March 30, 2007

Board Secretary
Ontario Energy Board
P. O. Box 2319
2300 Yonge Street, Suite 2700
Toronto, Ontario M4P 1E4

Re: RP-2004-0203\EB-2005-0204
2007 Annual Report CDM Third Tranche Funding
North Bay Hydro Distribution Limited

Deleted: North Bay Hydro¶
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Draft ¶
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March 26, 2006¶

1.0 Introduction

This submission is intended to satisfy North Bay Hydro's Conservation and Demand Management Plan reporting requirements for 2006. Enclosed are three hard copies, one electronic copy in PDF format consisting of the entire report and a second electronic copy of the appendices in Excel format as per the filing requirements. There are two Excel files: one for appendices A, B and C and a second with Appendix D.

On January 13, 2005 North Bay Hydro submitted its Conservation and Demand Management Plan to the Ontario Energy Board. An approval was received from the Board on March 16, 2005. The plan for 2006 was to carry on with those programs implemented in 2005 and to begin the data collection for System Optimization study as well as initiate some other Optional programs such as a Street Lighting pilot and purchase of a demonstration Electrical Thermal Storage Unit. Funding is being provided to the City of North Bay to undertake a landfill gas feasibility study as a part of the Renewable Energy program. The response to most programs has been very positive.

For most of 2006 all CDM activities have been undertaken by individuals and companies living in and/or based in the City of North Bay.

The following is a brief summary of the status of each program up to December 31, 2006:

Table One
Summary of CDM Program Implementation – North Bay Hydro

Program	Description	Status	Cost ($) Savings (kWh) 2006	Cost ($) Savings (kWh) To Date
Water Heater Tune Up	Installation of insulating blankets, low flow showerhead, aerators, pipe wrap, compact fluorescents and outlet insulators	Mature program with sufficient activity that is surpassing target results under budget. Program continuing	$19,366 181,805	$67,027 488,043
Fridge Buy Back	Removal and proper disposal of older second refrigerator, pay incentive	Mature program with sufficient activity that is surpassing target results under budget. Program continuing	$32,104 136,800	$67,212 531,600
Energuide For Houses	Promotion of Natural Resources Canada's program with customers with electric heat	Program was cancelled by Natural Resources Canada after large expenses by North Bay Hydro, audits remain	$35,340 36,344	$35,621 108,121
Information Based	Use of various channels to increase awareness of programs and conservation opportunities	Mature program with most emphasis on residential programs – more required for commercial, industrial and institutional users	$10,015 46,980	$59,750 46,980
Demand Reduction Commercial	Use of audits, studies and incentives to help commercial customers reduce peak demand, kWh and bills	Several projects completed and many others with executed contracts. Customers are slow to react and many take significant time to complete projects. A high percentage is lighting as noted in Appendix B	$103,146 538,419	$109,623 553,419
Demand Reduction	Use of audits, studies and incentives to help	Several projects completed and many	$30,869	$66,985

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Institutional	Institutional customers reduce peak demand, kWh and bills	others with executed contracts. Customers are slow to react and many take significant time to complete projects. A mixture of lighting and Roof Tops.	161,135	244,773
Demand Reduction Industrial	Use of audits, studies and incentives to help industrial customers reduce peak demand, kWh and bills	Several projects completed and one or two with executed contracts. Customers are slow to react and many take significant time to complete projects. Control systems are significant in this market	$62,962 328,658	$62,962 328,658
System Optimization	Optimization of the electrical distribution system	Gathering data and input into model is complete. Next step is to analyze for losses.	$31,970	$40,739
Optional Program -- LED Traffic Lights	Developed pilot, full program underway	City installing LED traffic lights at most intersections – awaiting savings and cost information from the City	$1,000 0	$9,018 18,516
Optional Program – Street Lighting	Developed pilot for City of North Bay streetlights	Research light harvester and Ballast, difficulty with water leakage -- ongoing	$7,906 3,456	$7,906 3,456
Optional Program – ETS Heater	Installed a Demonstration Unit at North Bay Hydro	Project complete Shifted to off peak -- from on peak -- from mid peak	$5,158 407	$5,158 906
Renewable Energy	Working with customers to study feasibility of renewable energy opportunities	Landfill gas project started in 2006. Flare installed in 2006 – study underway	$0 0	$0 0
Total $ Total kWh			$339,836 1,433,596	$532,002 2,323,566
Note: The 2005 reporting included participant costs amounting to $32,132.45 in error. This is not included in above numbers and is removed from Appendix A so the Gross CDM expenditures balance.				

2.0 Evaluation of the CDM Plan

Appendices A and C provide an overview of the effectiveness of the North Bay Hydro CDM plan. All initiatives either in progress or completed during 2006 are included in the Appendices. For the Residential programs all savings and costs are reported on an ongoing basis, as they are not project oriented. For example at year-end the units implemented and costs incurred are completed and reported in these Appendices.

For the Demand Reduction (Commercial, Institutional and Industrial) utility costs are often incurred for projects well in advance of the customer initiating a project. The audits, assisting with applications, preparation of agreements, meetings, and TRC screening are examples of such costs. For these situations only the utility costs are included in the Appendices. As of December 31st, 2006 14 projects are completed and verified with all costs and savings reported. For the remaining 73 projects, all utility costs are reported to year-end with no energy savings. Following completion and verification the incentive is recalculated and paid to the customer. The TRC is recalculated based on actual costs and energy savings recognizing any changes in the project from the original agreement.

For programs such as pilots and system optimization the costs are well in advance of any savings. Currently one of three pilots shows good promise of having a positive TRC with Benefit to Cost Ratio well over one. The Benefit to Cost Ratio is lower during the initial years compared to near the conclusion of programs.

