to phase out CFC chillers. This leaves little scope to impact the cooling demand via the traditional retrofit approach.
- The *peaksaver*® program is geared towards single family residences and is not designed to impact the MURB sector with central equipment plants.

This program is a means of dealing with a large portion of the summer peak cooling load that will not otherwise be addressed by the OPA-Contracted Province-Wide programs.

1.2. Program Objectives

The objective of this program is to:

- Achieve sufficient market penetration in the MURB sector to reduce the net peak summer electricity demand by 11.7 MW and save 467 MWh in cumulative energy savings.
- Provide condominium owners and corporations with a tool to reduce the electricity and natural gas consumption thereby reducing their monthly maintenance fees
- Promote a culture of conservation in a market that has little opportunity for conventional energy efficiency measures at the suite level
- Help to reduce the need to build expensive “peaking” electricity generating plants that operate only a few hours during peak demand days.

1.3. Program Details

The MURB DR program will permit the cooling and non-essential loads in the facility to be reduced during periods when electricity demand needs to be decreased to alleviate the electricity grid load. To achieve this, participating condominiums will have a wireless network setup within their building to communicate and activate load control devices and Programmable Communicating Thermostats (PCT) installed within the condominium units. Activation will occur automatically based on signals provided by THESL during a Load Control Event (LCE) and in response the system will control the cooling loads in the common areas and the suites. Non-essential loads in common areas will also be turned off.

The typical common area elements that will be controlled include: corridor pressurization fans, recreational area cooling units and other discretionary loads. In-suite loads will be controlled using a PCT that will control air-conditioning output from a fan coil or heat pump. The PCT will come pre-programmed with a specific profile, as identified from the signup package, for typical occupancy patterns (i.e. unoccupied during weekdays). The owner/occupant will also be able to manually modify or override these initial settings on a limited basis. The PCT will then respond to load reduction signals and increase the set points in the controlled space to reduce or eliminate the cooling load. This will occur based on IESO/ **peaksaver**® activation protocols as per Section 5.4.1 for the duration of the event after which the set points will transition to the original settings.

The occupant may also override the activation; however, this will be recorded and the activation fees will be reduced accordingly. A web-based service will track the activations and record all of the overrides that have occurred during the activation season. This information will be used to calculate incentives that will flow back to the condominium corporation and individual suite owners.

The system will be installed on a turn-key basis by a vendor that will be selected via an RFP process, on behalf of THESL or in conjunction with other utilities. The vendor will maintain the customer interface, provide maintenance/support services and training.

To encourage participation in the program, enrolment and on-going incentives will be provided to the condominium corporation, building owner and suite owner. Further details are provided in section 5.3.

1.3.1. Program Scope

The program scope for THESL will include:

- 1) Calibration Stage
 - a) Install the system at two (2) selected sites to calibrate and refine the delivery model using early customer response to the technology.
- 2) RFP Stage
 - a) THESL will issue an RFP for the turn-key provision of demand response software, load control devices and PCT supply and installation. The selected vendor will also provide a web interface, training and maintenance/support services.
 - b) Evaluate and apply required modifications to system controls and operation.
- 3) Pre-Application Stage
 - a) Communicate and market program to target customer group.
- 4) Application Stage
 - a) Communicate and market program to target customer group.
 - b) Accept customer applications and review to ensure that the site is eligible for incentives.
- 5) Full Scale Implementation Stage
 - a) Manage third party program vendor/service providers
 - b) Service providers will offer installations, PCT education, service calls and technical support.
 - c) Provide vendor with customer enrolment data.
- 6) Operational Stage (Load Control Events)
 - a) Induce demand reduction events within enrolled participant base through vendor-managed web-based control interface.
- 7) Post-Implementation Stage
 - a) Verify results (M&V process see Section 6.0)
 - b) Process incentives
 - c) Manage the third party program evaluation process.

1.4. Value Proposition

The value proposition for the both the condominium and participating suite owners are:

- Incentives are provided based on signup and participation rate for demand reduction events.
- Reduced facility operation costs.
- Improved environmental sustainability profile through reduced GHG emissions.
- Customer will have access to technical support, which will promote customer adoption of the system.

