Hydro One Networks Inc.
and
Hydro One Brampton Networks Inc.

Conservation and Demand Management Plan

RP-2004-0203 / EB-2004-0533

January 11, 2005

hydro one

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Executive Summary

Purpose of Submission
Hydro One Networks Inc. (Networks) and Hydro One Brampton Networks Inc. (Brampton) seek a final order of the Board for approval of their CDM Plans as well as confirmation that their respective CDM plans satisfy the Minister's condition of a financial commitment to reinvest in CDM initiatives.

Provincial Goal
Networks and Brampton will help advance the Provincial Government's conservation and demand management (CDM) initiative, which has established an overall goal of a five per cent reduction in the Province's energy needs by 2007. Accordingly, their CDM Plans will contribute to reducing energy growth and shifting demand while serving our customers' interests.

MARR Funding for Conservation and Demand Management
Networks anticipates funding in the amount of $ 39.5 million from the next installments of Market Adjusted Rate of Return (MARR) – not including an adjustment for Payments in Lieu of taxes (PILs). Brampton is planning CDM expenditures of $3.2 million also based on the Board-approved after-tax MARR adjustment. This funding will be allocated as follows (numbers may not add exactly due to rounding):

Figure 1.0

Networks	$M	Brampton	$M
Load Management		***Residential***	
• Smart Metering (partial)	14.9	• CFL Promotion	0.5
• TOU Rates Pilot	0.5	• Holiday Lights Trade- in	0.1
• Residential Load Control	4.7	• Customer Education	0.2
• C&I and Farm Load Control	3.5	• Pilots – Load Control --Real-Time Monitoring -- Smart Metering	0.3
Sub-total	23.6	*Sub-total*	1.0
Conservation		***Commercial and Industrial***	
• Low Income Program	4.5	• Power Factor Correction	0.2
• Residential Real-Time Monitoring	1.8	• Technology Demonstration	0.1
• Farm Efficiency	0.8	• Conservation Assets	1.3
• Distribution Loss Reduction	2.0	• Load Control	0.5
• Mass Market Programs	2.1		
Sub-total	11.2	*Sub-total*	2.1
Communication/ Education	1.0	***Utility Efficiency (System Loss Reduction)***	0.1
Program Management and Research	3.7	***Research and Planning***	0.04
Total	**39.5**	**Total**	**3.2**

The smart meter funding above is partial funding, for the initial start-up and first priority implementation of the program. The focus here on smart meters is to advance an

important Provincial initiative. It also helps put in place an enabling platform for CDM activities such as load management. The full metering plan, estimated to be in the several hundred million-dollar range, will be developed after the Board's final plan is presented, expected to be February 15, 2005.

Criteria
The programs are directed at the needs of the customer bases of Networks and Brampton. The former is unique in terms of its extensive Provincial coverage, often over rural regions of low density. In choosing program concepts for development, Networks and Brampton have been using the following criteria:

- Customer Needs – The programs meet the needs of Networks' and Brampton's individual customer bases.
- Benefit Allocation – Benefits arising from the planned initiatives to be distributed across Networks' customer base.
- Benefit Assurance – Potential to realize energy savings and cost of delivery.
- Leveraging Partnerships – Partnerships that will make use of economies associated with greater scale of delivery or existing delivery channels.
- Activities Support Minister's Plans - The preferred concepts or initiatives to fit within the activities identified in the Minister's May 31, 2004, letter to distributors.

Flexibility and Prudence
Networks and Brampton believe that this is a balanced proposal, but acknowledges that the planned activities are still generally at the early conceptual stage. Furthermore, the current dynamic state of the electricity market will necessitate flexibility in program planning and development. Such flexibility will enable Networks and Brampton to respond to customer demand levels and the results from pilot projects so that funds can be re-allocated among programs as needed. Also, final budget estimates will change due to the results of competitive tender processes where used.

Networks and Brampton believe that the most prudent approach to investing the one-time infusion of MARR funds, is one which utilizes pilot projects to test promising technologies and approaches before embarking on a full-scale roll-out. Before a full program is launched, the results of pilot projects will be reviewed for customer acceptance, customer behaviour change, and amount of either energy savings or demand reduction. Until customer results are obtained, it is not possible to establish feasible targets for either kilowatt-hour savings or kilowatt demand reduction. Hence, we consider it premature to establish such program targets at this time.

Cost Effectiveness
Given the current dynamics in Ontario's electricity market, the resulting lack of published system avoided costs, and the fact that the proposed Conservation Bureau has not yet been established, there is currently an inability to apply proposed cost benefit tests that put supply and demand on equal footings. It is expected that the new Ontario Power Authority, the new Conservation Bureau and/or the Board will establish such tests and the associated inputs for 2006 rates.

This plan encompasses a blend of conservation, efficiency and demand management initiatives that fit well with the Minister's vision. Those components have been chosen for their capability to contribute to peak demand reductions within the short planning horizon, as well as to build toward culture change and to lower energy consumption

The detailed program descriptions for Networks and Brampton are contained in Schedules A and B, respectively.

Introduction

Networks and Brampton seek a final order of the Board for approval of their CDM Plans. Networks and Brampton also seek confirmation that their respective CDM plans satisfy the Minister's condition of a financial commitment to reinvest in CDM initiatives. This submission does not include initiatives from Hydro One Remote Communities Inc. (Remotes), which is seeking approval of its CDM plan under a separate filing.

This submission reflects a joint effort between Networks and Brampton in the development of a CDM strategy with co-operative work on research, planning, communications and program support. However, each company is assessing a portfolio of CDM concepts and initiatives which is tailored to its individual customer base to the extent possible. Accordingly, this submission is structured with a set of high-level planning assumptions and considerations in the choice of strategy and programs common to both companies, while Networks' and Brampton's separate portfolios of programs and related expenditures are described in Schedule A and Schedule B, respectively.

Upon the Board's approval of these plans, Networks and Brampton would release work for competitive tender and/or negotiation with product suppliers, delivery channel members, or experts in the field of conservation, efficiency, and demand management as required. The Company has initiated a Request For Qualification during the period June to December 2004 and has assembled a roster of potential collaborators.

Planning Assumptions

Board approval of these plans would enable a total of approximately $42.7 million to fund CDM programs, split between Networks and Brampton as follows.

Networks anticipates CDM funding in the amount of $39.5 million from the next installments of the Market Adjusted Rate of Return (MARR), not including any further adjustment for Payments In Lieu of taxes (PILS).

Brampton has developed a CDM plan whose spending equates with a revenue increase of $3.2 million (which is the MARR increase exclusive of any PILs adjustment).

These spending commitments are a precondition to the Board's approval of applications for rate changes for both Networks and for Brampton. In their applications for March 2005 rate adjustments, both Networks and Brampton will seek an increase in rates for the third stage of MARR and for related PILs. We anticipate that the Board, when authorizing the March 2005 rate increase, will also approve an increase in revenue requirement for PILs.

While the Board has directed that expenditures related to this initial MARR funding be completed by the end of September, 2007, we anticipate that some portion of this funding may be needed through to the end of the year or possibly into 2008.

Our two companies are proposing to follow a pilot project approach to confirm the costs and benefits before full scale programs are initiated. Further, specific criteria which Networks and Brampton are using in their decision-making are identified in the Strategy sections of Schedules A and B.

It is expected that the Conservation Bureau (of the soon to be established Ontario Power Authority) or the Board will develop reliable cost-benefit tests and inputs. These will be incorporated in the updated Distribution Rate Handbook and their use will assist Networks, Brampton and other LDCs in evaluating future programs funded through the 2006 rate review process.

