Thunder Bay Hydro

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Thunder Bay Hydro

2005 Distributor Conservation Demand Management Plan Report for Ontario's Energy Culture of Conservation

March 2006

Thunder Bay Hydro

Introduction

The Ontario government is committed to getting Ontarians to conserve electricity by a total of 5% by the end of 2007. The government believes that local distribution utilities need to play a leading role in this 3-year initiative, which began May 1st, 2005. As such, the Ministry of Energy through the Ontario Energy Board has strongly encouraged utility involvement.

To this end, Thunder Bay Hydro Electricity Distribution Inc. has begun implementing its own plan for encouraging customers to conserve electricity. The main focus on the implementation of Thunder Bay Hydro's CDM Plan for 2005 was targeted at Energy Efficiency Projects.

It is our desire to be a conservation leader in our community through partnering with our own local conservation agencies to help this government and the province achieve the targeted 5% reduction. Our plan is intended to cover all areas of conservation and demand management while allowing full participation from all of our customer classes.

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Our Unique Circumstance

Since the introduction of Market Based Rate of Return to Ontario distribution utilities, Thunder Bay Hydro has been operating under a ‘Rate Minimization’ model. The model was mandated by the utility’s shareholder, the City of Thunder Bay. The essence of this model is that the City of Thunder Bay has decided that it will forego any financial return from its ownership of Thunder Bay Hydro. The shareholder made this decision in anticipation that avoiding the distribution rate increases associated with a financial return to the City would serve as an economic stimulant in a weak local economy.

In accordance with the ‘Rate Minimization’ model, Thunder Bay Hydro did not previously apply for the distribution rate increases required to fund a financial rate of return. The utility is essentially operating under a breakeven scenario, where the small return earned is used to fund the capital expenditure program. At this time, the City of Thunder Bay is not considering abandoning the ‘Rate Minimization’ model.

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Evaluation of the CDM Plan

Thunder Bay Hydro Electricity Distribution Inc. main focus on the implementation of the CDM Plan was targeted at Energy Efficiency Projects. These projects included the following.

1. Compact Fluorescent Lamp (CFL) Promotion,
2. Refrigerator Buy-Back Program,
3. Energy Star Appliance Incentive Program,
4. Christmas L.E.D. Light Exchange Program,
5. City of Thunder Bay L.E.D. Traffic Light Conversion Program.

See Appendix A, Evaluation of the CDM Plan.

Appendix A - Evaluation of the CDM Plan

	Total	Residential	Commercial	Institutional	Industrial	Agricultural	LDC System	Other 1	Other 2	Other 3	Other 4
Net TRC value ($):	*$206,242*	$177,660	$28,582								
Benefit to cost ratio:	*1.75*	3.84	1.13								
Number of participants or units delivered:	*2781*	2780	1								
Total KWh to be saved over the lifecycle of the plan (kWh):	*7,133,092*	3,377,773	3,755,319								
Total in year kWh saved (kWh):	*988,800*	519,385	469,415								
Total peak demand saved (kW):	*120*	66	54								
Total kWh saved as a percentage of total kWh delivered (%):	*0.68%*	*0.94%*	*0.54%*								
Peak kW saved as a percentage of LDC peak kW load (%):	*0.07%*	0.04%	0.03%								
Gross in year C&DM expenditures ($):	*$346,516*	$59,976	$286,540								
Expenditures per KWh saved ($/kWh):*	*$0.0486*	$0.0178	$0.0763								
*Expenditures per KW saved ($/kW)**:*	*2,887.65*	908.75	5,306.30								

Utility discount rate (%):	1.47

*Expenditures include all utility program costs (direct and indirect) for all programs which primarily generate energy savings.
**Expenditures include all utility program costs (direct and indirect) for all programs which primarily generate capacity savings.

