Greater Sudbury Hydro Inc./
Hydro du Grand Sudbury Inc.

Custom Programs
Conservation and Demand Management Plan

For the Period 2008 to 2010

Filed: June 2008

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1.0 Introduction

Making a community more energy efficient takes leadership. In 2005, Greater Sudbury Hydro Inc. (GSH) began an aggressive community awareness campaign aimed at encouraging community involvement and gaining support for energy conservation. This strategy proved extremely successful with an overwhelming response to its 'Waste Not Watt Not' program.

Armed with 1,000 compact fluorescent light bulbs (CFLs), students from the local Lockerby Composite Secondary School went door-to-door collecting incandescent bulbs in exchange for a CFL. Once collected, the inefficient bulbs were used to create Christmas tree ornaments. The ornaments were then sold with proceeds from the sales going to support the local food bank.

In 2007, GSH launched the first Landfill Gas Generator in Northern Ontario. Using methane gas purchased from the City of Greater Sudbury, the 1.6MW generator produces enough electricity to power approximately 1,200 homes for the next 20 years.

With the execution of its 2005 CDM plan, GSH has proven the role it plays in creating a 'Culture of Conservation'[1] not only in the province of Ontario but the community of Greater Sudbury. Recognizing this and the importance of offering CDM services to its customers, GSH is moving forward to secure additional funding for its CDM efforts.

This application contains GSH's (2008-2010) CDM Plan. The plan outlines the direction it intends to take to enhance its OPA sponsored program portfolio. As a winter peaking Northern Ontario community, there are unique CDM programming needs to be addressed. This plan addresses those needs by bridging the gap between provincial systems requirements and local constraints of the Greater Sudbury community.

2.0 Background

On March 28th 2008, the Ontario Energy Board (the Board) issued its "Guidelines for Electricity Distributor Conservation and Demand Management" (the Guidelines). These guidelines set forth the future for conservation funding available to local electricity distributors (LDC) in Ontario.

Prior to 2007, Greater Sudbury Hydro's CDM activity had been solely funded through electricity rates with the government's approved incremental installment of their market adjusted revenue requirement (MARR). This gave GSH an opportunity to design and market its own conservation and demand management

[1] January 14, 2004 — Energy Minister Dwight Duncan press release on the report of the Electricity Conservation and Supply Task Force.

(CDM) programs. However on July 13, 2006, when the Ministry of Energy issued a directive giving the Ontario Power Authority (OPA) the task of establishing a conservation fund, the ability to manage its own CDM needs had changed.

With the introduction of the OPA's standard program offerings[2], GSH renewed its commitment to promoting energy conservation, engaging in a delivery partnership with the OPA. With OPA funding, GSH facilitated the pick-up of more than 380 old appliances, provided nearly $125,000 in rebates for summer load saving customers and approved over fifty Electric Retrofit Business Incentive (ERIP) projects. This partnership effort will continue to grow throughout 2008.

However, in light of the current OPA custom funding priorities and being located in Northern Ontario with winter distribution constraints GSH believes it is necessary to move forward in designing and delivering CDM services that make sense for its customers and local issues.

3.0 CDM Plan Strategy

The programs proposed in this three-year plan have been thoughtfully developed based on GSH's (2005 to 2007) program delivery experience and its in-depth knowledge of the local market.

GSH is also proposing a new funding strategy that demonstrates true leadership and commitment to conservation and to our ratepayers. Over the course of this plan, funds collected through the Shared Savings Mechanism (SSM)[3] will be re-invested by GSH and its shareholders, to support the on-going CDM efforts. This re-investment could potentially offer 1% of the required funding over the life of the plan.

In addition, wherever possible GSH will streamline its CDM efforts by seeking out synergies with OPA sponsored programs. For example, delivery vehicles used for the OPA programs will be leveraged for custom programs reaching similar audiences. In doing so, GSH believes it will lead the way in delivering long-term sustainable electricity conservation.

3.1 Summary of Plan Budget

This plan is based on three years of CDM program funding and has been summarized in Tables 3.1.1 and 3.1.2.

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[2] Appliance Retirement, Business Incentive, Summer Savings and Residential and Commercial Demand Response.

[3] Pg. 20, Guidelines for Electricity Distributor Conservation and Demand Management EB-2008-0037.

Table 3.1.1 Summary of Plan Budget[4]

	2008	2009	2010	Total
Community Awareness Program	$50,000	$50,000	$50,000	**$150,000**
Electric Thermal Storage Program	$222,000	$350,000	$485,000	**$1,057,000**
Commercial Parking Lot Plug Controller Program	$197,000	$300,000	$360,000	**$857,000**
Vending Machine and Self Service Coolers Efficiency Program	$109,500	$160,000	$160,000	**$429,500**
LED Traffic Light Conversion Program	$29,048	$48,790	$0	**$77,838**
West Nipissing Street Light Conversion Program	$39,625	$41,625	$0	**$81,250**
Evaluation Costs	$35,000	$35,000	$0	**$70,000**
Total	**$682,173**	**$985,415**	**$1,055,000**	**$2,722,588**

Table 3.1.2 Summary of Plan Budget by Rate Class

	Residential Budget	General Service <50 kW Budget	General Service >50 kW and Larger User Budget
2008	$287,000	$326,500	$68,673
2009	$415,000	$480,000	$90,415
2010	$535,000	$520,000	$0
Total	**$1,237,000**	**$1,326,500**	**$159,088**

As shown, the proposed budget is approximately $2.7 Million over 3 years, which has been further allocated to the rate classes based upon programming activity. GSH believes the potential impact on rates from the proposed budget is minimal. The impact on each rate class is highlighted in the tables below.

Table 3.1.3 Estimated Impact on Residential Rates

	Residential Budget	2007 kWh Sold[5]	Rate Impact per kWh Sold
2008	$287,000	376,970,987	$ 0.00076
2009	$415,000	376,970,987	$ 0.00110
2010	$535,000	376,970,987	$ 0.00142

[4] Includes both operating expenses (program delivery and incentives) and capital.
[5] GSH 2007 distribution revenue data.