Our 2005 experiences of using estimated savings and costs rather than using verified completed project costs and savings proved somewhat inaccurate. As a result, the TRC Benefit and Benefit to Cost ratio was either overstated or understated for some projects. As per filing guidelines we have not tampered with 2005 results where they were overstated or understated. We had anticipated that any errors reported in 2005 would be corrected in 2006 and beyond. It should be noted these overstatements and/or understatements are not significant for 2005. The major understatement is in water savings, not electricity. The cumulative totals in this submission are what were reported in 2005 and what took place in 2006.

3.0 Discussion of Programs

Appendix B follows Appendix A; it provides details for each program as per guidelines. This section is divided into various programs in the same order as those listed in Appendix B. There are frequent references to "Appendix D", which contains the "North Bay Hydro Assumptions and Measures List" for each of the programs that vary from those provided in the "Assumptions and Measures List" that forms part of the TRC Guide. Any variation from the TRC Guide is included in Appendix D whether it is Base or Efficient Technology, operating time per year, base or energy efficient energy usage, summer or winter peak, EE Technology life, incremental cost as well as the energy profile by the eight seasons. Nearly every energy efficient initiative undertaken by customers is unique and is included in the "North Bay Hydro Assumptions and Measures List".

It should be noted that two additional columns have been added to the "North Bay Hydro Assumptions and Measures List" from those that were included in the "Assumptions and Measures List" that forms part of the TRC Guide. The purpose of these two columns is to simplify the calculations for winter and summer peak (pertains mostly to lighting). They are entitled "Base kW' and "Energy Efficient kW".

It should be noted that:
"North Bay Hydro Assumptions and Measures List" is referred to as "Appendix D" and the "Assumptions and Measures List" that forms part of the TRC Guide is referred to as the "OEB Tables".

For various components a proxy is identified or an explanation of how the quantities were derived is provided.

3.1 Common Comments

Ontario Seasonal Average Avoided Energy Cost (2005 Canadian)

It was noted in the 2005 Annual report that the Ontario Seasonal Average Avoided Energy Cost (2005 Canadian) ended at 20 years for technologies with an Equipment Life of more than 20 years. This resulted in understating the TRC Benefit. For 2006 North Bay Hydro has extended the period to 25 years by using the same Ontario Seasonal Average Avoided Energy Cost (2005 Canadian) for the years 20 through 25. For periods over 25 years, the years are ignored reducing the TRC Benefit.

Data Collection

An auditor who is normally a consultant conducts an energy audit on behalf of customers and/or North Bay Hydro to gather the required information. A contractor, supplier or the customer may provide the information. They are required to provide the necessary information so that North Bay Hydro can conduct the necessary Technology Screening Analysis as per the TRC Guide. The information provided normally varies from the OEB Tables. As a result the remainder of section 3 together with Appendix D is necessary to explain the various TRC test inputs as per section 3 of the Amended Requirements for Annual Reporting of Conservation and Demand Management ("CDM") Initiatives issued March 1, 2007. Section 3.1 provides a general overview of many of the common elements whereas the other sub sections 3.2, 3.3, 3.4, etc. describes the specifics of various programs and refers to Appendix D for the applicable proxies. Appendix D contains separate worksheets for Residential-Optional, Commercial, Industrial and Institutional.

Lighting

Lighting has proven to be the largest portion of the activities thus far. Requested information includes the number of lights, wattages (base case and energy efficient), annual operating time, incremental cost and specifies whether the installation is a retrofit, replacement, or new. We also inquire regarding the removal of the old equipment.

The OEB Tables have the same load profile for all commercial, industrial or institutional lighting – only the magnitude changes, not the shape. Although the load profile for any of the commercial, industrial or institutional lighting is the same, some components may differ. Examples are hours in use and unit cost. The proxy is shown in sections 3.6, 3.7 and 3.8. Nearly all commercial and industrial lighting initiatives have different inputs. The reason for this is that there is almost always a variable that is different than those included in the OEB Tables. There are numerous variables causing this such as energy efficient technology, base case technology, decision type, annual operating time, base kW, energy efficient kW, energy efficient technology life, lifespan hours, and incremental cost. The energy efficient technology is the lifespan hours divided by the annual operating time. The lifespan hours varies by manufacturers, number of starts per day and design of lamp. This information is available in the specifications obtained from suppliers. The incremental cost varies for many reasons such as decision type, required work, location, labour rates and material costs. Free Ridership is always assumed at 10%.

Where lighting is altered resulting in the installation of more or less lights than originally existed, the altered lighting is all considered replacement and/or retrofit. For these changes the equipment life is based on the life of the energy efficient technology. Where there is an area of lighting that is no longer required and the lights are removed, the equipment life is 18 years. Although the OEB Tables do not include a specific proxy, this is considered a reasonable life. The only comparable items are switching to gas clothes dryers, ranges and water heaters with an equipment life of 18 years as per numbers 6 [from average existing stock to fuel switching – gas clothes dryer], 8 [from average existing stock to fuel switching – gas range] and 35 [from current standard electric water heater to fuel switching – gas water heater] of the Residential Worksheet in the OEB Tables.

The calculation of the summer and winter peak kW is based on the results in the OEB Tables. The winter peak kW is normally derived by taking the difference between base case kW and energy efficient kW and multiplying this difference by 90%. For summer the difference is multiplied by 85%. This is true for commercial, which is based on 4,000 hours of operating time, and for industrial, which is based 6,500 hours. For LED lights that operate 8,760 hours, the difference is multiplied by 100%. The longer the lights operate the more likely the lights will be on during the summer and winter peaks. Conversely the less the lights operate, the less likely the lights will operate during the summer or winter peaks.