Appendix B - Discussion of the Program

A. **Name of the Program:** Energy Efficiency Programs: Community Outreach Campaign - Compact Fluorescent Lamp Promot

Description of the program (including intent, design, delivery, partnerships and evaluation):

This program is part of the Community Outreach campaign. This consists of giveaways of 1,800 (from original 3,000) bulbs at local trade shows and community presentations. The program benefits customers in the residential rate class. The derived wattage benefit is calculated based on a 15W bulb replacing a 60W bulb. Although we can't be certain that individuals will continue using CFLs, we are confident that this program combined with our education efforts will instill a conservation culture shift

Measure(s):

	Measure 1	Measure 2 (if applicable)	Measure 3 (if applicable)
Base case technology:	60W Incandescent Bulb		
Efficient technology:	Replace with 15W CFL		
Number of participants or units delive	1,800		
Measure life (years):	4		

B. **TRC Results:**

TRC Benefits ($):	*$*	*58,351.03*
TRC Costs ($):		
Utility program cost (less incentives):	$	15,145.38
Participant cost:		
Total TRC costs:	$	15,145.38
Net TRC (in year CDN $):	$	43,205.65
Benefit to Cost Ratio (TRC Benefits/TRC Costs):	$	3.85

C. **Results:** (one or more category may apply)

Conservation Programs:

Demand savings (kW):	*Summer*		
	Winter (Peak)		41.4
	lifecycle		*in year*
Energy saved (kWh):	*748,800*		187,200
Other resources saved :			
Natural Gas (m3):			
Other (specify):			

Demand Management Programs:

Controlled load (kW)	
Energy shifted On-peak to Mid-peak (kWh):	
Energy shifted On-peak to Off-peak (kWh):	
Energy shifted Mid-peak to Off-peak (kWh):	

Demand Response Programs:

Dispatchable load (kW):	
Peak hours dispatched in year (hours):	

Power Factor Correction Programs:

Amount of KVar installed (KVar):	
Distribution system power factor at begining of year (%):	
Distribution system power factor at end of year (%):	

Line Loss Reduction Programs:

	lifecycle	in year
Peak load savings (kW):		
Energy savngs (kWh):		

Distributed Generation and Load Displacement Programs:

Amount of DG installed (kW):	
Energy generated (kWh):	
Peak energy generated (kWh):	
Fuel type:	

Other Programs (specify):

Metric (specify):	

D. **Program Costs*:**

Utility direct costs ($):	*Incremental capital:*	$	9,680.40
	Incremental O&M:	$	1,286.37
	Incentive:	$	-
	Total:	$	10,966.77
Utility indirect costs ($):	*Incremental capital:*		
	Incremental O&M:		$4,178.61
	Total:		$4,178.61
Participant costs ($):	*Incremental equipment:*		
	Incremental O&M:		
	Total:		

E. Comments:

*Please refer to the TRC Guide for the treatment of equipment cost in the TRC Test.

Appendix B - Discussion of the Program

A. **Name of the Program:** Energy Efficiency Programs: Community Outreach Campaign - Refrigerator Buy-Back Promotion

Description of the program (including intent, design, delivery, partnerships and evaluation):

The Refrigerator Buy Back program is aimed at customers that have a second "vintage" refrigerator and have not recycled the old unit. Under this program, Thunder Bay Hydro covers the costs of pick-up, disposal, and refrigerant recycling costs up to a maximum of $59/unit.

Measure(s):

	Measure 1	Measure 2 (if applicable)	Measure 3 (if applicable)
Base case technology:	Vintage Refigerator		
Efficient technology:	Removal of unit (1200 kWh)		
Number of participants or units delive	227		
Measure life (years):	6		

B. **TRC Results:**

TRC Benefits ($):	*$*	*126,581.67*
TRC Costs ($):		
Utility program cost (less incentives):	$	14,836.71
Participant cost:		
Total TRC costs:	$	14,836.71
Net TRC (in year CDN $):	$	111,744.96
Benefit to Cost Ratio (TRC Benefits/TRC Costs):	$	8.53

C. **Results:** (one or more category may apply)

Conservation Programs:

Demand savings (kW):	*Summer*		61.7
	Winter		65.4
		lifecycle	*in year*
Energy saved (kWh):		*1,634,400.00*	272,400.00
Other resources saved :			
Natural Gas (m3):			
Other (specify):			

Demand Management Programs:

Controlled load (kW)	
Energy shifted On-peak to Mid-peak (kWh):	
Energy shifted On-peak to Off-peak (kWh):	
Energy shifted Mid-peak to Off-peak (kWh):	

Demand Response Programs:

Dispatchable load (kW):	
Peak hours dispatched in year (hours):	

Power Factor Correction Programs:

Amount of KVar installed (KVar):	
Distribution system power factor at begining of year (%):	
Distribution system power factor at end of year (%):	