Table 3.1.4 Estimated Impact on General Service <50 kW Rates

	General Service <50 kW Budget	2007 kWh Sold[6]	Rate Impact per kWh Sold
2008	$326,500	515,490,492	$ 0.00063
2009	$480,000	515,490,492	$ 0.00093
2010	$520,000	515,490,492	$ 0.00101

Table 3.1.5 Estimated Impact on Street Lighting Rates

	General Service >50 kW and Larger User Budget	2007 kWh Sold[7]	Rate Impact per kWh Sold
2008	$68,673	7,804,406	$ 0.00880
2009	$90,415	7,804,406	$ 0.01159
2010	$0	7,804,406	$ -

As described above, GSH is committed to developing a path of sustainable electricity conservation programs for its customers. For each year of the plan, all funds collected through the SSM will be re-invested to offset CDM operating and capital expenditures from custom programs. Using the estimated Total Resource Cost (TRC) results outlined in section 5.0, Table 3.3 provides a summary of the potential funds available to GSH through the appropriate application of the SSM formula.

Table 3.1.6 Summary of Potential Funding Contribution from SSM[8]

	TRC Net Benefits	SSM (5% of TRC Net Benefits)
2008	$45,695	$2,285
2009	$329,441	$16,472
2010	$151,856	$7,593
Total		**$26,350**

3.2 Summary of Planned Energy and Demand Savings

The estimated energy and demand savings for this plan are based on the technology savings described in Appendix A and the program parameters shown in Section 4.0. Summarized results are shown in Table 3.2.1.

[6] GSH 2007 distribution revenue data.
[7] GSH 2007 distribution revenue data.
[8] Based on un-audited TRC results . For illustrative purposes only.

Table 3.2.1 Summary or Energy and Demand Savings

	Annual Net Energy Savings (kWh)	Annual Net Demand (Summer) Savings[9] (kW)
2008	1,018,924	20.51
2009	1,606,718	41.20
2010	1,417,500	0.00
Total	**4,043,142**	**61.71**

By the third year of this three year plan, GSH will have helped deliver over 4 MWh of energy savings and 61 kW of summer peak savings to its residential, commercial and institutional customers.

Table 3.2.2 Summary of Energy Savings by Rate Class

	Residential Annual Net Energy Savings[10] (kWh)	General Service <50 kW Annual Net Energy Savings (kWh)	General Service >50 kW and Larger User Annual Net Energy Savings (kWh)
2008	0	694,575	324,349
2009	0	1,247,400	359,318
2010	0	1,417,500	0.00
Total	**0**	**3,359,475**	**683,667**

[9] The focus of the OPA is summer peak reduction. Each of the programs proposed in this plan provide winter peak load saving opportunities, however these were not considered in this document..

[10] The program associated with this rate class provides only load shifting opportunities.

4.0 Custom Programs

4.1 Residential and General Service (< 50kW) Mass Market Programs

4.1.1 Community Awareness Program

Program Strategy:
Changing customer behaviour through education is a priority for GSH and is an integral component of our community outreach efforts. This vehicle also offers an opportunity to educate customers about other Ministry and OPA program initiatives.

In addition to this effort, GSH will actively pursue partnerships with local business to showcase and promote other energy conservation efforts being made throughout the community.

Program Elements:
Waste Not Watt Not

Building on the overwhelming success of the 2007 program[11], GSH will continue working with local schools to develop an action plan for promoting conservation and raising funds for community charities.

Kill-A-Watt Monitor

This program uses a grassroots approach to education by working directly with customers. An electricity monitor that collects consumption data (i.e. voltage, kilowatts consumed) on appliances is loaned to customers so that they can better understand their electricity use. The data collected provides customers with information about the appliance's contribution to their overall electricity bill.

Going forward, this program will be expanded to include an energy audit/analysis. Responding to customer high bill inquires, GSH will take greater steps in helping customers better understand their household electricity consumption. Along with an audit/analysis GSH will provide advice about energy saving options.

Home Sweepstake (Sudbury)

In the past, GSH has supported the Kinsmen Home Sweepstakes. Going forward GSH will continue its support of an annual local home sweepstakes.

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[11] See reported program results in GSH 2007 Annual Report.

This annual event has given GSH an opportunity to showcase energy efficient products and ideas for the home. Attracting nearly 200,000 participants a year, the program offers a perfect vehicle for promoting the conservation message.

Smart Meter Education

Through involvement with its smart meter pilot program, GSH believes there will be a need to prepare customers for the full deployment of smart meters. In response, GSH will provide education on the differences and uses of smart meters, time of use rates and energy conservation.

Program Budget:

	2008	2009	2010
Operating Expense	$50,000	$50,000	$50,000
Capital	$0	$0	$0
Total	**$50,000**	**$50,000**	**$50,000**

4.1.2 Electrical Thermal Storage Heating (ETS) Program – 'Build Up Heat While You Sleep'[12]

Program Strategy:
GSH customers experience cold winters and extremely high heating costs and contribute significantly to peak loading both within GSH's service territory and on the Provincial Transmission System (PTS). The initiative focuses on the promotion and use of the electric storage system for space heating. The program delivers a greater prospect of consumer involvement by offering both a financial incentive for participating and the bill savings that are an outcome of using the technology.

The utilities of the north experience a much higher winter peak than summer peak – the complete opposite of what the trend is for utilities located in the south. Specific to Sudbury, the summer peak is about 140 MW in comparison to the winter peak of about 180 MW, with an all time winter high of 203 MW. Diverting and/or shifting electrical usage to off peak periods has long term potential that will ultimately help transmission assets remain in service.