Program Development Considerations

Provincial Goal

The Provincial Government has committed to reducing energy demand in the Province by five per cent by the year 2007. A five percent reduction of Ontario's 26,000 MW summer peak comprises 1,300 MW.

System peak demand is a key driver behind the need for new generation and transmission infrastructure. Energy costs are also highly sensitive to peak demands. We note that the Province of Ontario has in recent years trended towards summer peak rather than winter peak, mainly due to increased air-conditioning. Accordingly, Hydro One's early efforts will include pilot tests of techniques to help manage summer peak.

The following charts in Figure 2.0 below, outline the 2003 energy consumption and summer and winter peak demand for Networks' and Brampton's distribution customer bases for 2003.[1]

Figure 2.0

Networks (Actual for 2003)

Customer	Energy (GWh)		Summer Peak (MW)		Winter Peak (MW)	
Commercial	5,550	(24%)	1,211	(37%)	1,143	(26%)
Industrial	3,042	(13%)	753	(23%)	798	(18%)
Farm	2,419	(11%)	262	(8%)	500	(12%)
Residential	11,701	(52%)	1,047	(32%)	1,895	(44%)
Total	22,711		3,272		4,336	

Brampton (Actual for 2003)

Customer	Energy (GWh)		Summer Peak (MW)		Winter Peak (MW)	
Commercial	1,320	(38%)	232	(35%)	218	(40%)
Industrial	1,170	(34%)	185	(28%)	158	(29%)
Residential	951	(28%)	245	(37%)	169	(31%)
Total	3,441		662		546	

The amount of energy savings or demand reduction actually attainable will depend on a number of external factors, not the least of which are the pricing structures which the OEB has been directed to review. Changes to pricing structures are contemplated for both the commodity and for distribution charges.

Until such factors are in place, and customers have had some experience managing their load and see some savings, and some of the culture change has begun to take hold, Networks and Brampton cannot determine their capability to achieve significant targets.

Customer Energy Use Profile and Load Analysis

Using in-house end-use models and the data and information on hand, the summer and winter peak day profiles by sector and end-use were analyzed. The analysis shows which customer groups and end-uses are major contributors to the summer peaks for

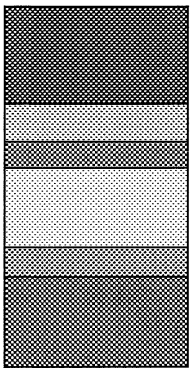
[1] Breakdown between customer sectors is based on assumptions on end-use equipment.

Networks, Brampton and Ontario in total. As noted earlier, the Province of Ontario has trended toward a greater summer peak than winter peak.

The largest components of summer peak demand for Networks and Brampton are air conditioning and lighting. We therefore, are concentrating our early conservation and demand efforts on these key areas of demand, as well as on residential water heating control which has been successfully implemented in Ontario in the past.

Figure 3.0

Networks' All Sector Summer Peak



Air Conditioning - 27%

Refrigeration - 11%

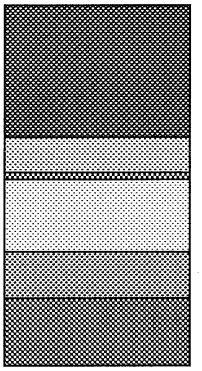
Water Heating - 7%

Lighting - 22%

Motors - 8%

Other - 25%

Provincial All Sector Summer Peak



Air Conditioning - 37%

Refrigeration - 10%

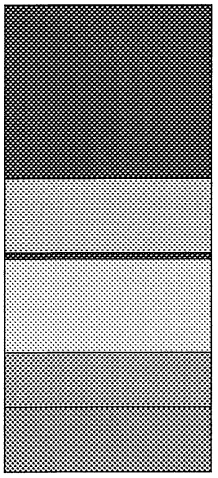
Water Heating - 2%

Lighting - 20%

Motors - 13%

Other - 19%

Brampton's All Sector Summer Peak



Air Conditioning - 37%

Refrigeration - 16%

Water Heating - 1%

Lighting - 20%

Motors -12%

Other - 14%

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Schedule A

Hydro One Networks Inc.

Conservation and Demand Management Plan

RP-2004-0203 / EB-2004-0533

January 11, 2005

Hydro One Networks Inc. ("Networks") CDM Plan

Objectives

The objectives of this plan are to:

- Contribute to the creation of a conservation culture in Ontario.
- Help consumers and businesses manage their electricity use.
- Contribute to the Province's target of reducing energy demand.
- Support community-based programs and foster co-operation with municipal local distribution companies.

Strategy

Choice of Program Concepts

In developing the plan, the following criteria are being used to assist in deciding which program concepts are likely to be most cost-beneficial and a priority for further development:

- Customer Needs – The program meets the needs of Networks' customer base.
- Benefit Allocation – Benefits arising from the planned initiatives to be distributed across Networks' customer base.
- Benefit Assurance – Potential to realize energy savings and cost of delivery.
- Leveraging Partnerships – Partnerships that will make use of economies associated with greater scale of delivery or existing delivery channels.
- Activities Support Minister's Plans - The preferred concepts or initiatives fit within the activities identified in the Minister's May 31, 2004, letter to distributors.

General Program Strategies

Networks will:

- Rely on external expertise (consultants, contractors, universities, etc.) where appropriate to assist with research, concept design and program development and delivery.
- Leverage partnerships and work with other LDCs, the EDA, Government agencies, such as Natural Resources Canada (NRCan) and the eventual Ontario Power Authority Conservation Bureau, to more efficiently leverage our efforts with those underway or planned elsewhere in the Province.
- Continue to place a high priority on a few quickly implemented pilot projects to begin assessing customer response.

The demand management and conservation work that Networks is currently undertaking or plans to undertake in 2004-2007 will include initiatives in the areas of:

- Load management (which includes metering, a time-of-use rates pilot project and load control initiatives).
- Conservation and energy efficiency (which includes a residential low-income program, a residential real-time energy monitoring pilot, farm efficiency and other mass market conservation initiatives, such as compact fluorescent lights).
- A distribution system loss reduction initiative.

- Customer communications, education and continuing program support.

Networks' CDM program overview is illustrated in Figure 4.0 below.

Figure 4.0

Initiative	**Funding ($ 000s)**
Load Management	$ 23,600
Conservation and Efficiency	11,200
Communication and Education	1,000
Program research, planning and administration	3,700
Total	$ 39,500

Load Management: Smart Metering

Target Markets
All of Networks' customers are expected to benefit from this program.

Description of the Program
Smart metering provides the ability to record consumption in time intervals that can be matched to price signals aligned to reflect the true cost of power.

The provincial targets for smart metering, established in the Minister of Energy's directive, are 800,000 smart meters by 2007 and all 4.3 million meters by 2010. This plan describes Networks' initial start-up effort to contribute to the Province's smart metering program.

The Board has established working groups, populated by stakeholder representatives to examine, among other things, prioritization of smart meter deployment in the Province. Based on the directive above, the group is recommending that LDCs install smart meters for 20% of their customer population by 2007 and for the remainder by 2010 (refer to RP-2004-0196 Smart Meter Initiative-OEB Draft Implementation Plan). The Board's recommended Smart Meter Implementation Plan is expected on February 15 2005.