1.5. Conformance with OPA Program Measures

The proposed program is designed to address a conservation opportunity that is currently being missed by broader CDM programming. Currently, the demand response measure used in the manner proposed in this document to reduce central chiller load is not included in the OPA Measures and Assumption Lists. The phased approach proposed will allow the effectiveness of the demand response measure to be analyzed and determined for the full-scale program deployment.

1.6. Conformance with CDM Code Requirements

This submission is compliant under Section 3.1.4 of the “Conservation and Demand Management Code for Electricity Distributors”, which specifies the requirements for a distributor's application for a proposed Board-Approved CDM Program and is documented under Appendix A.

2. Target Market

2.1. Sector Analysis

The primary targets for the MURB DR program are air-conditioned condominium buildings within the THESL service area, which have individual electricity suite meters. The secondary targets will be air-conditioned condominium buildings that have a bulk-meter that measures electricity used by the whole building. Centrally cooled apartment buildings will also be considered if the installation is feasible.

At present, there are approximately 2,000 multi-unit residential buildings in the THESL service area. The buildings contain over 300,000 suites. Of the 2,000 buildings, approximately 63% are condominium properties and the remaining 37% are rental properties. THESL estimates that the cooling load associated with these buildings is 203.5 MW.

Currently, there are approximately 200 condominium buildings that have been sub-metered to measure electricity used by individual suites, and in many cases, electricity used in common areas (corridors, recreation facilities, underground parking, etc.). This figure will increase steadily as the MURB market moves to comply with the provincial target to have “smart” meters installed in all residential units.

The following table gives a breakdown of the number of buildings, suites, and electrical loads associated with the MURB sector:

Sector	Total Number of Facilities	Number of Units	Total Sector Demand (MW)	Cooling Demand (MW)
Rental	727	145,400	188	63.7
Condos (Sub-metered)	200	30,800	41	14.1
Condos (Non Sub-metered)	1,056	162,624	371	125.7
TOTAL	1,983	338,824	600	203.5

2.2. Market Penetration

In THESL’S service area the **peaksaver**® program managed to sign-up 60,000 customers out of an eligible customer base of 200,000 for a penetration rate of almost 30% in the residential single family segment of the program.

Based on the similarity of the program design elements and the penetration rates achieved with **peaksaver**®, and the provision of a higher incentive rate than that paid to customers participating in the **peaksaver**® program, a 40% participation rate is expected for the individual suites in each participating condominium.

Facilities can participate with or without individual suite participation provided they can meet the conditions outlined in Section 5. Based on THESL's experience in the existing sub metering marketplace, the expected penetration rate in bulk-metered condominiums is only expected to be half of that occurring in sub- metered condominiums.

Sector	Buildings	Units	Building Penetration Rate (%)	Participating Buildings	Suite Penetration Rate (%)	Participating Suites
Rental	727	145,400	0%	0	0%	0
Condos - Sub-metered	200	30,800	30%	60	40%	3,696
Condos - Bulk-metered	1,056	162,624	15%	158	40%	9,757
Total	1,983	338,824	11%	218	3%	13,453

3. Projected MW and MWh Savings

3.1. Methodology

The demand and consumption savings are calculated using analysis of the sector cooling loads and using the penetration rates extrapolated for the projected market share. The energy savings are a function of assuming savings from 20 activation hours per year.

3.2. Savings Summary

The projected net electricity demand and consumption savings expected over the four year duration of the program are summarized in the following table:

	2011	2012	2013	2014	Total
# Participants	2	55	76	85	218
Projected MW Reduction	0.1	2.9	4.1	4.6	11.7
Projected MWH Savings	2	62	87	97	248
Cumulative MWH Savings	2	67	218	467	467
Ave kW reduction/site	53.6				
Ave kWh reduction/site	1,136				

4. Marketing and Sales Plan

4.1. Marketing Strategy

This program will be delivered through a third-party vendor selected through a competitive bidding process. The implementation vendor will be responsible for jointly marketing the program with THESL. The vendor will also be responsible for installing and maintaining all equipment, providing support, as well as tracking and reporting results. THESL staff will coordinate the program deployment and provide assistance to the vendor, as needed, while ensuring that the program delivery milestones, targets and timelines are met. THESL or its contractor will aggregate and settle with each participant.