The program promotes the use of Electric Thermal Storage (ETS) technology, which stores low cost electricity in the form of heat for use in heating 24 hours a

[12] GSH has submitted a custom program application with the OPA for the Electrical Thermal Storage Heating (ETS) Program. At the time of preparing this application, approval for funding had not been received. Pending results from the OPA custom funding application process, this program may or may not be included in the CDM program portfolio.

day. ETS equipment utilizes a storage medium to store heat during off-peak hours and releasing it consistently throughout the day during the mid-peak and on-peak hours. Additionally, ETS also has the ability to control electric water heaters so that they use off-peak energy to heat stored water.

Program Participation:
Anticipate program participation is modest, starting at 50 units in 2008 and growing by 50 units per year.

	2008	2009	2010
Electric Thermal Storage Unit	50	100	150

Program Budget:

	2008	2009	2010
Operating Expense*	$222,000	$350,000	$485,000
Capital	$0	$0	$0
Total	**$222,000**	**$350,000**	**$485,000**

* Includes up to a $2,500 incentive per customer

4.2 General Service <50 kW Programs

4.2.1 Commercial Parking Lot Plug Controller Program

Program Strategy:
Parking lot controllers are electronic devices that control the amount of electricity used by an outdoor plug, allowing building and property managers to effectively manage their electricity usage for block heaters in outdoor parking lots during the winter months.

Studies have shown that parking lot plug controllers have been proven to reduce electricity costs by up to 50 per cent, yet ensure trouble-free starts for tenants, staff and guests. In contrast to timers, parking lot controllers save energy by automatically adjusting the length of time that electricity is provided to the car plugs depending on outside temperatures. Above –5°C, outlets typically receive no electricity. As the temperature drops, electricity is progressively delivered for longer periods of time. Once the temperature drops to between –20°C to –30°C, the power stays on all the time.

Targeting multi-residential buildings, this program will offer a $200 financial incentive per device to encourage building and property managers to install the

controllers at their sites. Participants will be required to fill out an application requesting the units for installation. Each participant will be responsible for arranging installation and will be free to select an electrical contractor of their choice. Once installed, the participant will notify GSH so that a company representative can then verify installation. Once verified, the incentive will be issued to the participant.

Program Participation:

	2008	2009	2010
Controller Plug Units	500	1,000	1,250

Program Budget:

	2008	2009	2010
Operating Expense*	$197,000	$300,000	$360,000
Capital	$0	$0	$0
Total	**$197,000**	**$300,000**	**$360,000**

*Includes a $200 incentive per unit

4.2.2 Vending Machine and Self Service Coolers Efficiency Program

Program Strategy:
Vending machines and self-serve coolers present an excellent opportunity for energy conservation. They operate 24/7 and consume six times the amount of energy of a household refrigerator. By installing vending machine power controllers, energy costs can be cut in half. The vending machine is plugged into a power controller, which consists of a passive infrared motion sensor and control unit.

The device monitors the presence of people in the room using infrared technology. If no one is present for 15 minutes, the device automatically powers off the vending machine but maintains the temperature of the product. Once powered off, the device monitors the temperature of the room and will power the machine on in 1.5 to 3 hour intervals. The device allows the machine to run a complete cycle before shutting down.

These devices are used extensively in the USA. The units are not "hard wired" to the supply circuit but simply plug in; therefore no ESA permits or trade qualified people are required for installation. After extensive research, the choice of technologies is limited with the VendingMISER made by USA Technologies being the only technology of its kind on the market today.

GSH estimates thousands of refrigerated vending machines and glass front self serve coolers throughout its service territory. These machines can be found in almost all local hotels/motels, restaurants, colleges, university, hospitals, high school cafeterias, recreation facilities and supermarkets and corner stores. Given the target audience for this program GSH will take advantage of the opportunity to cross-market with the OPA Business Incentive program.

Program Qualifications:
A $150 dollar rebate per device will be available to non-residential customers of Greater Sudbury Hydro (GSH). All products must be installed and used in facilities in the GSH service territory. For reasons of health and safety only refrigerated vending machines and self serve coolers that dispense or contain non-perishable product such as soft drinks water etc. will be eligible.

The vending machine must be in an area not occupied 24 hours per day. The device must be installed on indoor equipment. All incentive applications will have to be pre-approved by GSH. Equipment will have to be purchased and installed before incentive payment is issued. The applicant must be an end-user (i.e., not a wholesaler, distributor, or installer). Incentives will only be paid on product purchased after an incentive application has been approved. Units must remain in service in the GSH service area for a period of 3 years. Incentives will be paid on a per controlled machine basis.

Program Participation:

	2008	2009	2010
VendingMISER Devices	250	400	400

Program Budget:

	2008	2009	2010
Operating Expense*	$109,500	$160,000	$160,000
Capital	$0	$0	$0
Total	**$109,500**	**$160,000**	**$160,000**

*Includes a $150 incentive per installed device

4.3 Large User (>5,000 kW) Programs

4.3.1. LED Traffic Light Conversion Program

Program Strategy:
The traffic signal market in Canada as well as abroad is shifting toward low energy consuming LED technology and away from inefficient incandescent bulbs. Besides being more energy efficient, LED heads are more durable; requiring less maintenance once installed, are brighter and eliminate the need for coloured

lenses. However the initial costs are substantially higher, upwards of $150 per LED head compared to $2 per incandescent bulb. The Program will be open to municipalities within the existing Greater Sudbury Hydro service area.

Several utilities in Canada, including Hydro One and Horizon Utilities, have offered or are offering incentives to replace incandescent bulbs in traffic lights to the new LED technology. Countries such as France, Belgium, Great Britain and Japan have taken advantage of the technology. Joint studies by BC Hydro, Manitoba Hydro and Natural Resources Canada have shown 85% to 95% in energy savings.

Program Qualifications:
Incentives will only be offered for Red, Green, Advance Green Arrows and Pedestrian Signals. Yellow yield and yellow arrows will not be covered. Applicants will be required to fill out an application prior to purchasing or commencing work. A savings calculation worksheet will be made available to calculate the potential savings and incentives. Once approved, the applicant will be notified, and work can commence. When completed, the applicant will submit paid copies of invoices and receipts. Following a site inspection by a GSH representative, incentives will be paid.