The following deployment pattern is generally consistent with the Board working groups' recommendation, as it would be applied to Networks:

Figure 5.0

Full Smart Metering Deployment:	Total Customers
All demand-billed customers (>50 kW) by 2007	9500
All new customers (mid-2005 – 2007)	
• New connections	40,000
• Service Upgrades	15,000
• Measurement Canada requirements	50,000
Mass-geographic deployment (2006 – 2007)	125,500
Total Meters by 2007	**240,000**
Mass-geographic deployment (2008 - 2010)	960,000
Total Meters by 2010	**1.2 Million**

An integral piece of Networks CDM plan will be the funding of an initial deployment for 2005-06 of smart meters in the Province.

Benefits
Understanding and reacting to proper pricing is an essential component to creating a conservation culture and managing customer demand. The largest benefit of smart meters is providing customers with the ability to understand their consumption patterns and to make effective decisions on usage.

Working Assumptions
Since LDCs do not have a supply obligation or commodity price exposure, the benefits to support expenditures reside in other areas of the market.

The infrastructure investments for smart meters can also be used as a platform for other CDM and productivity initiatives (e.g. load control, automated meter reading, etc.). It is Networks'

intention to study these and other potential benefits with an aim to reduce costs or increase service for customers. The CDM plan expenditures will be directed to the minimum functionality that satisfies the Minister's directive. Approval for added functions will be presented in 2005 as proposed by the OEB working groups in their draft report.

Early indications, again from the OEB work group's draft report, are that cost recovery for smart meters will be permitted through delivery charges. The funds outlined in this CDM are only for part of the full metering deployment requirement. CDM funding will be used for the initial start-up and deployment for about the first year of the implementation plan.

Budget

The demand management funds allocated to the smart metering program would address initial startup costs and roughly the first twelve months of smart meter deployment. Since the OEB's final smart meter implementation plan has not yet been finalized, the deployment plan will not be in one calendar year. Hence the first twelve months of initial smart meter deployment will cover the later part of 2005, and the earlier part of 2006.

Figure 6.0

Customer Segment	# of Meters	OMA / Capital	2005 / 2006 $'000s
Start-up Costs		OM&A	$ 1,400
Customers > 50 kW, retrofit demand meters	1,500	Capital	$ 6,300
Customers < 50 kW, (e.g. new connections, service upgrades,)	24,000	Capital	$ 7,200
Total from CDM funding			**$ 14,900**

As noted above, the MARR funds are directed to initial start-up and first priority implementation of Networks' contribution to the Province's smart metering program. This funding is not sufficient for the full program, which anticipates meter replacements on a mass scale and which Networks estimates will require expenditures in the range of several hundred million dollars.

The budget assumes:

- No provision for ongoing OM&A, as an implementation plan has yet to be developed.
- Includes cost of new customer connections at above 200 kW but below 500kW as per OEB recommendation of March 2004 (see description page 12).

Load Management: Interval Metering Pilot

This pilot project was discussed in Networks' October 1, 2004, application for a deferral account to address the company's expenditures on demand management. It will be incorporated into the company's future smart metering program.

Target Markets
This pilot project is targeted to the approximately 130 new farm, commercial and industrial customers who will consume an average annual peak amount of electricity within the 200 to 500 kW range per month.

Description of the Program
The main objectives of this project are to respond to the OEB's March 2004, Report to the Ministry of Energy on Demand Side Management and Demand Response and to develop a better understanding of the logistics of undertaking the Minister's directive on smart metering. The report recommends lowering the Distribution System Code threshold to 200kW from 500kW for interval meter installations on new load customers. Accordingly, in May 2004, Networks began to install interval meters at the premises of new customers with demand equal to and greater than 200 kW.

Benefits
As a result of this measure, these customers can access their load profile data. This will educate customers on their energy use patterns, help them better manage their load and thus aid them in reducing their bills.

Budget
The incremental cost to install interval meters versus that for demand meters for the 130 new customers in the segments discussed above is estimated at $200,000 per year.

Incremental Cost for: $200,000

This cost has now been included in the smart metering initiative (discussed on page 11).

Load Management: Time-of-Use Rate Pilot

The OEB approved this pilot project on an interim basis, effective on November 10, 2004 and on a final basis, December 21, 2004 (RP-2004-0203/EB-2004-0461).

Target Markets
The pilot program applies to customers whose off-peak period electricity demand is substantially higher than that during the 7 a.m. to 7 p.m. peak period. The program will be offered to Networks' core General Service, Farm, and T-class customers as well as to eligible General Service and Large Use customers of acquired LDCs.

Description of the Program
This pilot program offers customers rate incentives through the application of rates that help to shift electricity demand away from periods of maximum demand and into the off-peak periods. There is no change proposed to existing rates. Instead, eligible customers would have the current volumetric charge ($/kW/month) applied to their on-peak billing demand only, rather than to their overall billing demand. Depending on the difference in demand between the two time periods, customers could realize substantial savings in their distribution bills. The on-peak period is defined as 7 a.m. to 7 p.m. weekdays excluding holidays, similar to the definition currently applied for the calculation of wholesale Transmission Network charges. The off-peak period is defined as all remaining hours. Several implementation eligibility criteria apply:

- A ratio of off-peak billing demand at least double that of on-peak billing demand.
- Sustainability of the minimum ratio of off-peak to on-peak billing demand for at least two consecutive billing periods.
- The appropriate metering, capable of recording demand by interval period, must be in place.

Customer consumption patterns will be reviewed annually to ensure that they continue to meet the eligibility criteria. All applicable pass-through charges would continue to apply.

Benefits
The number of customers who will modify their consumption patterns to take advantage of this pilot program will indicate whether Distribution charges are an impediment or a significant factor in promoting load shifting by customers. Encouraging Commercial and Industrial customers to shift their demand away from the more constrained peak period would benefit both those customers and the electricity system as a whole. The net effect is lower electricity demand during the on-peak period and lower system losses. Consequently, some reduction would be expected in the electricity commodity prices paid by all electricity customers since, in general, lower demand requires less expensive generating capacity to meet that demand.

Budget

Figure 7.0

($'000s)				
Time of Use Rate Pilot	**2004/2005**	**2006**	**2007**	**Total**
OM&A	175	150	150	475

The Board has approved an amount of $150,000 per year or $450,000 to 2007, to address revenue losses associated with the pilot project. The amount could be higher if the program is successful and more customers change their usage patterns as a result of the availability of the interim rate. In addition, the estimated costs of the proposal include one-time costs for billing, communication and monitoring costs in the range of $25,000 to $35,000.

Load Management: Residential Load Control

This pilot project was discussed in Networks' October 1, 2004, application for a deferral account to address the company's expenditures on demand management.

Target Markets
Residential customers with central air conditioning, and/or electric hot water heating, and/or pool pumps.

Description of Program
The objectives of this project are to assess residential customer response and the potential load impact of controlling central air conditioning, pool pumps and electric hot water heating during system peak periods through installations of load control units and interval meters in up to 450 homes. This represents a statistically representative sample, and includes four areas in Hydro One's service territory: Kingston area, Simcoe area, Newmarket area and Brampton (A description of Brampton's portion of the pilot project and related costs are provided in Schedule B). Participants are paid a monthly incentive for participation in the pilot project. To capture both winter and summer peaks, this project will run from July 2004 through September 2005.

Benefits
Air conditioning and water heating are significant contributors to both summer and winter peak loads on Networks' system. Accordingly, potential demand savings from load control could contribute significantly to Networks demand side management effort, if results from this pilot project indicate that expansion to a full program is warranted. Customers will experience reductions in their energy usage without a significant effect on their comfort.

Toronto Hydro is in the process of joining Hydro One's pilot program and plans to add 150 of its customers to the pilot.