The assumption in this report is that the 90% rule applies for winter peaks between 3,250 hours and 6,500 hours. If a business operates during weekdays and the lights are on over 6500 hours then the lights would have to be on during the peak. For example a business that operates 5 days per week, 24 hours a day all year long would require lights 6,240 hours. Since number 1 [a change from 4-T12 34W (156W) to 2-T8 32W (58W)] of the Industrial Worksheet in the OEB Tables is at 6,500 hours and using the 90% factor for winter peak, the lighting is calculated over 6,500 hours at 100% as opposed to over 6,240 hours. The same is true for numbers 2 and 3.

The 3,250 hours criteria is selected as it is similar to the 4,000 hours criteria at 90% in that it covers all of the peak hours. If one assumes the business only operates weekdays and always operates during the peak on weekdays less statutory holidays where the peak occurs on weekdays from 7:00 am to 8:00 pm, then the product is 3,250 hours. Some of this period is ignored as it is mid peak, but it is likely the lights will be on during the hours before or after the mid peak period. For hour's usage less than 3,250 hours, the winter peak is decreased by using a factor less than 90%. For example if the lights operate 2,000 hours the factor is 2,000/3,611 or 55%. Many commercial buildings operate in the range of 2,000 to 3,000 hours. For very occasional usage such as a storage area, the lights may only operate a 100 hours a year thus the factor is 100/3611 or 2.8%. For the above calculations for all hours of use from 0 to 8760 the above results are multiplied by 95% to arrive at the summer peak. This corresponds with the calculations for LED exit lights.

Seasonal Energy Usage

Where there isn't a proxy for a load profile included in the OEB Tables, a unique load profile must be developed for each different initiative. North Bay Hydro normally develops the load profile with input from the customer or their contractor. This may apply to such initiatives as control systems, rooftops, chillers, photocells and occupancy sensors.

The analysis is based on when energy is saved. The number of hours is determined for each of the eight periods (winter peak -- off, on and mid; summer peak -- off, on and mid; shoulder -- mid and off) for each technology with different operating characteristics. Then the total kWh for each of the technologies with different operating characteristics is determined for the eight periods. These kWh values are included in Appendix D and used as input to calculate TRC Benefit.

The calculation for the winter peak (kW) and summer peak (kW) is based partly on the above calculations. The total kW is calculated for each technology with different operating characteristics. Then the hours the energy efficient equipment is turned off is compared to the base case and calculated for both summer and winter. The total kW is decreased for both summer and winter separately by the ratio of the hours the energy efficient equipment is off compared to the base case divided by the total peak hours in summer and winter. This is a straight-line ratio that recognizes on average that the peaks are reduced by a value that may vary downwards to zero.

These results are summarized for all energy efficient technologies with each customer and attached to the application, which forms part of the agreement between the customer and North Bay Hydro.

Occupancy Sensors and Dimmer Switches

These are all different because the number of controls and/or sensors and/or dimmer switches, as well as wattage and cost differs for most installations. An energy reduction of 30% is assumed. The same free ridership and equipment life is used as the proxy. For occupancy sensors, in all cases except where highlighted in the following subsections, number 17 [on/off switch control to occupancy sensor control (private office - 1200 W controlled)] of the OEB Tables in the Commercial Worksheet is used as proxy prorating all values except incremental cost, which is normally provided by the customer, contractor or consultant. Similarly for dimmer switches and manual switches except where highlighted in the following sections, number 23 [2-100 Watt Incandescent bulbs to controlled by a dimmer switch] of the OEB Tables in the Residential Worksheet is used as proxy. Please note there are two number 23's in this Worksheet.

Photocell

Using the seasonal energy usage, a load profile is developed for the eight periods based on the data used to establish the street light profile for North Bay Hydro. The source of information for the sunset and sunrise times is as per "Certification by Herzberg Institute of Astrophysics Certification for Sunset and Sunrise times for the National Research Council". The load profile data provides the percent of time the lights are on and off for the winter and summer peak periods. Previous to the installation of the photocell, the lights were on 8,760 hours per year. After the photocell is installed the lights are on 4,320 hours. The energy savings including peak periods occur when the lights are on and turned off as a result of the photocell. Thus the summer savings are highest when the lights are turned off for the daylight periods. By installing the photocell, the lights will be turned off during the winter 61.1% and for the summer 96.5% of the time. These factors are applied to the kW load of the lights to decrease the kW on peak.

3.2 Residential – Water Heater Tune-up

Residential Water Heater Tune-up – (Reference Worksheet "Appendix D Residential-Optional")

The Water Heater Tune-up program is highly successful. This program is delivered in partnership with Greening Nipissing, a local non-profit environmental group. In addition to discussing the benefits of the Water Heater Tune-up program, during the home visits there is a variety of discussion with customers as well as handouts related to energy efficiency, environment and safety. In addition to the hot water heater wrap, compact fluorescent bulbs, aerators, and showerheads are installed in the customer premises. Where the visit is to a gas water heater customer, only the compact fluorescent bulbs are provided to the customer. Outlet insulators are installed in some customer premises.

Since there is nothing in the OEB Tables for outlet insulators, they are included in number 1 of Appendix D. The proxy is number 36 [average existing stock to caulking products] of the OEB Tables in the Residential Worksheet for all components except cost and savings. The cost is estimated $0.30 each and the savings are estimated 0.1%. These will vary substantially depending on existing insulation, vapour barrier, etc. The installer would normally pick the worst locations to install one or more. Some outlets are quite cold and outside air often felt.

The other components of the Water heater Tune-up program are numbers 16 [60 watt incandescent to CFL screw-in 15 watt], 25 [Average existing stock to efficient shower head], 26 [average existing stock to faucet aerator], 27 [average existing stock to faucet washers], 28 [average existing stock to tank wrap] and 30 [average existing stock to pipe insulation 6-10'] of the OEB Tables in the Residential Worksheet.

Of the $45,067 charged to the Information Based program, $12,518.61 was included in the TRC analysis for Water Heater Tune-up program. This amount is the estimated amount that supports the Water Heater Tune-up program as per the note in section 3 of the requirements for *Annual Reporting of Conservation and Demand Management ("CDM") Initiatives*.