Other strategies include:

- Developing an integrated marketing plan to create awareness and drive enrolments of the MURB program
- Integrating MURB into the CDM suite of services and marketing plans for co-promotion
- Creating unique targeted opportunities to promote MURB
- Utilizing an alternate channel approach to promote the program (sub metering companies, associations, stakeholders and vendor partner)

4.2. Marketing Objectives

Introduce Toronto Hydro's the MURB Program to approximately 2000 prospective customers by the end of 2011 with a take up rate of 200 customers by the end of 2014 and leveraging existing operational infrastructure available through **peaksaver®**.

Main Target Sectors

- Multi- Residential Condominium Buildings
- Multi- Residential Rental Buildings

Primary Target Market

- Condominium Corporations
- Condominium Owners
- Property Managers
- Unit Owners
- Sub metering companies
- Industry Associations

Secondary Market

- Associations (ACMO, CCI, GTAA)
- Stakeholder groups

Key Program Drivers

- Providing “double” incentives (i.e. for installations and per demand reduction event) to encourage participation
- Assisting Time of use (TOU) customers to better manage their electricity costs
- Promoting the notion that “what gets measured, gets managed”
- Providing free installation, support and training

Key Messaging

- Program load control options which allows more efficient and cost effective use of energy resources improving overall energy efficiency
- Educate customers about energy conservation and TOU rates as well as the benefits of shifting usage to better manage their electricity bills
- Two types incentives are provided: for installation of the system devices and incentives for demand reduction event participation
- THESL and its partners are honest brokers who provide a full suite of energy programs
- Helps to keep Toronto Green and promotes a culture of energy conservation

Tactics

- Develop new webpage to provide a one-stop hub of information on THESL site
- Provide links to and from partner web site
- Create installation video and simple online enrolment/applications process
- Develop sell sheet, FAQ, scripts to be used by partner
- Create customer testimonials and case studies for print and web
- Direct mail to end use customers
- Utilize internal and third party communication channels (newsletters and websites) to communicate program
- Sell through/to associations and relevant stakeholders
- Targeted media releases, advertisements and editorial in trade journals (print and online)
- Customer education sessions

4.3. Collaboration with other LDC's

If other LDCs elect to participate in the program, THESL will work closely with them to deploy the program, ensuring the programs are consistent and optimized for efficiency and cost effectiveness.

5. Program Rules

5.1. Eligibility

To be eligible for this program, a participant must meet the following criteria:

- Be a registered condominium corporation or building owner in the City of Toronto
- Agree to provide access to electricity information for the duration of the program.
- Have a central cooling plant or in-suite heat pumps
- Contain at least 50 condominium or rental suites and commit to having at least 30kW of load available for control. For suites where the corporation or owner would like to have suites incorporated there must be at least a 40% take-up rate for the suites to participate.
- Be contractually committed to remain in the program until December 31st, 2014. This condition is intended to support the persistence of demand response savings.

5.2. Enrolment Process

The Condo Corporation or owner will enroll via THESL's web site, direct mail or at CDM promotional/educational events. Specific customer groups will also be contacted by key account sales personnel to develop chain opportunities. Individual suite owners or renters will not be enrolled directly.

After the initial contact an enrollment package will be sent to each potential participant. The enrollment package will include an explanation of the program, the rules and an agreement will require signature will be sent to each prospective participant that meets the eligibility criteria. The enrollment package will also include information packages for distribution to the suite owners.

Upon receipt of a signed customer agreement, the third party vendor will visit each site to confirm installation requirements.