Budget -- Pilot Project

Figure 8.0

ACTIVITY	COST ($'000s)
Meters, Control Devices and their Installation	980
Market and Technical Expertise	140
Customer Incentives and Other	180
Less HO Brampton cost	(80)
HO Networks	**Total 1,220**

Budget -- to 2007

Figure 9.0

($'000s)					
Residential Load Control		**2004/2005**	**2006**	**2007**	**Total**
Pilot	OM&A	1,220			1,220
Program	Capital		2,300	1,200	3,500
					Total 4,720

The budget assumes:

- Results of the pilot project are successful before the 2006 and 2007 capital budget is released for a larger-scale program.

- Ongoing customer incentive payments and program management costs for OM&A have not been included. If the pilot project proves successful and broader rollout is warranted, then these costs would be included in the 2006 cost of service application.
- Capital spending is on equipment associated with load control.
- Costs indicated above are for Networks' customers only.

Load Management: Commercial, Industrial and Farm Load Control

Target Markets
Commercial and Industrial General Service rate class customers, including the Municipal University, Schools and Hospital (MUSH) sector and Networks' larger three-phase commercial farm customers.

Program Description
In addition to the load management programs already discussed, Networks is committed to implementing a Load Control and Demand Response Pilot for its commercial and large industrial customers.

Benefits
Load control could contribute significantly to demand side management savings, especially at critical peak periods. A pilot project will be designed for this sector, the results of which will be assessed before expansion to a full program is warranted. Customers will experience voluntary reductions in their energy usage without a significant effect on their operations.

Budget

Figure 10.0

($'000s)					
Program		**2004/2005**	**2006**	**2007**	**Total**
Pilot	OM&A	420	80		500
Program	Capital		1,500	1,500	3,000
					Total 3,500

The budget assumes:
- The pilot project must demonstrate success prior to approval for capital expenditures.
- The projected capital would be spent on equipment for load control.

Conservation: Low Income Program Residential

Target Markets
Residential Networks customers who are low income. "Low income" will be defined as per government offices or programs (either federal or provincial).

Program Description
Low income customers may have a higher prevalence of electric water heating, or electric heating, and spend proportionately more of their disposable income on energy. It is also believed that the populations of rural areas are typically housed in older, more poorly-insulated homes, and are likely to have older, less efficient appliances. Low income customers have fewer means to improve the efficiency of their energy-using equipment. Therefore this group could be motivated to invest in energy efficiency improvements if assistance is provided.

Statistics Canada stated that 1,378,000 residents or 11.7% of Ontario residents were living at or below the low income cut-off (2001). For all Ontario households, the lowest income quintile spent nearly 5.2% of their income on electricity, while the highest income spent 0.9% of their income on electricity. Networks' early research indicated the following:

Figure 11.0 Average Per Capita Income Level

Census Year	Ontario	% Growth Ontario year over year	Networks'	% Growth Networks Year over Year
1999	27,906	5.6	24,199	1.13
2000	29,701	8.0	25,392	0.67
2001	30,268	3.6	25,991	0.49
2002	30,884	3.5	26,876	0.33

The difference in the per capita income level between the general Ontario population and Networks' customer population suggests that the incentive (subsidies) and program costs may need to be higher than those of other local utilities to be effective.

Networks is currently in discussions with potential delivery channel partners from community based organizations, non-government organizations, federal government programs, and the private sector, to determine the content of the CDM program. Assuming Board approval, Networks would enter into negotiations with one of the above delivery agents.

Benefits
The benefits include improved energy efficiency and decreased consumption.

Budget
The Provincial Government has set aside $2 million to address the low income sector. Networks has allocated annual funding of $1.5 million over the three year period ($4.5 million in total).

Figure 12.0

($'000s)				
Low Income Program	**2005**	**2006**	**2007**	**Total**
OM&A	1,500	1,500	1,500	4,500

This budget will be directed to high priority energy savings programs. It will not be used for utility security deposits.

Conservation: Residential Real-Time Monitoring

This pilot project was discussed in Networks' October 1, 2004, application for a deferral account to address the company's expenditures on demand management.

Target Markets
Residential customers with electro-mechanical meters on the exterior of their home.

Description of Program
The major objectives of this project are to assess residential customer behaviour and quantify potential energy savings arising from the provision of real-time usage data. The real-time monitor is an in-home display device that receives a wireless signal from a sensor placed on the exterior electricity meter. About 500 homes in different areas of the Province have been provided with real-time energy usage monitors and feedback devices to record their usage from July, 2004, to August, 2005, thus capturing both winter and summer system peak periods. The pilot project will test the assumption that when provided with actual real time usage data, customers will change their behaviour to reduce electricity consumption. The program will also test a customer's willingness to use such technology and monitoring devices.

Benefits
Customers will be able to track their energy consumption in kilowatt-hours and their estimated monthly electricity costs, as well as to experience the benefits of behaviour changes and of implementing energy efficiency measures. Results from this pilot project will help Networks assess the potential change in customer behaviour and the energy reduction which can be attributed to the availability of this device and the benefits of expansion to a full program.

London Hydro has joined Networks' pilot project and is adding 70 of its customers.

Budget -- Pilot Project
The total cost for the pilot project during 2004-2005 is $465,000, less $40,000 for Brampton's cost, or $425,000 for Networks.

Budget -- to 2007

Figure 13.0

($'000s)				
Residential Real Time Monitoring	**2004/2005**	**2006**	**2007**	**Total**
Pilot OM&A	425			
Program OM&A		700	700	1,825

If the 2004-2005 pilot project is successful, and customers change their behavior, the estimated budget for 2006 and 2007 is based on the assumption that Networks will provide customers with a financial rebate when they purchase a real time monitor.

The costs indicated above are for Networks' customers only.

Conservation: Farm Energy Efficiency

This pilot project was discussed in Networks' October 1, 2004, application for a deferral account to address the company's expenditures on demand management.

Target Markets
This program applies to all of Networks' 92,000 farm customers.

Description of the Program
Networks has identified its farm customers as an important customer sector in which to test the applicability of certain initiatives aimed at reducing electricity demand or consumption. Networks high number of agriculture customers is unique in comparison to the customer bases of the municipally-owned LDCs. Given Networks' large geographic service territory, delivery channels are a significant challenge. Hence, a prudent approach to cost mitigation is to leverage existing delivery channels in either the government, not-for-profit, and/or private sectors. Networks plans to invest in three programs.

- *Compact Fluorescent Light Bulbs (CFLs) Pilot*

  Networks plans to introduce a pilot program that will leverage existing delivery channels to create awareness and acceptance of CFLs. Up to 5,000 farm customers will receive incentives to purchase CFLs, which have been determined to help reduce energy consumption and reduce costs. The on-site nature of the program will help to encourage higher participation rates.

- *Energy Audit Pilot*

  Networks, in partnership with the Ontario Ministry of Energy, the Ontario Ministry of Agriculture and Food and the Ontario Federation of Agriculture will participate in the delivery of an on-farm energy audit program. This program will include a combination of information materials, delivery of audits and incentive programs that will help to reduce energy consumption, primarily on livestock farms.

  The audit initiative will help farm customers determine areas (such as heating, ventilation, insulation and lighting, among others) where energy efficiency can be improved. The provision of incentives will help customers to improve the energy efficiency of their businesses.

  Networks will contribute both "in kind" support and financial support to this initiative.