Program Participation:

	2008	**2009**	**2010**
LED Light Fixture Conversions[13]	274	558	0

Program Budget:

	2008	**2009**	**2010**
Operating Expense*	$29,048	$48,790	$0
Capital	$0	$0	$0
Total	**$29,048**	**$48,790**	**$0**

*Includes $55 incentive for red and green; and, $88 incentive for red, green and advanced arrow.
Alternatively, where partial conversions have already been completed, individual incentives will be as follows: Red - $20, Green - $30, Advanced Arrow - $30, Pedestrian - $30. These installations will be tracked and reported as part of the reporting process.

[13] Conversion data provided by the City of Greater Grand Sudbury (powerconsumption2006-Oct 10 06-Paula Analysis.xls)

4.3.2 West Nipissing Street Light Conversion Program

Program Strategy:
The Municipality of West Nipissing has nearly 250 mercury vapor street light fixtures ranging in size from 175W to 400W. The maintenance and operating costs for these inefficient fixtures are much higher their efficient counterpart, however budget constraints have delayed the conversion to more efficient lighting.

This program has been designed to assist the municipality of West Nipissing make more efficient purchase decisions.

Program Participation:

	2008	**2009**	**2010**
Street Lamp Conversions	125	125	0

Program Budget:

	2008	**2009**	**2010**
Operating Expense	$39,625	$41,625	$0
Capital	$0	$0	$0
Total	**$39,625**	**$41,625**	**$0**

* Includes a $245 incentive/fixture

5.0 Total Resource Cost Analysis of Plan

In accordance to the cost effectiveness framework laid out in the OEB guidelines, a TRC assessment of the proposed programs was undertaken. Using the program assumptions presented in Section 4.0 and the technology inputs described in Appendix A, TRC results are shown in the tables below.

Note that the TRC results represent the discounted Net Present Values (NPV) of the streams of benefits and costs that accrue from the operation of the programs. The benefits stem from the avoided cost of the electricity, while the costs are the customer equipment cost and the utility program costs. Results are provided for each individual year in the plan. Note that 2 programs, LED Traffic Light and Street Light Conversions will be completed prior to 2010. TRC results are provided for the years in which they are operated.

Table 5.1 Summary of 2008 TRC Results[14]

Programs	TRC Benefits[15] (NPV)	TRC Costs (NPV)	TRC Net Benefits (NPV)	TRC Benefit Cost Ratio
Community Awareness Program	$0	$50,000	($50,000)	n/a
Electric Thermal Storage Program	$44,857	$216,500	($171,643)	0.21
Commercial Parking Lot Plug Controller Program	$290,960	$214,000	$76,960	1.36
Vending Machine and Self Service Coolers Efficiency Program	$253,678	$117,000	$136,678	2.17
LED Traffic Light Conversion Program	$178,295	$77,130	$101,165	2.31
West Nipissing Street Light Conversion Program	$18,972	$31,438	($12,465)	0.60
Evaluation Costs	$0	$35,000	($35,000)	n/a
Total	**$786,763**	**$741,068**	**$45,695**	**1.06**

[14] TRC results have been calculated using SeeLine Group Ltd.'s commercially available software, SeeTool™ and a discount rate of 8.125%

[15] The avoided costs used in this analysis are those prepared by Navigant Consulting Ltd., June 14, 2005 for Hydro One Networks Inc, representing the official electricity avoided costs as approved by the OEB.

Table 5.2 Summary of 2009 TRC Results

Programs	TRC Benefits (NPV)	TRC Costs (NPV)	TRC Net Benefits (NPV)	TRC Benefit Cost Ratio
Community Awareness Program	$0	$50,000	($50,000)	n/a
Electric Thermal Storage Program	$89,715	$361,000	($271,285)	0.25
Commercial Parking Lot Plug Controller Program	$581,920	$334,000	$247,920	1.74
Vending Machine and Self Service Coolers Efficiency Program	$405,884	$172,000	$233,884	2.36
LED Traffic Light Conversion Program	$363,097	$146,710	$216,387	2.47
West Nipissing Street Light Conversion Program	$18,972	$31,438	($12,465)	0.60
Evaluation Costs	$0	$35,000	($35,000)	n/a
Total	**$1,459,589**	**$1,130,148**	**$329,441**	**1.29**

Table 5.3 Summary of 2010 TRC Results

Programs	TRC Benefits (NPV)	TRC Costs (NPV)	TRC Net Benefits (NPV)	TRC Benefit Cost Ratio
Community Awareness Program	$0	$50,000	($50,000)	0.00
Electric Thermal Storage Program	$134,572	$491,500	($356,928)	0.27
Commercial Parking Lot Plug Controller Program	$727,400	$402,500	$324,900	1.81
Vending Machine and Self Service Coolers Efficiency Program	$405,884	$172,000	$233,884	2.36
Total	**$1,267,856**	**$1,116,000**	**$151,856**	**1.14**

As shown in each year of the plan, GSH's custom program CDM portfolio is cost effective under the parameters of the TRC. It is important to note that not all programs included in the portfolio, provide positive TRC net benefits. Due to the nature of Ontario's electricity avoided costs, which do not credit winter demand (kW) savings or load shifting technologies, some of the programs were chosen for other merits such as electricity bill savings for the customer and winter peak load reduction.

At the time of filing this plan, OPA custom funding approval for the Electric Thermal Storage Program was not known. Should funding for this program be approved, overall TRC net benefits for the portfolio would more than triple in 2008, 2010 and nearly double in 2009. TRC portfolio results without the ETS program are shown in the tables below.