5.3. Incentives

5.3.1. Ownership: Suite Level

The suite owner will receive \$50 on sign-up and \$25 per year afterwards for participating in the program. The \$25 fee will be prorated based on the percentage of events participated in during the course of the year. In the case of the THESL suite metered sites this will be applied as a billing credit. In the case of non-THESL suite metered sites, THESL will work with the existing service provider to a reasonable settlement methodology and provide settlement for the suite owner. For bulk-metered condominiums the incentive will be paid to the condominium corporation or owner for distribution.

5.3.2. Ownership: Condominium Corporation or Other Entity

The condominium corporation or owner will receive \$50 on sign-up for each participating suite and \$25 per year afterwards for each suite that participates in the program. The \$25 fee will be prorated based on the percentage of LCEs participated in during the course of the year.

For common area loads the incentive will be \$50 for every 5kW controlled with annual \$25 fees for every 5 kW of load controlled in subsequent years. Controlled load will be based on nameplate ratings.

5.4. Activation Rules & Requirements

5.4.1. Activation Rules

It is expected the activation protocol will be consistent with the existing IESO/ *peaksaver*® practice where,

- Activations will occur between May 1 and September 30 for up to 40 hours.
- Each activation (i.e. Load Control Event) has a 4 hour maximum duration.
- Activations will not occur on weekends or holidays.
- Each season there will be a test activation to confirm operation.

Activations are triggered by one of two conditions - a primary trigger or a secondary trigger. The primary trigger is when the criteria for an Energy Emergency Alert (EEA) are met (refer to IESO Systems Operation Manual for additional information). Secondary triggering occurs when the outside air temperature is above 30°C and the electricity system demand exceeds 23,000MW.

Secondary triggers are also activated within the following rules and limitations:

- Only three triggers are allowed per season.
- The system will be activated in each month (June, July and August) if no activations have occurred.

5.4.2. System Requirements

The load control interface will have the following capabilities:

- Allow for rule based activation of participants.
- Provide a customer interface that allows scheduling, set point control and electricity usage data.
- Compile electricity data from demand events for EM&V purposes.
- Automatically store and provide reports indicating customer participation.

Load Control Technology: Functional Specifications

The Load Control Devices shall:

- Support both active and rule-based remote dispatch of Load Control by the Dispatch Administrator or the Aggregation Operator, as applicable.
- Allow differential control of multiple Appliances.

- Allow Load Control of different Appliances simultaneously.
- Allow Load Control of Load Control Devices of different groups of customers, based on licensed distribution service territories.
- Suitable for use with existing telecommunications infrastructure that is available for the Load Control Device at the time of Installation and that there is adequate signal strength at the time of installation to enable the exercise of Load Control.
- Be capable of receiving appropriate dispatch signals from the Dispatch Administrator or the Aggregation Operator, as applicable, within 20 minutes of the dispatch signal.
- Be compliant with all applicable Laws and Regulations.

Load Control Devices – Relay-Based Switches

Load Control Devices in the form of relay-based switches shall meet the following requirements:

- Suitable for indoor or outdoor installation, as appropriate given for the Appliance in respect of which the Load Control Device will operate.
- Compliant with CSA (Canadian Standards Association) approved and/or ESA (Electrical Safety Authority) standards.
- Embedded wireless communications (or other to be specified).
- Capable of independently controlling multiple Appliances.
- Shall not interfere with normal use of Appliances.
- Maintain a temporary log of recent operations that can be accessed electronically.
- Tamper-resistant construction.
- Return controlled Appliance to normal operating mode at the end of a Load Control Event, without a further dispatch signal (timed reset).

Load Control Devices – Programmable Communicating Thermostats

Load Control Devices in the form of programmable thermostats shall meet the following requirements:

- Compatible with commercially available central air conditioning systems.
- Easily installed in existing thermostat locations.
- Maintain a log of operations that can be accessed via electronic means.
- Can be overridden by the Participant, including by using a function on the Load Control Device, when subject to a Load Control Event.
- Must return Load-Controlled Appliance to its regular operating state at the end of a load control event, without a further dispatch signal (timed reset).
- Capable of independent control.
- Wireless two-way communication with facility gateway.
- Provide verification signals of participation during an activation event.
- Logging capability of overrides and other relevant data.
- Capable of remote programming of schedules, set points and activation protocols.
- Provide auxiliary load control capability. Program Evaluation

6. Project M&V

A savings report will provide results in conformance with IPMVP standards and/or OPA M&V protocols. Refer to Appendix B for a description of M&V methodology.