- *TVO Information Segments*

  Networks also plans to invest in the production of information segments to be aired on TV Ontario. These segments will be aimed at helping farm customers improve their farms' energy efficiency.

Benefits
The programs will help to reduce energy consumption, reduce costs and promote a culture of conservation.

Budget

Figure 14.0

($'000s)					
Program		**2004/2005**	**2006**	**2007**	**Total**
CFL Program	OM&A	200	200	200	600
Energy Audit	OM&A	25	25	25	75
TVO Programs	OM&A	25	25	25	75
					Total 750

Conservation: Distribution Network Loss Reduction Program

Target Markets
All of Networks' customers will benefit from this program.

Discussion of the Program
Management of system losses is an on-going consideration in the planning, design, operation, purchase, upgrading and replacement of Networks' distribution facilities and equipment. Nonetheless, Networks believes that there is an opportunity to achieve incremental economic reductions in distribution system delivery losses through targeted investment.

The Distribution Network Loss Reduction Program involves identifying and implementing projects in three specific areas where incremental investments will result in an overall economic benefit to customers by reducing system delivery losses. The three areas in which opportunities for such projects will be investigated are:

- *Power Factor Correction*

  Feeder power factors in the distribution network are typically in the range of 0.85 to 0.95, depending on time of year, mix of customers, and customer usage patterns. Loss reductions in the order of 10 to 25% are theoretically achievable through power factor correction. Power factor correction is achieved through application of shunt capacitor banks on distribution feeders. Targeting feeders with the known poorest power factors will generate the highest contributions to loss reduction DSM.

- *Feeder Phase Balancing/System Configuration*

  The distribution network consists of approximately 400 "sub-transmission feeders" and 2700 "distribution" feeders. Preliminary studies indicate that, on average overall feeder loss savings in the order of 10 to 15% could be achieved through measures such as balancing phases and optimizing open point locations between feeders. Directing incremental funding toward these areas could result in overall economic benefits to customers.

- *Leveraging System Reinforcement Investments*

  Networks currently has an existing capital program for reinforcing its distribution network in response to load growth, for new customer connections, and for risk mitigation and reliability improvement. We generally assess programs based on technical and financial considerations using a least-cost planning approach. We will be amending our investment planning criteria to more explicitly identify and evaluate opportunities to reduce losses through plan modifications.

Investment opportunities will be prioritized and implemented, based on the most beneficial investment- to-loss reduction ratios.

Benefits
Lowering distribution system delivery losses will reduce overall system demand and provide additional network capacity for growth. Since system delivery losses are currently passed onto all customers, improvements in this area will benefit all customers.

Budget

Figure 15.0

($'000s)				
Distribution Network Loss Reduction	**2004/2005**	**2006**	**2007**	**Total**
Capital		1,000	1,000	2,000
				Total 2,000

Conservation: Mass Market (Residential and Small Commercial) Programs

Target Markets
These programs apply to Small Industrial and Commercial customers (including the Municipal, University, School, and Hospital segments), as well as to Residential customers.

Program Description- Small Commercial and Industrial
There are several other conservation initiatives that Networks is investigating. Programs designed to target small Commercial and Industrial customers include a Customer Efficiency Needs Analysis/Audit Program. This may be web-based or by analysis of customer premise.

Program Description- Residential
Programs that will target Residential Customers include a Compact Fluorescent Lighting (CFL) Program and an LED Holiday Light Exchange Program. Networks also plans to offer a self-administered Energy Analysis/Audit Program, likely to be "do-it-yourself" or web-based. Networks is also investigating the potential of an Air Conditioning Exchange Pilot Program. Any exchange programs would need assistance from the community.

Benefits
Compact fluorescent lights use one-quarter of the energy of a standard incandescent lamp. This fact makes their total impact on Networks' distribution system, measurable. LED lights also use substantially less energy. A reduction in demand and energy consumption due to the removal of inefficient incandescent lamps is a major benefit. Also, the benefits are sustained, as a CFL lasts up to 10,000 hours, or 10 times longer than an incandescent lamp.

Energy audit or analysis programs can help customers identify opportunities to change their behaviour and/or pursue or leverage government-sponsored programs to invest in more efficient equipment. (There are many federally-sponsored programs through the Office of Energy Efficiency and Natural Resources Canada.) Increased customer awareness of efficiency options can contribute to overall cultural change.

Budget
The total budget, to 2007, allocated to cover these initiatives is $2,160,000.

Figure 16.0

($'000s)		
Program		**Total**
CFL	OM&A	1,500
LED	OM&A	430
Energy Audits/Analysis	OM&A	230
		Total 2,160

Communication and Education

This pilot project was discussed in Networks' October 1, 2004, application for a deferral account to address the company's expenditures on demand management.

Target Markets
This initiative is generally targeted to the mass market – primarily Networks' residential and small business customers.

Program Description
Networks has initiated the development of an integrated energy conservation campaign based on its POWERSAVER brand. The objective is to raise the awareness and understanding of customers, so that they will voluntarily adopt a new attitude to energy conservation. Given the diversity of Networks' customer base, a variety of approaches have been developed, from the very basic to the more complex. The campaign builds on Networks' relationship with customers, leverages existing channels (such as the electricity bill and web site) and government programs, and builds new relationships with industry allies, non-profit organizations and school boards.

During 2004, a variety of activities encompassed:

- The development and distribution of brochures and bill stuffers, such as:
  - Brochures providing energy-saving tips for homeowners were developed for use at trade shows, community events and by government and other organizations.
  - As part of Natural Resources Canada's national "Switch and Save" campaign, Networks' mass market customers received bill inserts which promoted EnergyStar CFLs.
- Sponsorship of and participation in community-based events, trade shows and conferences such as "The Art of Being Green Energy Show" in Lanark in July, 2004 and the Annual Association of Municipalities of Ontario 2004 Conference.

During 2005 through 2007, the existing channels will continue to be used and refined. Networks' web site will be strengthened with new information, links to relevant DSM web sites, and an enhanced electricity calculator for homeowner use. Networks' quarterly customer newsletter, *Staying Connected*, also will regularly feature energy conservation stories.

Communications initiatives will also be developed to complement Networks' other mass market programs such as the CFL program, energy audits and school-based initiatives.

Benefits
Networks' communication efforts will complement its other programs, create greater awareness of the issue and thereby contribute to the Province's shift toward an energy-conserving society.

Budget

Figure 17.0

($'000s)				
Education & Communication	**2004**	**2005**	**2006/2007**	**Total**
OM&A	300	700	0	1,000

The budget assumes that as other agencies such as the Conservation Bureau begin to play a larger role in energy education, Networks would adjust the nature or scale of its communications.

Program Management and Research

Costs are included below for a team to monitor the effectiveness of pilot projects, manage and report related costs, adjust the variable elements of the plan, manage vendors and contracts and oversee and report on the delivery of individual programs. This group will be responsible for ensuring that costs are controlled within budgets, and that cost tracking methods are in place.

Networks also recognizes the need to update our understanding of the electricity market to improve our program design and delivery capability. In April 2004, to better understand our customers' attitudes towards energy management and their level of interest in various DSM initiatives, a telephone survey of 500 customers was conducted. Customers were asked about factors that motivate them to conserve electricity, who was best to deliver programs and what types of programs would they be willing to participate in. This information has provided valuable information for program design.