Line Loss Reduction Programs:

	lifecycle	in year
Peak load savings (kW):		
Energy savngs (kWh):		

Distributed Generation and Load Displacement Programs:

Amount of DG installed (kW):	
Energy generated (kWh):	
Peak energy generated (kWh):	
Fuel type:	

Other Programs (specify):

Metric (specify):	

D. **Program Costs*:**

Utility direct costs ($):	*Incremental capital:*	
	Incremental O&M:	$ 1,260.15
	Incentive:	$ 9,483.11
	Total:	$ 10,743.26
Utility indirect costs ($):	*Incremental capital:*	
	Incremental O&M:	$4,093.45
	Total:	$4,093.45
Participant costs ($):	*Incremental equipment:*	
	Incremental O&M:	
	Total:	

E. Comments:

*Please refer to the TRC Guide for the treatment of equipment cost in the TRC Test.

Appendix B - Discussion of the Program

A. **Name of the Program:** Energy Efficiency Programs: Community Outreach Campaign - Energy Star Appliance Rebate Prom

Description of the program (including intent, design, delivery, partnerships and evaluation):

The Energy Star Appliance Rebate program consisted of incentives for the purchase of Energy Star Rated appliances. Rebates were based on the type of appliance purchased and amount of energy consumed.

Measure(s):

	Measure 1	Measure 2 (if applicable)	Measure 3 (if applicable)
Base case technology:	Standard Efficiency		
Efficient technology:	Energy Star		
Number of participants or units delive	353		
Measure life (years):	See comments		

B. **TRC Results:**

TRC Benefits ($):	*$*	*41,246.22*
TRC Costs ($):		
Utility program cost (less incentives):	$	28,134.94
Participant cost:		
Total TRC costs:	$	28,134.94
Net TRC (in year CDN $):	$	13,111.28
Benefit to Cost Ratio (TRC Benefits/TRC Costs):	$	1.47

C. **Results:** (one or more category may apply)

Conservation Programs:

Demand savings (kW):	*Summer*		4.2
	Winter		4.3
		lifecycle	*in year*
Energy saved (kWh):		*766,573.00*	52,185.00
Other resources saved :			
Natural Gas (m3):			
Other (specify):			

Demand Management Programs:

Controlled load (kW)	
Energy shifted On-peak to Mid-peak (kWh):	
Energy shifted On-peak to Off-peak (kWh):	
Energy shifted Mid-peak to Off-peak (kWh):	

Demand Response Programs:

Dispatchable load (kW):	
Peak hours dispatched in year (hours):	

Power Factor Correction Programs:

Amount of KVar installed (KVar):	
Distribution system power factor at begining of year (%):	
Distribution system power factor at end of year (%):	

Line Loss Reduction Programs:

	lifecycle	in year
Peak load savings (kW):		
Energy savngs (kWh):		

Distributed Generation and Load Displacement Programs:

Amount of DG installed (kW):	
Energy generated (kWh):	
Peak energy generated (kWh):	
Fuel type:	

Other Programs (specify):

Metric (specify):	

D. **Program Costs*:**

Utility direct costs ($):	*Incremental capital:*		
	Incremental O&M:	$	1,847.75
	Incentive:	$	20,285.00
	Total:	$	22,132.75
Utility indirect costs ($):	*Incremental capital:*		
	Incremental O&M:	$	6,002.19
	Total:	$	6,002.19
Participant costs ($):	*Incremental equipment:*		
	Incremental O&M:		
	Total:		

E. Comments:

Energy Star EE Technology Life Refrigerator 19 Years, Freezer 21 years, Dishwasher 13 years, Clothes Washers 14 years

*Please refer to the TRC Guide for the treatment of equipment cost in the TRC Test.

Appendix B - Discussion of the Program

A. **Name of the Program:** Energy Efficiency Programs: Community Outreach Campaign - Christmas L.E.D. Light Promotion

Description of the program (including intent, design, delivery, partnerships and evaluation):

As part of the Community Outreach Program, Thunder Bay Hydro offered our customers a limited number (400 strings) L.E.D. christmas

Measure(s):

	Measure 1	Measure 2 (if applicable)	Measure 3 (if applicable)
Base case technology:	5W Incandescent Lights		
Efficient technology:	L.E.D. C-7 Lights		
Number of participants or units delive	400		
Measure life (years):	30		