6.1. Operational Program Evaluation

The key component of the program is determining the effectiveness of the LCE's on system demand in a timely fashion. This will be determined by using the aggregate interval data for the participating customers. The centralized web software will upload this data and provide the comparison between the normalized baseline consumption, calculated based on the IESO Historical Baseline method, versus the actual consumption throughout the LCE.¹ This will provide a more up to date picture of the actual impact of the program rather than waiting several months for the formal evaluation of results. This feedback will be used to determine if the program has to be modified to meet the savings targets.

To ensure that the analysis being completed is in line with the IESO methodology and the overall program OPA EM&V Protocol, the third party evaluator will be involved in reviewing and approving the protocols used for monitoring demand reductions as described under Section 6.2.

6.2. Program Evaluation Plan

Program evaluation will be carried out by a certified third-party M&V Professional based on the OPA EM&V Protocol. It will focus on the following areas to assess the cost-effective delivery of the program:

- The actual gross peak demand reductions and energy savings
- The net peak demand reductions and energy savings in consideration of the realization rate to be determined; free-ridership should not be material for the demand response component, but needs to be determined for the energy management measure
- The actual TRC and PAC results based on the achieved savings
- The effectiveness of the program delivery in terms of marketing activities in signing up participants
- Program administration and governance effectiveness

The draft OPA EM&V template is used to outline the evaluation plan as shown in Appendix B, but the eventual evaluation plan will be prepared by the M&V Professional evaluator based on the OPA EM&V protocols. If necessary THESL will follow the OPA's EM&V Protocols for custom measures not included in the OPA's Measures and Assumptions List.

¹ A normalized baseline approach will allow participants to manage their own loads and engage in energy efficiency efforts in a manner that will not understate the effectiveness of this program in achieving demand reductions during LCEs.

7. Program Budget

The 2011-2014 budgeting plan for the program is summarized in the following table:

Description	2011	2012	2013	2014	Total
Marginal Costs					
Fixed Costs					
Legal Cost	\$52,500	\$15,750	\$15,750	\$15,750	\$99,750
Marketing	\$147,525	\$147,525	\$110,644	\$73,763	\$479,456
Sales	\$67,100	\$134,200	\$134,200	\$67,100	\$402,599
Program EMV	\$0	\$60,000	\$60,000	\$60,000	\$180,000
Administrative Costs	\$291	\$7,284	\$10,197	\$11,363	\$29,135
Operation Cost	\$49,388	\$59,182	\$59,478	\$38,460	\$206,507
Total Fixed Costs	\$316,804	\$423,940	\$390,268	\$266,435	\$1,397,447
Variable Costs					
Administrative Costs	\$1,165	\$29,135	\$40,789	\$45,450	\$116,539
Operation Cost	\$197,553	\$236,727	\$237,911	\$153,839	\$826,030
Vendor Cost	\$107,619	\$2,690,470	\$3,800,291	\$4,277,853	\$10,876,233
Total Variable Costs	\$306,338	\$2,956,332	\$4,078,991	\$4,477,142	\$11,818,802
Total Marginal Cost	\$623,142	\$3,380,272	\$4,469,259	\$4,743,577	\$13,216,249
Total Allocable Cost	\$17,448	\$94,648	\$125,139	\$132,820	\$370,055
Total Program Costs	\$640,590	\$3,474,919	\$4,594,398	\$4,876,397	\$13,586,304
Total Incentives	\$63,231	\$1,430,181	\$2,179,206	\$2,655,768	\$6,328,386
Total Budget	\$703,821	\$4,905,100	\$6,773,604	\$7,532,165	\$19,914,690

8. Cost Benefit Analysis

The table below summarizes the results for cost effectiveness tests using the most current OPA model named "Conservation_Program_Resource_Planning_Tool_V3.3". The tests include both Total Resource Cost (TRC) and Program Administrator Cost (PAC)².