We will continue such research and planning efforts in the future including:

- Further analyzing residential load data and gathering more detailed information on aspects of the residential sector such as homeowners' buying behaviour, residential energy and appliance usage. This will help Networks to better design and target effective residential programs (e.g. potential market penetration rates).
- Conducting an equipment and opinion survey of our commercial and industrial customers in early 2005. This will provide segmentation data to be used in finalizing the design of the load management pilot program planned to begin in 2005, as discussed previously, and will aid in the development of other initiatives.
- Surveying other utilities and jurisdictions to identify key success factors and business issues in the provision of CDM programs to the marketplace.
- Identifying key channel members in the marketplace – a research-based initiative which will focus on determining the existence of channel members who may effectively deliver Networks' CDM initiatives to customers.
- Continuing with strategy and portfolio development – a key component of Networks' research and planning initiatives, which will build upon the above research. The purpose of the strategy is to identify opportunities, to make recommendations for achieving Networks' strategic goals and to provide a match between our internal capabilities and external environment.

Budget

Figure 18.0

($'000s)				
Program Management & Research	**2004/2005**	**2006**	**2007**	**Total**
OM&A	1,500	1,200	1,000	3,700

- Assumes incremental costs; cost of existing internal resources have not been included.

A Summary of Program Expenditures

Two charts summarizing Networks' planned CDM expenditures are provided below, as follows:

- Figure 19.0 – the plan and proposed expenditures grouped by customer sector and year.
- Figure 20.0 – a breakdown of capital and operating expenditures by program and year.

Figure 19.0
Program Budget and Expenditures Detail 2004-2007

	Expenditures ($M)				
	Total		2004-2005	2006	2007
	($M)	%			
RESIDENTIAL					
• Smart Meters CDM	7.2		3.2	4.0	
• Load Management	4.7		1.2	2.3	1.2
• Conservation	8.3		3.9	2.2	2.2
Residential Total	***20.2***	***51%***	***8.3***	***8.5***	***3.4***
BUSINESS					
• Smart Meters CDM	6.3		3.2	3.1	1.6
• Load Management	4.0		.6	1.8	0.2
• Conservation	0.9		0.4	0.3	
Business Total	***11.2***	***28%***	***4.2***	***5.2***	***1.8***
ALL CUSTOMERS					
• Smart Meters PMO	1.4		1.4		
• Distribution Network Loss Reduction	2.0			1.0	1.0
• Communications/ Education	1.0		1.0		
• Program Management & Research	3.7		1.5	1.2	1.0
Total All Customers	***8.1***	***21%***	***3.9***	***2.2***	***2.0***
GRAND TOTAL	**39.5**		**16.4**	**15.9**	**7.2**

Figure 20.0
Proposed Budget and Timeline Summary
CDM Plan Expenditures ($000's)

PROGRAM	2004/2005		2006		2007		2004-07
$ 000s	CAPEX	OPEX	CAPEX	OPEX	CAPEX	OPEX	TOTAL
Smart Metering	6,400	1,400	7,100				14,900
Interim Time-of-Use Rate Pilot		175		150		150	475
Residential Load Control		1,220	2,300		1,200		4,720
C-I-F Load Control		420	1,500	80	1,500		3,500
Low Income Program Residential		1,500		1,500		1,500	4,500
Residential Real-Time Monitoring		425	700		700		1,825
Farm Energy Efficiency		250		250		250	750
Distribution Loss Reduction			1,000		1,000		2,000
CFL		1,500					1,500
LED		430					430
Energy Audits/Analysis		150		50		30	230
Communication and Education		1,000					1,000
Program Management and Research		1,500		1,200		1,000	3,700
Total	**6,400**	**9,970**	**12,600**	**3,230**	**4,400**	**2,930**	**39,530**

Hydro One Networks Inc.
8th Floor, South Tower
483 Bay Street
Toronto, Ontario M5G 2P5
www.HydroOne.com

Tel: (416) 345-5888
Fax: (416) 345-5870
Cell: (416) 704-3933
andy.poray@HydroOne.com

Andy Poray
Acting Chief Regulatory Officer
Regulatory Affairs

hydro one

EB-2005-0198

OEB BOARD SECRETARY	
File No:	SubFile:
Panel	GK-CS
Licensing	ZC-SM-MB
Other	AF
00/04	

BY FAX AND COURIER

July 8, 2005

JZ 7/11

Mr. John Zych
Secretary
Ontario Energy Board
Suite 2601, 2300 Yonge Street
P.O. Box 2319
Toronto, ON.
M4P 1E4

Dear Mr. Zych:

RP-2004-0203/EB-2005-0198 Hydro One Networks Inc.'s Conservation and Demand Management Plan: Revised Plan (With Re-allocated Smart Metering Funds)

The Board's Decision and Order issued March 17, 2005 directed Hydro One Networks to re-allocate $7.1 million from its smart metering budget to other CDM programs and re-file its plan for this amount by June 30, 2005. Networks indicated on June 29, that an extension of about a week would be needed for this submission.

Ten hard copies of the Company's plan are now attached and an electronic copy in Word format will be e-mailed.

Questions may continue to be addressed to Carolyn Russell (Senior Advisor, Regulatory Affairs), who may be reached by phone (416) 345-5914, fax (416) 345-5866, or e-mail: carolyn.russell@HydroOne.com. Her address is Hydro One Networks Inc., 483 Bay Street, South Tower, 8th Floor, Toronto, Ontario M5G 2P5.

Yours truly,

Andy Poray

cc. Mr. A. Fogwill, Applications Director, Market Operations

HYDRO ONE NETWORKS INC.

PLAN FOR RE-ALLOCATION OF SMART METERING FUNDS

RP-2004-0203/EB-2005-0198

SUBMISSION TO THE ONTARIO ENERGY BOARD
JULY 8, 2005

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EXECUTIVE SUMMARY

Purpose of Submission

In accordance with the Board's March 17, 2005 Decision and Order to replace the planned smart metering work in 2006 with other projects, Networks submits this revised plan for alternative conservation and demand management ("CDM") projects with related expenditures of $7.1 million. Figure 1.0 below shows Networks' re-allocation of the smart metering funding:

Figure 1.0
Networks' Allocation of Smart Metering Funding

	Net Change ($M)
Conservation	
• Residential – Low Income and Social Housing	0.5
• Business, Farms, "MUSH"	0.6
• Distribution Networks Loss Reduction	6.0
Total	7.1

Figure 2.0 below compares Networks' plan and expenditures as submitted on January 11, 2005, with that including the re-allocated funds, as now designed. Changed items are noted in bold font.

Figure 2.0

January, 2005 Plan		**June, 2005 Plan**	
Load Management	***$M***	***Load Management***	***$M***
• Smart Metering (partial)	14.9	• **Smart Metering**	**7.8**
• TOU Rates Pilot	0.5	• TOU Rates Pilot	0.5
• Residential Load Control	4.7	• Residential Load Control	4.7
• C&I and Farm Load Control	3.5	C&I and Farm Load Control	3.5
Sub-total	23.6	***Sub-total***	**16.5**
Conservation		***Conservation***	
• Low Income Program	4.5	• **Low Income & Social Housing**	**5.0**
• Residential Real-Time Monitoring	1.8	• Residential Real-Time Monitoring	1.8
• Farm Efficiency	0.8	• Farm Efficiency	0.8
• Distribution Loss Reduction	2.0	• **Distribution Loss Reduction**	**8.0**
• Mass Market Programs	2.1	• Mass Market Programs	2.1
		• **Business, Farms, "MUSH"**	**0.6**
Sub-total	11.2	***Sub-total***	**18.3**
Communication/ Education	1.0	***Communication/ Education***	1.0
Program Management and Research	3.7	***Program Management and Research***	3.7
Total	**39.5**	**Total**	**39.5**

Networks believes that these alternative projects continue to contribute to a balanced and prudent CDM portfolio. The Board's Decision had recommended "that Networks give greater consideration to social housing and the particular issues raised in the submission

by Vulnerable Energy Consumers Coalition (VECC)." Networks acknowledges VECC's concerns regarding the need for complementary approaches to energy efficiency programs for the low income and social housing market. In response, the Company submits that its enhanced low income energy efficiency project, which now includes a portion dedicated to social housing, should address these concerns. Networks continues to broaden its market coverage with new energy efficiency initiatives planned for municipal, business and farm customers. Also, as part of its investigation for re-allocating the $7.1 million in 2006 costs for smart metering, Networks engaged an external expert to assess the degree of potential for loss improvements in the distribution system. The resulting study found that there were significant opportunities for reducing distribution system losses through a combination of programs related to power factor correction and phase balancing of loads. Networks submits that this additional allocation of funds to loss reductions is a prudent investment which benefits all customers.