B. **TRC Results:**

TRC Benefits ($):	*$*	*14,011.34*
TRC Costs ($):		
Utility program cost (less incentives):	$	4,413.67
Participant cost:	$	-
Total TRC costs:	$	4,413.67
Net TRC (in year CDN $):	$	9,597.67
Benefit to Cost Ratio (TRC Benefits/TRC Costs):	$	1.46

C. **Results:** (one or more category may apply)

Conservation Programs:

Demand savings (kW):	*Summer*		
	Winter		3.2
		lifecycle	*in year*
Energy saved (kWh):		*228,000.00*	7,600.00
Other resources saved :			
Natural Gas (m3):			
Other (specify):			

Demand Management Programs:

Controlled load (kW)	
Energy shifted On-peak to Mid-peak (kWh):	
Energy shifted On-peak to Off-peak (kWh):	
Energy shifted Mid-peak to Off-peak (kWh):	

Demand Response Programs:

Dispatchable load (kW):	
Peak hours dispatched in year (hours):	

Power Factor Correction Programs:

Amount of KVar installed (KVar):	
Distribution system power factor at begining of year (%):	
Distribution system power factor at end of year (%):	

Line Loss Reduction Programs:

	lifecycle	in year
Peak load savings (kW):		
Energy savngs (kWh):		

Distributed Generation and Load Displacement Programs:

Amount of DG installed (kW):	
Energy generated (kWh):	
Peak energy generated (kWh):	
Fuel type:	

Other Programs (specify):

Metric (specify):	

D. **Program Costs*:**

Utility direct costs ($):	*Incremental capital:*	$ 2,875.68
	Incremental O&M:	$ 362.02
	Incentive:	
	Total:	$ 3,237.70
Utility indirect costs ($):	*Incremental capital:*	
	Incremental O&M:	$1,175.97
	Total:	$1,175.97
Participant costs ($):	*Incremental equipment:*	
	Incremental O&M:	
	Total:	

E. Comments:

*Please refer to the TRC Guide for the treatment of equipment cost in the TRC Test.

Appendix B - Discussion of the Program

A. **Name of the Program:** Energy Efficiency Programs: City Lighting Program - L.E.D. Traffic Lights

Description of the program (including intent, design, delivery, partnerships and evaluation):

The Traffic Light LED Conversion Program is a partnership with the City of Thunder Bay. The program began in the summer of 2005, will continue in 2006. The original completion date in 2007 maybe changed to an accelerated completion date to the fall of 2006 (this yet to be determined). Continuation of this program in 2006 will see conversions of another 36 intersections.

Measure(s):

	Measure 1	Measure 2 (if applicable)	Measure 3 (if applicable)
Base case technology:	Incandescent Lamps		
Efficient technology:	L.E.D. Trafic Lighting		
Number of participants or units delive	35 Intersections		
Measure life (years):	10		

B. **TRC Results:**

TRC Benefits ($):	*$*	*242,795.14*
TRC Costs ($):		
Utility program cost (less incentives):	$	214,212.84
Participant cost:	$	-
Total TRC costs:	$	214,212.84
Net TRC (in year CDN $):	$	28,582.30
Benefit to Cost Ratio (TRC Benefits/TRC Costs):	$	1.13

C. **Results:** (one or more category may apply)

Conservation Programs:

Demand savings (kW):	*Summer*		53.6
	Winter		53.6
		lifecycle	*in year*
Energy saved (kWh):		*3,755,319*	469,415
Other resources saved :			
Natural Gas (m3):			
Other (specify):			

Demand Management Programs:

Controlled load (kW)	
Energy shifted On-peak to Mid-peak (kWh):	
Energy shifted On-peak to Off-peak (kWh):	
Energy shifted Mid-peak to Off-peak (kWh):	

Demand Response Programs:

Dispatchable load (kW):	
Peak hours dispatched in year (hours):	

Power Factor Correction Programs:

Amount of KVar installed (KVar):	
Distribution system power factor at begining of year (%):	
Distribution system power factor at end of year (%):	

Line Loss Reduction Programs:

	lifecycle	in year
Peak load savings (kW):		
Energy savngs (kWh):		

Distributed Generation and Load Displacement Programs:

Amount of DG installed (kW):	
Energy generated (kWh):	
Peak energy generated (kWh):	
Fuel type:	

Other Programs (specify):

Metric (specify):	

D. **Program Costs*:**

Utility direct costs ($):	*Incremental capital:*	$ 168,700.00
	Incremental O&M:	$ -
	Incentive:	$ -
	Total:	$ 168,700.00
Utility indirect costs ($):	*Incremental capital:*	
	Incremental O&M:	$45,512.84
	Total:	$45,512.84
Participant costs ($):	*Incremental equipment:*	
	Incremental O&M:	
	Total:	$0.00

E. Comments:

Savings achieved in the first year of operating will help fund the remaining 2 years of conversions. A 30% Free Ridership was used in the

*Please refer to the TRC Guide for the treatment of equipment cost in the TRC Test.