3.3 Residential – Fridge Buy-Back

Residential Fridge Buy-Back – (Reference Worksheet "Appendix D Residential-Optional")

This program is delivered in partnership with Greening Nipissing, a local non-profit environmental group. The Fridge Buy-Back program is highly successful. The Residential Programs complemented each other. For example, during water heater tune-ups, a second hand fridge is spotted and a pick up arranged. Similar to the Water Heater Tune-up program discussions and handouts related to energy efficiency, environment and safety were provided to the customer. This is the only Residential program with an incentive to entice the customer to take part in the program.

The Fridge Buy-Back program is Number 1 [Average existing stock to Recycling Program] of the OEB Tables in the Residential Worksheet. However, it differs substantially in cost. The cost in the OEB Tables is $100 whereas our experience is that the cost averages about $53.00. As a result Number 1 is used as a proxy and is found in number 2 of Appendix D.

Of the $45,067 charged to the Information program, $16,524.57 was included in the TRC analysis for the Fridge Buy-back program. This amount is the estimated amount that supports the Fridge Buy-back program as per the note in section 3 of the requirements for *Annual Reporting of Conservation and Demand Management ("CDM") Initiatives*.

3.4 Residential – Energuide for Houses

Residential Energuide for Houses – (Reference Worksheet "Appendix D Residential-Optional")

This program is delivered in partnership with Greening Nipissing, a local non-profit environmental group. There have been a lot of expenditures on the Energuide for Houses program. The cancellation of the program by Natural Resources Canada had a large negative impact on the North Bay Hydro Energuide program. Thus it has a negative TRC for 2006. Three houses have undertaken a great deal of work as a result of the A Audits. The B Audits resulted in an annual average savings of 8,215 kWh at an average cost of $4,400. The average savings and costs as per Green Communities Canada are 7,400 kWh and $4,000 respectively. Therefore the costs provided by the customers are reasonable.

The OEB Tables in the Residential Worksheet includes a number of thermal envelope improvements in numbers 36 to 45. It is most difficult to obtain the data required for these ten thermal envelope improvements through the available information related to the B Audits. The best method to obtain the customer information is the calculated difference between the A Audits and B Audits. All the items in the thermal envelope improvements have the same load profile and winter peak kW and are proxies of each other except for cost and savings. For the purpose of the A and B Audits number 43 [Average existing stock to Basement Insulation] of the OEB Tables in the Residential Worksheet is used as a proxy. Number 3 of Appendix D has the same profile and peak kW calculations, equipment life and Free Ridership as the proxy. The energy savings and costs as per the above paragraph are included in number 3 of Appendix D.

Since most of the Audits are done on gas or oil heated homes there are no heating gains as a result of these audits, but there are savings associated with the furnace fan when oil and gas usage is reduced. Green Communities Canada has stated that the average home will save about 40% in their energy costs resulting in reduced electric fan operation amounting to about 300 kWh per year. There is no cost to the customer or North Bay Hydro to obtain this electric energy reduction. Number 43 [Average existing stock to Basement Insulation] of the OEB Tables in the Residential Worksheet is the proxy. There are 39 homes that reduced furnace fan consumption due to energy reductions in gas and/or oil. This is shown in number 4 of Appendix D at zero cost and saving 300 kWh per year.

Of the $45,067 charged to the Information program, $6,008.93 was included in the TRC analysis for the Energuide for Houses program. This amount is the estimated amount that supports the Energuide for Houses program as per the note in section 3 of the requirements for *Annual Reporting of Conservation and Demand Management ("CDM") Initiatives*.

3.5 Residential – Information

Residential Information Based – (Reference Worksheet "Appendix D Residential-Optional")

The Information Based program has been quite successful. This program is delivered in partnership with Greening Nipissing, a local non-profit environmental group. Since Greening Nipissing also delivers the water heater tune-up, fridge buy-back and energuide for houses, there is a great deal of contact with the general public in on ongoing basis. This has led to over 100,000 contacts during 2006. Of the $45,067 charged to the Information program, all but $10,013.89 was transferred to the other three Residential programs. Customers serviced by other LDC's in the surrounding area benefit from the North Bay Hydro conservation messages through the media.

There is a TRC benefit in this program because there were 450 compact fluorescent lights given to North Bay Hydro customers during 2006, which have been included in Appendix B Information Based. Water heater blankets have been ignored in the benefit, as they are considered non material and are mainly a promotion cost.

The following is a table of some of the activities included in this program:

Table 2
Summary of Consumer Education on Electricity Initiatives

Topic	Number of Presentations	Size of Audience (Exposure or people)
School Meetings	20 meetings, 6 with students	2000
Public Presentations	12, 1 with MTO	710
University Panel Presentation	1	100
Radio Interviews	2	25,000
Newspaper Articles	2	23,000
TV Show	13	20,000
Information TV Pieces	6 Cogeco, 2 MCTV	20,000
Trade Show	1	4,000
Open House in Mall	1	200
Display at Public Library	1 month	500
Silent Auctions	Prize donations	500
Church Group	Prize donations	100
Big Sisters Bowling	1	1000

3.6 Demand Reduction – Commercial

Demand Reduction – Commercial (Reference Worksheet "Appendix D Commercial")

Lighting

The lighting described in section 3.1 above is included in numbers 1 to 46 and 47 to 52 respectively of Appendix D Commercial. LED lighting is separated primarily because of the lengthy equipment life of 220,000 hours. The load profile is the same for both proxies. The proxy for the commercial lighting load profile is number 1 [a change from 4-T12 34W (156W) to 2-T8 32W (58W)] of the Commercial Worksheet on the OEB Tables. The proxy for the load profile for any LED exit lighting is number 10 [a change from 2-15W (30W) Incandescent Exits Sign to 3W LED exit sign] of the Commercial Worksheet on the OEB Tables.