Table 5.4 Summary of 2008 TRC Results without ETS Program

Programs	**TRC Benefits (NPV)**	**TRC Costs (NPV)**	**TRC Net Benefits (NPV)**	**TRC Benefit Cost Ratio**
Community Awareness Program	$0	$50,000	($50,000)	n/a
Commercial Parking Lot Plug Controller Program	$290,960	$214,000	$76,960	1.36
Vending Machine and Self Service Coolers Efficiency Program	$253,678	$117,000	$136,678	2.17
LED Traffic Light Conversion Program	$178,295	$77,130	$101,165	2.31
West Nipissing Street Light Conversion Program	$18,972	$31,438	($12,465)	0.60
Evaluation Costs	$0	$35,000	($35,000)	n/a
Total	**$741,905**	**$524,568**	**$217,338**	**1.41**

Table 5.5 Summary of 2009 TRC Results without ETS Program

Programs	TRC Benefits (NPV)	TRC Costs (NPV)	TRC Net Benefits (NPV)	TRC Benefit Cost Ratio
Community Awareness Program	$0	$50,000	($50,000)	n/a
Commercial Parking Lot Plug Controller Program	$581,920	$334,000	$247,920	1.74
Vending Machine and Self Service Coolers Efficiency Program	$405,884	$172,000	$233,884	2.36
LED Traffic Light Conversion Program	$363,097	$146,710	$216,387	2.47
West Nipissing Street Light Conversion Program	$18,972	$31,438	($12,465)	0.60
Evaluation Costs	$0	$35,000	($35,000)	n/a
Total	**$1,369,874**	**$769,148**	**$600,727**	**1.78**

Table 5.6 Summary of 2010 TRC Results without ETS Program

Programs	TRC Benefits (NPV)	TRC Costs (NPV)	TRC Net Benefits (NPV)	TRC Benefit Cost Ratio
Community Awareness Program	$0	$50,000	($50,000)	0.00
Commercial Parking Lot Plug Controller Program	$727,400	$402,500	$324,900	1.81
Vending Machine and Self Service Coolers Efficiency Program	$405,884	$172,000	$233,884	2.36
Total	**$1,133,284**	**$624,500**	**$508,784**	**1.81**

6.0 Evaluation Plan

Evaluation efforts in support of the CDM plan encompass both impact and process evaluation activities, where the impact evaluation efforts will seek to verify key results including savings and costs, while the process evaluation efforts will focus on the effectiveness of the program delivery. Both primary and secondary research will be used, depending on the specific needs of the program. In general, the intent is to both verify the key program parameters, ensuring that claimed savings are accurate, and examine the process elements of the program design and delivery with a view to improvements where necessary. GSH will undertake these evaluation activities, balancing the need to ensure adequate levels of evaluation activity with close attention to budget considerations.

Evaluation activities and the expected budgets are identified for each program in the portfolio.

6.1 Community Awareness

The Awareness Program aims to increase public perception and awareness of the conservation message. No direct savings are being claimed for this component of the portfolio. At the conclusion of the program in 2010, GSH may consider a survey of customers to determine the effectiveness of the Awareness program that would be undertaken as part of more general corporate market research.

Cost: 2008 - $5,000
2009 - $5,000

6.2 Electric Thermal Storage

The evaluation will commence in Year 1, however given the seasonality of the program, some aspects of the evaluation may occur in Year 2. Evaluation activities will focus on 2 main activities – verification of savings and program effectiveness:

Verification of Savings: A test will be undertaken to establish the electricity use with and without the Thermal Storage Unit. The test will be performed over the course of a number of days in the winter, representing typical conditions.

The evaluation will further examine a sample of installations to ensure that the units are properly installed and functional.

Program Effectiveness: This activity will survey a sample of program participants to assess their experience with the program and look for potential improvements.

The survey will also seek insights on the effectiveness of the incentive, the approach to the market and the overall awareness of the program.

Cost: 2008 - $10,000
2009 - $10,000

6.3 Commercial Parking Lot Controllers

The evaluation will commence in Year 1, however given the seasonality of the program, some aspects of the evaluation may occur in Year 2. Evaluation activities will focus on 2 main activities – verification of savings and program effectiveness:

Verification of Savings: A test will be undertaken to establish the electricity use with and without the controller. The test will be done over the course of a number of days in the winter, representing typical conditions.

The evaluation will further examine a sample of installations to ensure that the units are properly installed and functional.

Program Effectiveness: This activity will survey a sample of program participants to assess their experience with the program and look for potential improvements. The survey will also seek insights on overall awareness of the program.

Cost: 2008 - $10,000
2009 - $10,000

6.4 Vending Machine Controller

The impact evaluation will commence in Year 1, while the process evaluation effort will commence in Year 2, when there are a greater number of participants to survey.

Verification of Savings: A test will be undertaken to establish the electricity use with and without the controller. The test will be done over a series of days/weeks, representing typical conditions. More than 1 machine will be tested to determine if there is variability in savings depending on type of machine or location.

The evaluation will further examine a sample of installations to ensure that the units are properly installed and functional.

Program Effectiveness: This activity will survey a sample of program participants to assess their experience with the program and look for potential improvements. The survey will also seek insights on the effectiveness of the incentive, the approach to the market and the overall awareness of the program.

Cost: 2008 - $10,000
2009 - $10,000

6.5 LED Traffic Light Conversion

Evaluation activities will occur in Year 1 and will focus on the verification of installation and savings per installation. GSH staff will inspect a small sample of installations to ensure that they were completed. The GSH program manager will also undertake secondary research to verify the "deemed" savings. Per unit costs will also be verified as part of the on-going tracking of the program.

Cost: n/a – The evaluation activity is considered part of the GSH operation of the program.

6.6 Street Light Conversion

Evaluation activities will occur in Year 1 and will focus on the verification of installation and savings per installation. GSH staff will inspect a small sample of installations to ensure that they were completed. The GSH program manager will also undertake secondary research to verify the "deemed" savings. Per unit costs will also be verified as part of the on-going tracking of the program.

Cost: n/a – The evaluation activity is considered part of the GSH operation of the program.