1.0 Introduction

On January 11, 2005, Networks submitted its plan for conservation and demand management covering the period 2005 through 2007. On February 18, 2005, the Board issued an Oral Decision followed by a written Decision and Order on March 17, 2005. This Order approved Networks' CDM plan on the condition that Networks re-allocate the $7.1 million planned for smart meters in 2006 to other projects. This set of projects accordingly addresses the Board's February 18th Order.

2.0 Program Development Considerations

The Board also directed Networks to give greater consideration to programs for social housing and to VECC's concerns for this area. Networks has complied with this direction.

Networks believes that its criteria for program choice, as provided in the January plan, are sound. The Company will continue with the pilot project approach. It is also still anticipated that some portion of this overall expenditure related to the third tranche of MARR will be carried to the end of 2007, if not into early 2008.

Figure 3 below, compares the general funding allocation between load management and conservation and other measures between the two plans:

Figure 3.0

January 2005 Plan		**June 2005 Plan**	
Initiative	**Funding ($ 000s)**	**Initiative**	**Funding ($ 000s)**
Load Management	$ 23,600	Load Management	16,500
Conservation and Efficiency	11,200	Conservation and Efficiency	18,300
Communication and Education	1,000	Communication and Education	1,000
Program research, planning and administration	3,700	Program research, planning and administration	3,700
Total	$ 39,500	Total	39,500

3.0 A Description of the New and Enhanced Projects

The following lays out the new projects and project enhancements within Networks' revised portfolio of CDM measures.

3.1 Conservation – Residential: Low Income and Social Housing[1]

Target Markets
Social housing buildings in Networks' service territory.

Description of the Social Housing Portion
Networks will enhance its Low Income Program by leveraging the existing Social Housing Services Corporation (SHSC) Energy Management Pilot, which includes about 40 social housing providers. Three of these providers are in Networks service territory and contain 750 social housing units. The buildings for the pilot program were chosen by SHSC.

The SHSC Energy Management Pilot is a comprehensive program designed to improve the energy efficiency of social housing units in Ontario. Participants in the pilot will have an on-site energy audit conducted and will be able to view their results via a web-based energy audit program. The individual social housing buildings will then design an implementation plan based on their audit results and once approved by their municipalities will present this plan to the SHSC.

The SHSC will then develop a plan for the properties to fund the retrofits targeting 50% public contributions and 50% private contributions. The public contributions will leverage existing funds available through a variety of programs, the Networks grant to be included amongst the available options for those participants who are Networks customers. The Networks grant will be conditional upon the use of good practices for reducing electricity consumption and/or demand and the securement of additional public funds from other sources. The private contributions will consist of low-interest loans. An energy audit will be conducted upon completion of the retrofits to determine kWh or kW savings.

Benefits
The benefits that will be derived from this program include energy conservation through efficiency improvements.

Budget
This will come from both public and private funds. The table below shows both the funding for the previously approved program and the new increment addressing the social housing aspect.

Figure 4.0

(OM&A $'000s)				
	2005	**2006**	**2007**	**Total**
(Previously Approved) Low Income Program	1,500	1,500	1,500	4,500
(New) Social Housing Pilot	500	0	0	500
Low Income & Social Housing Program New Total	2,000	1,500	1,500	5,000

[1] The program description addresses only the Social Housing portion of the overall program.

3.2 Conservation – Business, Farms, "MUSH" (Municipalities, Universities, Schools, Hospitals)

Target Markets
Commercial, industrial, farm and "MUSH" customers in Networks' service territory.

Program Description
Networks serves several thousand commercial and industrial (C&I) distribution customers, about 90,000 farm customers and over 300 municipalities.

For the commercial and municipal sector, Networks intends to leverage NRCan's Energy Innovators Initiative (EII) program. Specifically EII energy retrofit assistance is available for "commercial businesses that own, manage, or lease buildings in sectors such as retail, hospitality, office and multi-unit residential".

Upon the Board's approval of CDM funding for this sector, Networks would develop a structured program offering for commercial customers in its service territory. The intent is to leverage the existing NRCan EII program which provides $7.50 per gigajoule saved, up to 25% of project costs. Networks has had discussions with EII program managers regarding options for best leveraging available funds. For example, converting the dollars per GJ incentive to the appropriate amount per kWh, or, sharing a portion of the retrofit project costs are options which are being discussed.

Unfortunately, the NRCan EII program does not cover industrial customers or farm customers. It is Network's intent to offer the same amount of $ / kWh as is determined above for commercial customers, to its industrial and farm customers.

NRCan Energy Innovators Initiative (EII) program has expanded its scope to include municipal assets and hospitals. Specifically EII energy retrofit assistance is available for "public institutions that own, manage, or lease buildings in sectors such as education, health care, non-profit, provincial/territorial governments and municipalities".

A target segment within the "MUSH" group is Hospitals (Networks' service territory comprises 2,000 beds – approximately 6% of the total in Ontario). The hospital segment has been under constrained funding for the last decade, and review of their electricity consumption and investment in energy reducing technologies or processes has not been a priority. One of Networks' hospital customers has requested our financial assistance with implementing recommendations arising from an energy audit underway. Subject to the Board's approval, Networks has agreed to review their proposal for energy efficiency savings to discuss funding. Networks has also begun approaching other larger hospitals in its service territory (Owen Sound, Huntsville, Timmins, Perth and Smith Falls, Brockville, Trenton / Quinte, and Lindsay) to gauge their interest in making energy savings a priority. Again, the existing NRCan EII program, which has been extended to include municipal assets, would be leveraged.

A second "MUSH" group comprises about 200 ice rinks within Networks' service territory – the majority of which are between 30 and 40 years old and many, requiring upgrades. Generally there are energy savings possible in four primary areas of ice rink operations -- heat recovery, updating/replacing refrigeration technology, ceiling insulation, and lighting.

Networks is developing a pilot project focused on two demonstration projects in collaboration with the Federal Government (NRCan), a web-site to disseminate information and links to program partners and possible funding for feasibility studies. Networks is working with NRCan to explore the joint funding of both feasibility studies and implementation costs of energy efficient technologies.

Benefits
The benefits that will be derived from this program include energy conservation through efficiency improvements.

Budget

Figure 5.0

($'000s)				
Commercial, Industrial, Farm, MUSH Energy Efficiency	**2005**	**2006**	**2007**	**Total**
OM&A	300	300	0	600

The budget assumes that the existing NRCan Refrigeration Action Plan for Buildings and the NRCan EII processes and funding can be leveraged.