Chiller

A single compressor chiller was replaced with a high efficiency dual compressor chiller. The incremental cost was $10,000 for the energy efficient chiller compared to the base case. The chiller was analyzed for various percentages of loadings: namely, 100%, 75%, 50% and 25%. Hours of use were estimated for each of the loadings, and then as per Seasonal Usage in 3.1 above, the hours were applied to different times of the day throughout the shoulder and summer period. These hours were all totalled for each of the four loadings producing the load profile that is in number 56 of Appendix D. The difference between kW per ton at 100% loading for the base case and energy efficient chiller was used to calculate the summer peak reduction. It is assumed the peak reduction of 16.12 kW for the chiller would correspond with the system peak, which would normally occur at the hottest summer days. At 50% and 75% the peak kW reduction for both would be about 11.4 kW, but it is unlikely the peak would occur then as there would be less demand on the system as the weather would likely be cooler. The equipment life of 23 years is from manufacturing information (ASHRAE Technical Committee TC 1.8 and agrees closely with the life of the base case chiller.

Occupancy Sensors and Dimmer Switches

For information related to the proxy refer to section 3.1 above under the heading occupancy sensors and dimmer switches. Occupancy sensors controlling 420 watts at an incremental cost of $256 are shown in number 53 of Appendix D. The number of hours operating without an occupancy sensor is 3,900 and with a sensor is 2,730 hours because of the 30% energy reduction. Since the operating time is less than 3,250 hours, the winter and summer peak demand is reduced by a factor of 2,730/3,611.

For information related to the proxy refer to section 3.1 above under the heading occupancy sensors and dimmer switches. Three occupancy sensors controlling 495 watts at an incremental cost of $420 are shown in number 55 of Appendix D. The number of hours operating without an occupancy sensor is 2,600 and with a sensor is 1,820 hours because of the 30% energy reduction. Since the operating time is less than 3,250 hours, the winter and summer peak demand is reduced by a factor of 1,820/3,611.

Photocell

For information related to the proxy refer to section 3.1 above under the heading photocell. A photocell controlling a 32-watt fixture at an incremental cost of $90 is shown in number 54 of Appendix D. The number of hours operating without a photocell is 8,760 hours and with a photocell is 4,320 hours. Seasonal energy usage based on the load profile for street lighting is calculated for each of the eight seasonal periods. As per section 3.1 the load profile and winter and summer peaks are calculated. The equipment life is assumed to be 10 years as per the Fisher Pierce website.

3.7 Demand Reduction – Industrial

Demand Reduction – Industrial (Reference Worksheet "Appendix D Industrial")

Lighting

The lighting described in section 3.1 above is included in numbers 1 to 21 and 22 to 24 respectively of Appendix D Industrial. LED lighting is separated primarily because of the lengthy equipment life of 220,000. The load profile is the same for both proxies. The proxy for the Industrial Lighting load profile is number 1 [a change from 4-T12 34W (156W) to 2-T8 32W (58W)] of the Industrial Worksheet on the OEB Tables. The proxy for the load profile for any LED exit lighting is number 8 [a change from 2-15W (30W) incandescent exits Sign to 3W LED exit sign] of the Industrial Worksheet on the OEB Tables.

Zone Control

There were eight areas designed for better light control at one location in a plant. Each of the areas originally had a timer that limited the usage to 8100 hours. The eight areas had three separate operating characteristics as shown in numbers 29 to 31 in Appendix D of the Industrial worksheet.

One area contained zones 4, 5, 6 and 7 as per number 29 of Appendix D. This zone controlled 37 lights for a total 15,150 watts. The zone controller reduced the hours of operation from 8110 hours per year to 2730 hours per year. The second area contained zone 8 as per number 30 of Appendix D. This zone controlled 5 lights for a total 2050 watts. The zone controller reduced the hours of operation from 8110 hours per year to 4680 hours per year. The third area contained zones 1, 2 and 3 as per number 31 of Appendix D. This zone controlled 38 lights for a total 15,580 watts. The zone controller reduced the hours of operation from 8110 hours per year to 6571 hours per year.

The manufacturer "Wattstopper" provided the equipment life for the zone controllers. They indicated that the limiting components would be the switching relays (1 per zone) and each have an expected life of 50 000 cycles. At the customer premises most of the relays operate twice daily, one "on" – one "off", which should last for approximately 68 years. As per section 3.1 the upper limit for this annual report is 25 years.

The three areas require three separate calculations for seasonal energy as described in section 3.1. As per that section three separate profiles for kWh are calculated and included in numbers 29, 30 and 31 of Appendix D. The kW peak demand for both winter and summer vary substantially for the three areas. Two of the areas, numbers 30 and 31 show zero values for winter and summer, as there is no reduction of kWh during the peak hours of either winter or summer.

The incremental cost for the zone controllers is $8,100. It is allocated to each of the three areas based on the estimated kWh saved. The split between the three zones has no bearing on the overall Benefit to Cost ratio.

Occupancy Sensors and Dimmer Switches

For information related to the proxy refer to section 3.1 above under the heading occupancy sensors and dimmer switches. The six occupancy sensors shown in number 25 of Appendix D control 50 fixtures representing 2,000 watts at an incremental cost of $100 per sensor. The number of hours operating without an occupancy sensor is 4,800 and with a sensor is 3,276 hours because of the 30% energy reduction. Since the operating time is greater than 3,250 hours, the winter and summer peak demand remains the same as the proxy.

For information related to the proxy refer to section 3.1 above under the heading occupancy sensors and dimmer switches. One dimmer switch controlling 6 pot lights totalling 300 watts and at an incremental cost of $75 per switch are shown in number 26 of Appendix D. The number of hours operating without an occupancy sensor is 2,900 and with is 2,030 because of the 30% energy reduction. The operating time is less than 3,250 hours, so the winter and summer peak demand is reduced by a factor of 2,030/3,611.