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Lessons Learned

The customer response to the implementation of the CDM Plan has been very encouraging. The level of customer awareness for conservation and demand management is very high. This was confirmed by the participation levels of the various programs. Thunder Bay Hydro partnered with Eco-Superior Programs to promote the CFL Promotion, Refrigerator Buy Back Program, and the Star Appliance Incentive Program.

Compact Fluorescent Lamp (CFL) Promotion

As part of the Community Outreach Campaign, 3,000 Compact Fluorescent Lamps were purchased in April 2005. Distribution of the CFL's was through various customer contacts (i.e. shows, home visits, etc.). By the end of 2005, 1,800 had been circulated to customers. The remaining 1,200 CFL's are being distributed through the first and second quarters of 2006. As more retailers handle the product, the more likely it is that customers will purchase the CFL's. Energy savings and long lamp life need to be promoted.

Refrigerator Buy-Back Program

The Refrigerator Buy-Back Program was aimed at 3 target areas. The first target was the removal of the "second" refrigerator from the household. The second target was to incent customers to remove an "older" refrigerator and purchase a new Energy Star rated refrigerator. The third target was to safely recycle not only the harmful refrigerants, but also recycle the metallic components to help our environment. Thunder Bay Hydro's original target of 100 units was met in the first few months. The program was extended to another 100 units which was again surpassed.

Energy Star Appliance Incentive Program

The Energy Star Appliance Incentive Program was aimed at customers who were considering upgrading their refrigerator, freezer, dishwasher, and clothes washer. As with the Refrigerator Buy Back Program, the Energy Star Appliance Incentive Program also exceeded the original 200 units. The program was expanded to over 260 units by the end of 2005. Customer feedback was very positive.

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Lessons Learned

Christmas L.E.D. Light Exchange Program

The Christmas L.E.D. Light Exchange Program was not included in the original CDM Plan. This program was dawned from the closure of Thunder Bay Hydro's Holiday Home Decorating Contest which had been existence for 10 years. This new program was to bring awareness to holiday conservation in terms of lighting a home's interior and exterior. Thunder Bay Hydro offered direct exchange of 2 incandescent light sets for 2 energy saving L.E.D. light sets. Each customer was limited to 2 sets. The program was promoted at 2 different sites with the same level of participation. Each site exchanged 200 sets of L.E.D. Christmas lights in less than one hour. There is high demand for this type of program.

City of Thunder Bay L.E.D. Traffic Light Conversion Program

The L.E.D. Traffic Light Conversion Program is a partnership with the City of Thunder Bay. While the program is successful, the savings received from the conversion work is not as high as originally anticipated. Savings were calculated based on actual pre-conversion and post conversion measurements. The analysis did show a benefit to cost ratio of greater than 1. Partnering with the City of Thunder Bay proved to be a positive experience with the benefits going towards the municipal tax base. Thunder Bay Hydro looks forward to help the City of Thunder Bay find and implement other energy conservation solutions.

Another 35 intersections will be converted from incandescent traffic lights to L.E.D. technology in 2006 with the remaining scheduled for conversion in 2007.

Conclusions

The Energy Efficiency Programs Thunder Bay Hydro implemented has all proven to be successful. There have been many positive results from the CDM Plan. The Refrigerator Buy Back and Energy Star Appliance Incentive Programs were the most popular.

Partnerships formed with the City of Thunder Bay and Eco-Superior Programs were both positive experiences. The reduction of electricity usage had and continues to have positive results for the One-Tonne Challenge.

The Refrigerator Buy Back, Energy Star Appliance Incentive Program, Compact Fluorescent Lamp Promotion should be considered as main staples of a CDM Plan. These programs will be investigated as part of the 2007 CDM Proposed Plan.