3.3 Conservation: Distribution Network Loss Reduction Program

Target Markets
All of Networks' customers will benefit from the distribution loss reduction program in terms of lower loss costs.

Background
Management of system losses is an on-going consideration in the planning, design, operation, purchase, upgrading and replacement of Networks' distribution facilities and equipment. Nonetheless, Networks believes that there are opportunities to achieve incremental economic reductions in distribution system delivery losses through targeted investment programs. These opportunities arise as the system evolves and actual load growth and/or load distribution deviates from original planning assumptions. The level of Networks' investment in loss reduction is representative of the scale and age profile of the Company's system.

Studies of Networks' distribution system have indicated that there are several methods that can be practically and economically applied to reduce distribution losses. These include:

- Power factor correction using shunt capacitors.
- Balancing of load on phases.
- Re-conductoring lines which presently have under-sized conductors.
- Installing properly sized high-efficiency transformers.

Program Description

Networks engaged an external expert to assess the degree of potential for loss improvements in its distribution system. The resulting study determined that there would be significant opportunities to reduce such losses through a combination of programs. Those identified as the most cost effective were power factor correction and phase balancing of loads, with a potential total cost of over $12 million. Networks plans to implement a mix of power factor correction and phase balancing, over the 2006–2007 period, with expenditures totaling $8 million (comprising the $2 million of previously approved funding and $6 million from a re-allocation of smart metering funding). This is believed to be the upper limit of economic spending which could be accommodated by Networks' resources within the planned period.

The two major areas offering the best economic opportunities are described below:

- ***Power Factor Correction using Shunt Capacitors***
  Feeder power factors in the Networks distribution network are typically in the range of 0.85 to 0.95, depending on time of year, mix of customers, and customer usage patterns. Power factor correction can be achieved through application of shunt capacitor banks. Capacitors reduce feeder losses by providing reactive power compensation near the load, thereby reducing the current flow in the line. The challenge in capacitor application involves the determination of the location, size, number and type of capacitors to be placed in the system. Fixed and/or switched capacitors can be used in the system. Fixed shunt capacitors provide constant reactive power compensation and are suitable for loads having approximately constant reactive power requirements. Switched shunt capacitors are used in cases of load variability since they allow more flexibility in controlling the losses and voltage drop.

  Networks will apply shunt capacitor banks to feeders, targeting those with the known poorest power factors, which will generate the highest contributions to loss reduction conservation. (Additional loss reduction could be achieved with the installation of switched capacitor banks which would match the connected kVAR to the variations in the load. Since this loss reduction method would require a substantial increase in costs, however, it will require further investigation in future.)

- ***Feeder Phase Balancing/System Configuration***
  The distribution network consists of approximately 400 "sub-transmission feeders" and 2700 "distribution" feeders. A considerable part of Networks' distribution system consists of single-phase residential loads, making the power flow in three-phase main feeders difficult to balance. The total $I^2 R$ loss in the three phases of an unbalanced

system is higher than that of a balanced system, and therefore, a concerted effort to balance phases, can result in loss reduction. Phase imbalance is often expressed as the maximum phase current minus the average of the phase currents divided by the average of the phase currents. At the present time phase imbalances at the distribution stations on the worst third of Networks' feeders are in a range of 30% to 100 %, indicating considerable room for improvement.

Networks' phase balancing program would target the worst of Networks' distribution feeders in a 2-year period (2006 – 2007).

Re-sizing of heavily loaded conductors and distribution transformers were also examined, as these options can reduce system losses in these areas. However, these are not as cost-effective to pursue at this time and would require further reviews to determine the potential candidates.

Benefits

Lowering distribution system delivery losses will reduce overall system demand and provide additional network capacity for growth. Since system delivery losses are currently passed onto all customers, improvements in this area will benefit all customers.

Budget

Figure 6.0

($'000s)				
Distribution Network Loss Reduction	**2004/2005**	**2006**	**2007**	**Total**
PF Correction Capacitors		1,600	5,000	6,600
Phase balancing		500	900	1,400
Re-conductoring		0	0	0
Transformer Size and Efficiency		0	0	0
Total		2,100	5,900	8,000

4.0 A Summary of Program Expenditures

Two charts summarizing Networks' revised CDM expenditures are provided as follows:

- Figure 7.0 – a breakdown of capital and operating expenditures by program and year.
- Figure 8.0 – the plan and proposed expenditures grouped by customer sector by year.

Figure 7.0

PROGRAM	2004/2005		2006		2007		2004-07
	CAPEX	OPEX	CAPEX	OPEX	CAPEX	OPEX	TOTAL
Smart Metering	**6,400**	**1,400**					**7,800**
Interim Time-of-Use Rate Pilot		175		150		150	475
Residential Load Control		1,220	2,300		1,200		4,720
C-I-F Load Control		420	1,500	80	1,500		3,500
Residential Low Income & Social Housing Program		**2,000**		**1,500**		**1,500**	**5,000**
Residential Real-Time Monitoring		425		700		700	1,825
Farm Energy Efficiency		250		250		250	750
Distribution Loss Reduction			**2,100**		**5,900**		**8,000**
Mass Market							
- CFL		1,500					1,500
- LED		430					430
- Energy Audits/Analysis		150		50		30	230
Commercial, Industrial, Farms		**280**		**320**			**600**
Communication and Education		1,000					1,000
Program Management and Research		1,500		1,200		1,000	3,700
Total	**6,400**	**10,750**	**5,900**	**4,250**	**8,600**	**3,630**	**39,530**

Figure 8.0
A Comparison of the January and June, 2005 Program Budgets and Expenditures 2004-2007

	January, 2005 Plan Expenditures ($M)[2]					June, 2005 Plan Expenditures ($M)[2]				
	Total		2004-2005	2006	2007	Total		2004-2005	2006	2007
	($M)	%				($M)	%[3]			
RESIDENTIAL										
• Smart Meters CDM	7.2		3.2	4.0	0	3.2		3.2	0	0
• Load Management	4.7		1.2	2.3	1.2	4.7		1.2	2.3	1.2
• Conservation	8.3		3.9	2.2	2.2	8.8		4.4	2.2	2.2
Residential Total	***20.2***	***51%***	***8.3***	***8.5***	***3.4***	***16.7***	***42%***	***8.6***	***4.5***	***3.4***
BUSINESS										
• Smart Meters CDM	6.3		3.2	3.1	0	3.2		3.2	0	0
• Load Management	4.0		.6	1.8	1.6	4.0		0.6	1.8	1.6
• Conservation	0.9		0.4	0.3	0.2	1.5		0.7	0.6	0.2
Business Total	***11.2***	***28%***	***4.2***	***5.2***	***1.8***	***8.7***	***22%***	***4.5***	***2.4***	***1.8***
ALL CUSTOMERS										
• Smart Meters PMO	1.4		1.4	0	0	1.4		1.4	0	0
• Distribution Network Loss Reduction	2.0			1.0	1.0	8.0		0	2.1	5.9
• Communications/ Education	1.0		1.0			1.0		1.0	0	0
• Program Management & Research	3.7		1.5	1.2	1.0	3.7		1.5	1.2	1.0
Total All Customers	***8.1***	***21%***	***3.9***	***2.2***	***2.0***	***14.1***	***36%***	***3.9***	***3.3***	***6.9***
GRAND TOTAL	**39.5**		**16.4**	**15.9**	**7.2**	**39.5**	**100%**	**17.2**	**10.2**	**12.1**

[2] Numbers may not add due to rounding.
[3] Percentage of the total $39.5 million.