Table 6.1 shows the O&M[16] and Evaluation budget consistent with the Plan defined above. Note that the evaluation budget is approximately 10% of the total program budget in 2008.

Table 6.1.1 2008 Evaluation Budget

Program	O & M Budget	Evaluation
Community Awareness Program	**$50,000**	**$5,000**
Electric Thermal Storage	**$97,000**	**$10,000**
Commercial Parking Lot Plug Controller Program	**$97,000**	**$10,000**
Vending Machine and Self Service Coolers Efficiency Program	**$72,000**	**$10,000**
LED Traffic Light Conversion Program	**$10,000**	**-**
West Nipissing Street Light Conversion Program	**$10,000**	**-**
Total	**$336,000**	**$35,000**

[16] Excluding incentives.

Table 6.1.2 2009 Evaluation Budget

Program	O & M Budget	Evaluation
Community Awareness Program	**$50,000**	**$5,000**
Electric Thermal Storage	**$100,000**	**$10,000**
Commercial Parking Lot Plug Controller Program	**$100,000**	**$10,000**
Vending Machine and Self Service Coolers Efficiency Program	**$100,000**	**$10,000**
LED Traffic Light Conversion Program	**$10,000**	**-**
West Nipissing Street Light Conversion Program	**$10,000**	**-**
Total	**$370,000**	**$35,000**

The evaluation budget for 2010 will be approximately 10% of the O&M budget and will be allocated based on specific needs and outcomes.

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7.0 Conclusions

This Greater Sudbury Hydro Custom CDM Plan acts as a roadmap for long-term sustainable conservation. Both sound and cost effective, it offers a range of electricity savings opportunities for residential, commercial and institutional customers.

As an enhancement to its existing suite of OPA sponsored programs, GSH believes this plan balances both the needs of the province and the local community.

8.0 Contact Information

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Appendix A – TRC Technology Input Assumptions

Electrical Thermal Storage Heating (ETS) Unit

Efficient Technology & Equipment Description
Electric Thermal Storage (ETS) technology stores low cost electricity in the form of heat for use in heating 24 hours a day. ETS equipment utilizes a storage medium to store heat during off-peak hours, and releasing it consistently throughout the day during the mid-peak and on-peak hours. Additionally, ETS has the ability to control electric water heaters so that they use off-peak energy to heat stored water.
Base Technology & Equipment Description
Standard electric heating (furnace or baseboard) with no thermal storage (load shifting) capability.

Resource Savings Assumptions

Electricity *kW or kWh*

Electric Thermal Storage heaters do not provide electricity savings but do provide substantial load shifting opportunities. Energy from electricity in the form of heat, purchased during off-peak periods at low cost is used for space heating during on-peak periods. Off-peak hours are those times during (usually at night) when electricity can be supplied most economically.

Based on manufacturer claims[17] of estimated load shifting opportunities are as follows:

Energy Savings Winter Peak (kW.h)	Energy Savings Winter Mid (kW.h)	Energy Savings Winter Off Peak (kW.h)	Energy Savings Summer Peak (kW.h)	Energy Savings Summer Mid (kW.h)	Energy Savings Summer Off Peak (kW.h)	Energy Savings Shoulder Mid (kW.h)	Energy Savings Shoulder Off (kW.h)
795.91	333.70	(1,129.62)	0.00	0.00	0.00	862.68	(862.68)

Natural Gas *m3 or Btu or CFM*

Not applicable.

Water

Not applicable.

Other Input Assumptions

[17] http://www.steffes.com/offpeak/company/units.aspx

Equipment Life *years*
18 years as per Measure List assumption for Electric Storage Furnace.
Incremental Cost *$/kW or $/kWh*
Based on manufacturer estimates the incremental cost is estimated to be approximately: $1,250 ETS unit $ 650 Electronic Controls $1,000 Installation **$2,900 Total**
Free Ridership *%*
Due to high equipment and installation costs it is expected that few customer would adopt this technology in the absence of the utility program. A 10% free ridership rate has been assumed for this program.

Commercial Parking Lot Plug Controller Unit

Efficient Technology & Equipment Description
Parking lot controllers are electronically controlled receptacles that replace existing parking stall power outlets. The devices control the electricity going to an outdoor plug by measuring the outside temperature. With factory installed regulators, an optimum level of power is delivered to the block heaters during the winter months.
Base Technology & Equipment Description
Uncontrolled standard power outlet.

Resource Savings Assumptions

Electricity *kW or kWh*

Based on reported savings from Manitoba Hydro, parking lot plug controllers can reduce block heater energy consumption by 50%[18].

Average Block Heater & Interior Car Warmer Load: 1,350 W
Multi Res Usage Per Day: 10 hrs
Multi Res Usage Per Week: 7 days
Multi Res Usage Weeks Per Year: 16 weeks
Annual Hours of Use: 1,120 hours
Annual kWh: 1,512 kWh
Energy Savings (kWh) (50%): 756 kWh

Energy Savings Winter Peak (kW.h)	Energy Savings Winter Mid (kW.h)	Energy Savings Winter Off Peak (kW.h)	Energy Savings Summer Peak (kW.h)	Energy Savings Summer Mid (kW.h)	Energy Savings Summer Off Peak (kW.h)	Energy Savings Shoulder Mid (kW.h)	Energy Savings Shoulder Off (kW.h)
103.90	114.02	297.00	0.00	0.00	0.00	102.03	139.05

Natural Gas *m3 or Btu or CFM*

Not applicable.

Water

Not applicable.

[18] Power Smart Profiles, Manitoba Hydro, March 2005/Apartments/Condominums No.01.

Other Input Assumptions

Equipment Life *years*
An estimate of 20 years has been assumed for this technology.
Incremental Cost *$/kW or $/kWh*
Based on manufacturer pricing the incremental cost is estimated to be approximately: $130 Parking Lot Controller[19] $ 60 ESA Permit $ 70 Installation **$260 Total**
Free Ridership %
This technology is relatively new with few customers expected to adopt technology in the absence of the utility program. A 10% free ridership rate has been assumed for this program.