Name of Test	Benefits	Costs	Net Benefits	Ratio
TRC	\$ 21,293,926	\$ 10,489,187	\$ 10,804,739	2.0
PAC	\$ 17,440,704	\$ 16,665,081	\$ 775,623	1.0

/C

² TRC and PAC calculations are based on annualized savings.

As a sensitivity analysis, the table below shows the test results assuming 20% fewer buildings enrol.

Name of Test	Benefits	Costs	Net Benefits	Ratio
TRC	\$ 17,035,141	\$ 8,858,838	\$ 8,176,303	1.9
PAC	\$ 13,952,563	\$ 13,799,553	\$ 153,010	1.0

/C

The above tests results are based on the following input assumptions:

- Free ridership : 10%
- Unit incremental equipment costs : \$49,800
- Operating life : 10 years
- Number of participants : 218
- Unit peak demand savings : 59.55 kW
- Unit annual energy savings : 1,263 kWh
- Program costs : \$13,586,304
- Financial incentive : \$6,328,386

9. Non-Duplication of OPA-Contracted Provincial Programs

The proposed program will not be duplicating any OPA-Contracted programs as the peaksaver and DR1 programs are not applicable to this market segment.

10. Data Collecting, Tracking and Reporting

Commercially reasonable efforts will be used to ensure that kWh and kW savings are calculated using best engineering practice. THESL will require supporting data from program participants to substantiate the claimed savings. Documentation archives will be maintained and will be used for governance, reference and audit purposes.

THESL employs a comprehensive financial and work order system to keep track of CDM related expenditures. After validation and verification of participant and third party invoices, payments will be made and recorded in the system. Each invoice will be substantiated by supporting documents.

Internal operational reports will be prepared and reviewed monthly subject to THESL's corporate governance rules and policies, including those established to govern OPA Programs. Annual reports consisting of financial and operational results, energy and demand savings (based on project M&V and program EM&V results from independent third party reports) will be submitted to the OEB.

THESL is committed to delivering CDM programs that has a ratio of benefits to costs greater than one. TRC and PAC calculations will be performed annually and on completion of the program which will be included in the OEB reports.

All data collection efforts will be in conformance with OEB CDM Code as well as any other instruction received.

Appendix A – CDM Code Requirement Cross Reference

This section documents that this program application is compliant under Section 3.1.4 of the “Conservation and Demand Management Code for Electricity Distributors”, requiring that a distributor's application for a proposed Board-Approved CDM Program must include the following:

CDM Code Reference	CDM Code Requirement	Section Addressing Requirement
3.1.4 (a)	a program evaluation plan, based on the OPA's EM&V Protocols, for each program;	6
3.1.4 (b)	a benefit-cost analysis of each program which shall be completed by using the OPA's Cost Effectiveness Tests;	8
3.1.4 (c)	a detailed explanation of the program's objective(s) and method of delivery;	1
3.1.4 (d)	the types of customers targeted by the program;	2.1
3.1.4 (e) ₁	a forecasted number of participants that the distributor expects will participate in the program;	2.2
3.1.4 (e) ₂	the total projected peak demand savings (kW) and electricity savings (kWh) per year, or if the program is for less than one year, the total projected peak demand savings (kW) and electricity savings (kWh) for the duration of the program;	3
3.1.4 (f)	a complete projected annual budget for each of the distributor's CDM Programs, including the following information:	7
3.1.4 (f) (i)	projected expenditures incurred on an annual basis, for each year of the CDM Programs, separated into customer incentive costs and program costs;	7
3.1.4 (f) (ii)	a division of program costs into Marginal Costs and Allocable Costs incurred as a result of program implementation;	7
3.1.4 (f) (iii)	information on the allocation of total expenditures incurred by targeted customer types for each direct projected expenditure; and	7
3.1.4 (f) (iv)	total projected expenditures for each program evaluation conducted; and	7
3.1.4 (g)	a statement that confirms that the distributor has used the OPA's Measures and Assumptions Lists or if the distributor has varied from the OPA's Measures and Assumptions Lists, the distributor must:	1.5
3.1.4 (g) (i)	appropriately justify the reason for varying from the OPA's Measures and Assumptions Lists in the application;	1.4
3.1.4 (g) (ii)	provide the technical assumptions and substantiating data that the distributor used; and	6
3.1.4 (g) (iii)	Provide a statement that the distributor has followed the OPA's EM&V Protocols for custom measures not included in the OPA's Measures and Assumptions Lists.	6.2