For information related to the proxy refer to section 3.1 above under the heading occupancy sensors and dimmer switches. Eight occupancy sensors controlling 30 fixtures representing 1,200 watts at an incremental cost of $100 per sensor are shown in number 27 of Appendix D. The number of hours operating without an occupancy sensor is 1,600 and with is 1120 because of the 30% energy reduction. Since the operating time is less than 3,250 hours, the winter and summer peak demand is reduced by a factor of 1120/3,611.

For information related to the proxy refer to section 3.1 above under the heading occupancy sensors and dimmer switches. Manual switches use the same proxy as dimmer switches. There are a number of manual switches controlling 260 fixtures representing 16,380 watts at an incremental cost of $10 per switch as shown in number 28 of Appendix D. The energy reduction is estimated at 50% as opposed to the 30% for other controllers. This is a result of the lights operating all the time the building is open. Some work stations are used infrequently. It is felt that 50% is very conservative, but there is no experience to justify a higher percentage. The number of hours operating without a manual switch is 1,600 and with a manual switch is 800 hours. The operating time is less than 3,250 hours, the winter and summer peak demand is reduced by a factor of 800/3,611. The equipment life for a manual switch is estimated at 25 years. These switches seldom fail.

3.8 Demand Reduction – Institutional

Demand Reduction – Institutional (Reference Worksheet "Appendix D Institutional")

Institutional customers include schools, hospitals, non-profit housing, and public buildings such as City, airport commissions, theatres, arenas, libraries and the YMCA

Lighting

The lighting portion as described in section 3.1 above is included in numbers 1 to 12 in Appendix D. The proxy for the Institutional Lighting load profile is number 1 [a change from 4-T12 34W (156W) to 2-T8 32W (58W)] of the Commercial Worksheet on the OEB Tables.

Roof Tops

The replacement of roof tops includes a higher efficient compressor with no economizer and the conversion of the heating portion to gas. The Base Case units were less efficient with an outside air economizer and electric heat. The total actual cost for the installation was $11,514 per roof top. The incremental cost is arbitrarily divided between the energy efficient coils and conversion to gas.

For the more efficient compressor coils and the economizer the proxy used is number 24 [a change from Outside Air Economizer to no Economizer] of the Commercial Worksheet on the OEB Tables. This proxy was used for the cooling period (summer and shoulder periods) load profile, operating time and the 25% reduction in energy. This assumed the operating time was reduced from 1000 to 750 hours per year. The remaining savings were provided by the manufactures information indicating a decrease from 12.3 kW to 7.1 kW. The calculated load profile and other data is shown in number 13 of Appendix D.

Number 14 of Appendix D shows the load profile for fuel switching from electric to gas. The 19.5 kW heating elements were eliminated. The load profile is developed from seasonal usage calculated as per section 3.1 above. The building has an unusual operating characteristic. More than normal occupancy is during the off peak period. The total operating hours for the winter period was estimated at 1,850 hours. It was calculated that the percent of hours used during the summer peak was 37.5%, thus the summer peak was reduced by multiplying the peak kW savings by 0.375. It was calculated that the percent of hours used during the winter peak was 74%, thus the winter peak was reduced by multiplying the peak kW savings by 0.74. The Equipment Life is estimated conservatively as there is no clear application for Roof Tops. The two replaced units were 21 years old, which was considered in line with expected life. However, it was reduced to 15 years for both the heating and cooling initiatives. Other cooling and refrigeration initiatives were either 15 or 20 years as per numbers 26 and 27 of the OEB Tables in the Commercial Worksheet. As a conservative measure number 26 [From Fixed head Pressure to Floating Head Pressure Control] of the Commercial Worksheet on the OEB Tables was used as a proxy for the Equipment Life of the Roof Tops for both Cooling and Heating. Thus 15 years is shown in numbers 13 and 14 of Appendix D.

Electric Heaters with no Control

Number 15 of Appendix D shows the load profile for the timer control of the entrance electric heaters. The building has two large electric heaters at the entrance door. This door is of extremely poor quality causing extreme cold in the area. These heaters total 45 kW and were on about 50% of the time for the winter and shoulder months. It was estimated conservatively that they were on 1,850 hours per year. These heaters had a manual thermostat that was always set at the top temperature. One timer was retrofitted and installed to tie the usage to occupancy. The timer had one coil controlling two contacts, one for each heater. The only costs were $40.00 labour for installation. The timer was set to reduce the winter peak as this was feasible due to the unique operating characteristics of the building. The energy reduction totalled 30%. The same seasonal energy usage was used for the load profile as per the heating portion of the Roof Tops. The setting of the timer made it more accurate to base the calculation for the winter peak kW on the heaters being off 4 of 7 hours of the daily winter peak... The equipment life of the timer is 10 years as per proxy number 16 [a change from on/off switch control - outdoor light to timer control - outdoor light (300 W controlled)] of the Commercial Worksheet on the OEB Tables.

3.9 System Optimization Study

The purpose of this project is to improve the reliability and efficiency of the North Bay Hydro distribution system. System wide optimization and balancing will minimize line losses.

The technical data gathered and input into the model is for the 44 kV, 22 kV, 12 kV and 4 kV distribution systems. This includes the field gathering of wire sizes and the verification of switch locations and position (open or closed). Data editing and verification is 99% complete. Loads have been assigned based on the transformer data. North Bay Hydro is ready to start optimization runs.

3.10 Optional Programs – Street Light Pilot

Optional Program Street Light Pilot – (Reference Worksheet "Appendix D Residential-Optional")

The street light pilot consists of retrofit of HPS. lights. The retrofit includes the installation of an electronic ballast and a light harvester. Some laboratory testing has taken place.