[19] Based on IPLC model 210D, SKU: IPLC0535

Vending Machine Power Controller Unit

Efficient Technology & Equipment Description
Using smart controls to manage the power consumption of vending machines, this technology is capable of powering down when no movement is detected within 20 feet of the machine for more than 15 minutes, monitor room temperature and occupancy patterns to optimize cooling cycles and avoid heavy-use machine start ups when powered down.
Base Technology & Equipment Description
Vending machines without controls.

Resource Savings Assumptions

Electricity *kW or kWh*

Based on a London Hydro report[20] suggesting 45% energy savings:

Average Energy Consumption of Vending Machine: 3,500 kWh
Average Savings: 45%
Estimated Energy Savings: 1,575 kWh

Energy Savings Winter Peak (kW.h)	Energy Savings Winter Mid (kW.h)	Energy Savings Winter Off Peak (kW.h)	Energy Savings Summer Peak (kW.h)	Energy Savings Summer Mid (kW.h)	Energy Savings Summer Off Peak (kW.h)	Energy Savings Shoulder Mid (kW.h)	Energy Savings Shoulder Off (kW.h)
108.24	123.70	290.19	93.85	140.78	291.81	234.63	291.81

Natural Gas *m3 or Btu or CFM*

Not applicable.

Water

Not applicable.

[20] System Planning Report SP04-05, Towards a Sustainable Energy Future: Master Plan of Strategies and Approaches for Energy Conservation and Demand-Side Management Investments, pg. 65.

Other Input Assumptions

Equipment Life *years*
Equipment life of 18 years as per Occupancy Sensor from Measure List has been used as a proxy.
Incremental Cost *$/kW or $/kWh*
Based on manufacturer pricing the incremental cost is estimated to be approximately $200.00.
Free Ridership %
This technology is relatively new with few customers expected to adopt technology in the absence of the utility program. A 10% free ridership rate has been assumed for this program.

LED Traffic Lights

Efficient Technology & Equipment Description
A Light Emitting Diode (LED) is a semiconductor device, which converts electricity into light. LEDs are small in size, but can be grouped together for higher intensity applications. Unlike incandescent lighting, LEDs do not contain a filament or wire, and as such, energy is directed to light rather than heat. LEDs produce more light per watt of electricity than incandescent or fluorescent bulbs and last considerably longer, often twice as long as the best fluorescent bulbs and twenty times longer than the best incandescent bulbs.
Base Technology & Equipment Description
Conventional traffic lighting.

Resource Savings Assumptions

Electricity *kW or kWh*
Energy (kWh) and demand (kW) savings data provided by the City of Greater Grand Sudbury.

Energy Savings Winter Peak (kW.h)	Energy Savings Winter Mid (kW.h)	Energy Savings Winter Off Peak (kW.h)	Energy Savings Summer Peak (kW.h)	Energy Savings Summer Mid (kW.h)	Energy Savings Summer Off Peak (kW.h)	Energy Savings Shoulder Mid (kW.h)	Energy Savings Shoulder Off (kW.h)
63.22	72.25	169.49	54.82	82.23	170.44	137.04	170.44

Natural Gas *m^3 or Btu or CFM*
Not applicable.
Water
Not applicable.

Other Input Assumptions

Equipment Life *years*
23 years as per Horizon Utilities 2007 Annual CDM Report.
Incremental Cost *$/kW or $/kWh*
Based on an average price of $350/LED head.
Free Ridership %
Assumes a free ridership rate of 30% as per Toronto Hydro EB 2007-0096 OEB Decision.

Street Light Conversion

400W Mercury Vapor converted to 250W Metal Halide Lamps for Commercial Measure List assumptions used as a proxy.

Appendix B – Utiltity Characteristics

Greater Sudbury Hydro 2007 Data Provided:

- Peak system load by season;
- Total energy purchases;
- Sales by rate class; and
- Number of customers by rate class

Capital additions by the following categories or aggregations of these categories: Land; land rights; buildings and fixtures; generating assets; transmission lines; transmission station equipment; distribution station equipment; sub-feeder overhead;

sub-feeder underground; distribution lines overhead; distribution lines underground; distribution transformers; distribution meters; sentinel light equipment; office equipment; computer equipment; store equipment; lease improvement; rolling stock;

miscellaneous equipment; water heaters; load management control; system supervisory equipment; and sentinel lights

Capital Additions for the Year ($)
6,395,614.99

Capital Composition of Additions

Labour ($)	Overhead ($)	Equipment/Material ($)
2,201,764.33	922,931.87	3,270,918.79
Other ($)	**Retirements For Year ($)**	**Total Contributed Capital ($)**
	291,505.00	1,781,824.00

Functional

NOTE: Utilities that merged or were acquired subsequent to the reporting year must report data relevant to the entity as it existed prior to the merger or acquisition.

(1) Operations and Maintenance

Operations and Maintenance Total ($)	Operations Maintenance Labour Component ($)
5,248,130.00	

(2) Billing and Collection

Billing and Collections Total ($)	Billings and Collections Labour Component ($)
1,987,315.00	

(3) Administration

Administration Total ($)	Administration Labour Component ($)
2,885,604.00	

Output and Revenues

NOTE: Utilities that merged or were acquired subsequent to the reporting year must report data relevant to the entity as it existed prior to the merger or acquisition.

Annual Wholesale Cost of Power ($)	Wholesale KWH (kWh)
67,437,170.00	947,115,992.00
Retail KWH (kWh)	**Distribution System Losses (kWh)**
900,265,885.00	46,850,107.00

Customers, Demand and Revenues

Rate Class	Number	Billed kWh	Revenues Account (4080)
Residential Customers	38,853	376,970,987.00	11,551,594.10

Rate Class	Number	Billed kW	Billed kWh	Revenues Account (4080)
General Service < 50 kW Customers	3,816		138,951,508.00	3,613,727.15
General Service >= 50 kW Customers	498	920,414	375,991,318.00	5,452,448.27
Large Use (>5,000 kW) Customers				
Street Lighting Connections	8,666	1,228	7,804,406.00	42,583.56

Sentinel Lighting Connections	428	21,809	547,666.00	6,691.93

Net Metering Initiative

Please indicate the number of Net Metering Customers and Total Capacity Installed as of December 31st of the reported year.