Appendix B – Program Evaluation Plan

Program Description	As described in this application document
Conservation Measures	Section 1.3
Evaluation Goals and Objectives	<p>Evaluation Goals and Objectives</p> <ul style="list-style-type: none"> • Process Design Effectiveness • Program Administration Effectiveness • Measures and Assumptions Review • Establish gross and net energy savings and demand reductions achieved • Estimate Program Cost Effectiveness • Ensure Level of Customer Satisfaction
Evaluation Deliverables	<p>Evaluation Deliverables</p> <p>Draft Evaluation Plan</p> <p>Final Program Evaluation Plan</p> <p>Annual Report – Elements</p> <p>Final Report</p>
Evaluation Description	<p>The evaluation elements of the Evaluation Goals and Objectives are anticipated to include (but are not limited to) those listed in the corresponding sections below. It is expected that these elements will be reviewed, discussed, evaluated or analyzed as appropriate and according to the OPA's EM&V Protocols to ensure that they meet the Program Evaluation Goals and Objectives during the Draft Evaluation Plan development phase. Review of these elements will assist THESL in determining and/or validating the appropriateness of the program design, administration and measures assumption elements and whether adjustments are necessary in order to successfully deliver the Initiative and to achieve the anticipated goals and objectives and estimated participation and results.</p> <p>Within the above overall EM&V process, the specific focus of EM&V for this program would be on the proper application of the IESO Historical Baseline Load calculation methodology to determine the demand reduction that has been achieved at each building, and the correlation between the demand reduction and the weather for the different times of day.</p>
Evaluation Elements	<p>i) Program Process Design Effectiveness - Evaluation criteria:</p> <ul style="list-style-type: none"> • Goals of program • Staffing and training • Program timing and timelines • Incentives and motivation for participation • Participant satisfaction feedback • Non participant feedback back – participant satisfaction • Monitoring and tracking procedures • Reporting procedures

	<p>ii) Program Administration Effectiveness - Evaluation Criteria:</p> <ul style="list-style-type: none"> • Program statistics – including participants, calculations of energy and demand reductions etc. • Program Impact Evaluation • Pre and post Project Analysis Assessment • Marketing Effectiveness Assessment • Actual versus Budget Reporting • Market Participant review <p>iii) Measures and Performance Assumptions Review:</p> <ul style="list-style-type: none"> • Custom Measures Assumptions Review • Behavioural and Performance Assumptions Review <p>iv) Gross and Net Energy Savings and Demand Reductions Achieved: (To be performed by a 3rd party based on the OPA's EM&V protocols)</p> <ul style="list-style-type: none"> • Measurement and verification of program weather or production normalized energy and demand savings achieved • Net to Gross ratio (including free rider rate) • Audit and Verification of project completion <p>v) Program Cost Effectiveness:</p> <ul style="list-style-type: none"> • Verification of program expenditures versus budget • Verification of incurred payments
Special Provisions	N/A
Data Collection Responsibilities to Support Program Evaluation	This will be completed with the assistance of a third party EM&V expert to ensure complete and appropriate collection of data to support Program evaluation.
Evaluation Schedule & Budget	Schedule will be established by the Third-Party certified M&V consultant in conjunction with THESL. Budget estimate is indicated in Section 7 of this document
Evaluation Team	Third-Party certified M&V consultant team with support from THESL CDM personnel.