There are approximately 16 lights installed. There has been a great deal of trouble with reliability. North Bay Hydro is working with the manufacturer on a problem with the light harvester. Once the harvesters are modified they will be reinstalled. They have not been reliable enough to do any testing related to energy efficiency. For the TRC Benefit we are assuming that they are installed and working. North Bay Hydro has spent a great deal of time and money on this project and is intending to proceed with the pilot in conjunction with the supplier.

Number 5 of Appendix D of the Residential-Optional worksheet shows the base case and efficient light harvester and ballast. Energy savings are calculated based on 35% savings. The incremental cost of $30.00 each covers the cost over and above the standard ballast. The high incremental costs as shown in Appendix B Street Light pilot are a result of the extensive time in testing, making modifications, etc. These are designed to last 35,000 hours as opposed to the 24,000 hours of the standard ballast.

The load profile and the winter and summer peaks are calculated from seasonal energy usage. Section 3.1 includes a discussion on installing photocells where they don't exist. In this case the photocell already exists. The load profile and calculation for the winter and summer peaks differ substantially. The load profile used is the same for all photocell-controlled streetlights or sentinel lights. The light harvester may change the load profile slightly and increase energy saving above 35. These will be considered if the pilot becomes a program.

By installing the light harvester and ballast the peak kW will be reduced during the winter 35.0% of the time and for the summer 23% of the time. These factors are applied to the peak kW of the lights to decrease the winter and summer on peak kW. It is a small kW savings.

3.11 Optional Programs – LED Traffic Lights

Although the pilot was considered a success in the Annual Report 2005 we are awaiting supporting documentation from the customer. The customer has continued changing traffic lights at intersections throughout 2006 and 2007. Some North Bay Hydro administrative costs were included and the TRC Benefit was under reported in 2005.

3.12 Optional Programs – Electrical Thermal Storage Heater

Optional Program Electrical Thermal Storage Heater – (Reference Worksheet "Appendix D Residential-Optional")

This is a demonstration project to test how an Electrical Thermal Storage (ETS) heater will function in a building in North Bay. It can be used to demonstrate technical and energy saving advantages. Customers have viewed the unit to get an idea of the look and space required. The existing room had two heating sources. One is from a 1500-watt baseboard heater and a second from a larger 2500-watt unit. The 2500 watt unit is only used when the room is occupied. Without the second heater the 1500-watt heater could not keep the room warm enough. The ETS heater is now the only source of heat. The larger unit is only used for cooling which is not part of this project.

These units do not need to operate during peaks as they charge during off peak hours, store the energy and release it when necessary. The ETS can store sufficient kWh to use in the off peak hours.

Number 6 of Appendix D shows the load profile for the installation. The proxy is number 43 of the Thermal Envelope Improvements [from Average existing stock to Basement Insulation] of the Residential Worksheet on the OEB Tables. There are no energy savings assumed for this application, only load shifting. The estimated kWh usage for both units is 2,951 kWh annually. The amount shifted from peak and mid peak to off peak is shown in Appendix B ETS. The peak kW saved is the 1.5 kW of the baseboard heater as well as a percent (13%) of the larger 2.5 kW ETS heater.

There was no good fit as a proxy for equipment life for the ETS unit. The Commercial Worksheet of the OEB Tables with complex equipment has some complex equipment for cooling and electrical heating with an equipment life ranging from 10 to 20 years. Those with 10 years were motors that are easily replaced and are not the most complex components at the greatest cost. Verbally, Steffes, the manufacturer informed us the blower motor has a life of 10 years, circuit board and elements 15 years and the bricks and insulators 26 years. The more complex parts have the higher equipment life. Later we received a letter from Steffes stating the equipment is designed for 20 years but know in many cases the equipment lasts much longer. Number 6 of Appendix D includes the 20-year Equipment Life.

3.13 Renewable Energy Opportunities

Funding is being provided to the City of North Bay to undertake a landfill gas feasibility study. A flare was installed and is burning gas to get an idea of volume. The flare was installed in 2006. The study has been on going for several months.

4.0 Lessons Learned

The following is a summary of the lessons learned in 2006 with respect to the application of North Bay Hydro's conservation initiatives. There are also some comments about information provided in our 2005 annual report and how they pertain to our 2006 initiatives.

- **Partnerships –** Our partnership with Greening Nipissing, a local environmental group, has proven very successful. They have delivered our residential programs for us. There is a big advantage to having one group deliver several programs as there are opportunities for efficiencies. Much of the information is common to all programs. Contact with a customers leads to interest in other programs. Greening Nipissing is also involved in the delivery of our information based programs. We have educated suppliers, consultants, contractors and electricians about the content of our programs. They have been very good at identifying potential customers for us. Word of mouth has been a good source of new projects. The mayor of the City of North Bay has been very supportive of our programs. He has been the opening speaker at several of our events. This helps draw media attention. We have worked with several government agencies on an energy workshop. Natural Resources Canada, the IESO and Ministry of Northern Development are examples. Some of these partnerships have extended to sharing costs as well as information.

- **Water Heater Tune Up** – There was very strong customer response to this program. No incentive was provided to customers participating in this program. We did provide compact fluorescent light bulbs, an energy efficient shower head and a sink aerator as part of the home visit. We left a package of energy efficiency information with the customer for future reference. We have spoken to several customers who have used this information to further improve the energy efficiency of their homes. This program has met our target while being under our budget. We will continue the program in 2007.

- **Fridge Buy Back –** There was a strong customer response to this program. We did provide an incentive to customers who participated in this program. We are using a local contractor to pick up and dispose of the fridges in an environmentally acceptable manner. This has proven to be very effective and efficient. Very little advertising was required to maintain customer interest in this program. This program has met our target while remaining under our budget. This program will continue in 2007.