	Number of Net Metering Customers	Total Installed Capacity (kW)
Wind		
Water		
Solar		
Biomass		

Utility Characteristics

NOTE: Utilities that merged or were acquired subsequent to the reporting year must report data relevant to the entity as it existed prior to the merger or acquisition.

Total Service Area (SQ.KM)	Rural Service Area (SQ.KM)	Urban Service Area (SQ.KM)
Service Area Population	Municipal Population	Number of Seasonal Occupancy Customers
102,811	155,219	142
Utility Winter Max Monthly Peak Load (kw)	Utility Summer Max Monthly Peak Load (kw)	Utility Average Peak Load (kw)
182,354	173,560	157,232
Utility Average Load Factor		
65		
Total Circuit Kilometers of Line (route kms only)	Overhead Kilometers of Line	Underground Circuit Kilometers of Line

Circuit Kilometers of Line by Type (route kms only)

3 Phase	2 Phase	Single Phase
833	660	173
Total of all phases		
1,666		

Number of Transformers By Type

Transmission	Sub-transmission	Distribution
	27	5,066

Miscellaneous Utility Characteristics

NOTE: Utilities that merged or were acquired subsequent to the reporting year must report data relevant to the entity as it existed prior to the merger or acquisition.

System Voltage Levels (KV)	Number of Distribution and Transmisison Stations and Voltages
2.3,4.16, 12.48,44.0	1X44.0 KV/2.3 KV 10X44.0 KV/4.16 KV
Does Utility have Control Center	Control Center Comments
Yes	Control West Nipissing Energy Services Ltd (24X7)
Transmission System Description (>50kV)	Special Circumstances/Unique Attributes

Capital additions by the following categories or aggregations of these categories: Land; land rights; buildings and fixtures; generating assets; transmission lines; transmission station equipment; distribution station equipment; sub-feeder overhead;

sub-feeder underground; distribution lines overhead; distribution lines underground; distribution transformers; distribution meters; sentinel light equipment; office equipment; computer equipment; store equipment; lease improvement; rolling stock;

miscellaneous equipment; water heaters; load management control; system supervisory equipment; and sentinel lights

Capital Additions for the Year ($)
186,748.00

Capital Composition of Additions

Labour ($)	Overhead ($)	Equipment/Material ($)

Other ($)	Retirements For Year ($)	Total Contributed Capital ($)
186,748.00		30,750.00

Functional

NOTE: Utilities that merged or were acquired subsequent to the reporting year must report data relevant to the entity as it existed prior to the merger or acquisition.

(1) Operations and Maintenance

Operations and Maintenance Total ($)	Operations Maintenance Labour Component ($)
192,440.00	

(2) Billing and Collection

Billing and Collections Total ($)	Billings and Collections Labour Component ($)
218,170.00	

(3) Administration

Administration Total ($)	Administration Labour Component ($)
127,823.00	

Output and Revenues

NOTE: Utilities that merged or were acquired subsequent to the reporting year must report data relevant to the entity as it existed prior to the merger or acquisition.

Annual Wholesale Cost of Power ($)	Wholesale KWH (kWh)
4,558,899.00	64,209,186.80

Retail KWH (kWh)	Distribution System Losses (kWh)
58,425,965.30	5,783,221.50

Customers, Demand and Revenues

Rate Class	Number	Billed kWh	Revenues Account (4080)
Residential Customers	2,922	28,765,217.30	636,220.68

Rate Class	Number	Billed kW	Billed kWh	Revenues Account (4080)
General Service < 50 kW Customers	362	43,439	28,804,739.00	174,008.31
General Service >= 50 kW Customers				
Large Use (>5,000 kW) Customers				
Street Lighting Connections	1	2,070	820,820.60	15,709.73

Sentinel Lighting Connections	22		35,188.50	871.28

Net Metering Initiative

Please indicate the number of Net Metering Customers and Total Capacity Installed as of December 31st of the reported year.

	Number of Net Metering Customers	Total Installed Capacity (kW)
Wind		
Water		
Solar		
Biomass		

Utility Characteristics

NOTE: Utilities that merged or were acquired subsequent to the reporting year must report data relevant to the entity as it existed prior to the merger or acquisition.

Total Service Area (SQ.KM): 9	Rural Service Area (SQ.KM):	Urban Service Area (SQ.KM): 9
Service Area Population: 6,718	Municipal Population: 15,000	Number of Seasonal Occupancy Customers: 6
Utility Winter Max Monthly Peak Load (kw): 13,098	Utility Summer Max Monthly Peak Load (kw): 9,430	Utility Average Peak Load (kw): 10,222
Utility Average Load Factor: 71		
Total Circuit Kilometers of Line (route kms only): 38	Overhead Kilometers of Line: 36	Underground Circuit Kilometers of Line: 2

Circuit Kilometers of Line by Type (route kms only)

3 Phase: 20	2 Phase:	Single Phase: 18
Total of all phases: 38		

Number of Transformers By Type

Transmission:	Sub-transmission: 7	Distribution: 430

Miscellaneous Utility Characteristics

NOTE: Utilities that merged or were acquired subsequent to the reporting year must report data relevant to the entity as it existed prior to the merger or acquisition.

System Voltage Levels (KV): 44KV, 7.2KV, and 2.4KV

Number of Distribution and Transmisison Stations and Voltages:

Does Utility have Control Center: No

Control Center Comments:

Transmission System Description (>50kV)

Special Circumstances/Unique Attributes