- **EnerGuide for Houses –** Initially there was very little customer interest. We used a local home as an example of the potential for energy savings. A documentary was created and shown on the local cable channel. We had great support from the local cable company. They ran our material as local content at very little cost. This increased customer interest substantially. Natural Resources Canada cancelled the program before we received full advantage from our advertising initiatives.

- **Information Based Programs –** We have used our information based program to promote all of our conservation initiatives. We have utilized radio, television and newspaper advertising. We have held information sessions, program launches and news releases to kick off our programs. We have created our Saving Together and Bright Lights programs to increase public interest in conservation. We have worked with consultants, electricians, suppliers and government agencies as partners. These initiatives have all added to our message and increased customer participation in our programs. I have had several calls from customers congratulating us for our leadership in the community. We are working with a local marketing firm to ensure the consistency of our message across all programs. We are delivering our conservation message to grade six classes in our local schools. We have learned that children are very interested in our message and are instrumental in convincing their parents to take action. We have conducted seminars with our commercial/industrial customers. We have highlighted specific technologies, conducted energy seminars and have educated customers to be better able to identify potential measures for themselves. These sessions have been very well attended. We have learned that this type of education is a key to getting involvement in our programs.

- **Commercial/Industrial Program –** We have had excellent participation in this program. We have found that customers are very reluctant to sign an agreement our make a commitment. The administration of this program is very labor intensive. We conduct an initial walk through to access the potential for energy savings. If there is potential we conduct an audit. The cost of the audit is shared with the customer. This demonstrates some commitment on the customer's behalf. Once the audit is completed we conduct the TRC and provide the customer with the amount of the incentive. We then ask the customer to sign an application and a contract. We have kept the contract quite simple in an effort to speed up the process. Some projects are completed quickly while others require a great deal of follow up to ensure that the project gets started. Customers seem to be sitting back hoping that more government funding will be made available. In 2006 we introduced our Bright Lights Program. This program is meant to speed up the evaluation process for a project. The customer can estimate his own incentive from the documentation provided. This program provides an incentive on a per fixture basis for energy efficient technologies. We designed this program as customers seem to be most interested in the faster payback they receive from lighting upgrades. The suppliers and contractors like this program. They can provide their customer with an estimate of the incentive as part of their estimate for the entire project based on our product list. We do insist that the incentive goes to the customer. The suppliers have access to qualified lighting auditors. We have been working closely with these auditors to help both the customer and North Bay Hydro save on audit costs. It is very important to make the process as simple as possible for the customer. We have to be prepared to provide assistance with the application and contract process to facilitate getting the project started. The projects require follow up right through to the verification process. We will increase our customer contact on these projects in 2007. We are also renewing our marketing strategy at this time.

- **LED Traffic lights –** In our 2005 annual report we stated that this pilot was a success. The program was expanded and the customer has continued to install LED traffic lights in 2006. The objective is to have all major intersections converted by the end of 2007. Although the work is proceeding we are still awaiting supporting documentation from the customer. We believe that this program is very visible and will benefit all the residents of North Bay. We have been using the city projects as examples to convince residents that conservation is a high priority.

- **Street lighting –** In our 2005 report we indicated that a streetlight pilot would be initiated in 2006. We have installed 19 lights with electronic ballasts and light harvesters. We have experienced problems with the light harvesters. We are still working with the manufacturer to rectify the problem. There are 16 lights in service at this time. The lights have not been reliable enough to conduct a conclusive energy consumption study. We believe deeply in this project and will continue work on this pilot in 2007. The manufacturer is predicting a 35% energy saving and an increased life for this product.

- **Renewable Energy –** We have provided funding to the City of North Bay to conduct a landfill gas study. A flare has been installed at the site and the study is progressing. The report is expected by the end of 2007. The City of North Bay has also completed a wind study project. The wind data indicates that a wind project is unlikely at this time. There is still other local interest in a wind project for this area. This is a private sector project. The company is trying to get funding to conduct a wind study.
- **System Optimization –** We have gathered the data and populated the computer model. We will be running the model in the near future. We will use funding from our optional program to implement any efficiency. This has been a very worth while project for North Bay Hydro. We now know all conductor sizes and have verified the position of all switching devices.

5.0 Conclusions

North Bay Hydro is very excited about the success of its CDM program in 2006. The initiatives undertaken have satisfied the principles of the CDM Plan. All classes of customers have been included in our programs. We have engaged non-profit housing, schools, factories, group homes, senior’s homes, hotels, stores, residential customers and the City of North Bay in conservation initiatives. The acceptance and participation from all sectors has been exceptional. We have formed alliances with consultants, contractors, electricians, distributors, suppliers and government agencies to deliver our programs in the most efficient manner for the benefit of our customers. We have utilized the local media and a marketing firm to deliver our program and our conservation message to our customers. We have visited schools, church groups, commercial/industrial customers and participated in trade shows. We have made home visits and provided energy efficiency information to residential customers. We have exceeded our targets in both the Water Heater Tune Up and Fridge Buy Back Programs. These programs will be extended into 2007. We have visited 87 local commercial/industrial establishments and conducted either a walk through or a more in depth audit. We have conducted several education sessions and seminars for our commercial/industrial customers. We have worked on renewable energy projects and implemented pilots for streetlights and traffic lights. We are very interested in continuing these projects because they have an obvious and very visible benefit to all the residents of North Bay.

The benefit to cost ratio for the 2006 programs was 1.56 with a positive net TRC of $283,864. The ratio is expected to increase during 2007 as more of the identified projects are completed. The funding from the EnerGuide for Housing program will be transferred to another program unless new government initiatives make it worthwhile to continue.

We have created the North Bay Hydro Saving Together branding for our DSM programs. This will continue to be central to the promotion of our program. Our customers' best interest will continue to be the focus of our DSM program. We will continue to deliver the programs in an efficient manner so that our customers receive the most benefit at the best cost possible from our DSM plan.

Yours truly,

Jim Snider,
General Manager