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**Middlesex  
Power  
Distribution  
Corporation**

EB-2005-0197

January 11, 2005

John Zych, Board Secretary  
Ontario Energy Board  
PO Box 2319  
2300 Yonge St, 26<sup>th</sup> Floor  
Toronto ON M4P 1E4

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OEB BOARD SECRETARY	
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**Re: RP-2004-0203  
Conservation and Demand Management Application**

Middlesex Power Distribution Corporation (MPDC) is filing their Conservation and Demand Management (CDM) plan with the Ontario Energy Board.

MPDC is filing the plan in order to obtain a final rate order from the OEB.

MPDC is also requesting confirmation from the OEB that;

- 1) the CDM plan meets the objectives of the Minister of Energy
- 2) if minor changes or variations to the plan are undertaken that the whole plan is not invalidated
- 3) any costs for this application and possible hearing should be included in the costs for the CDM plan

If you have questions or concerns, please do not hesitate to contact me at (519) 352-6300, extension 277.

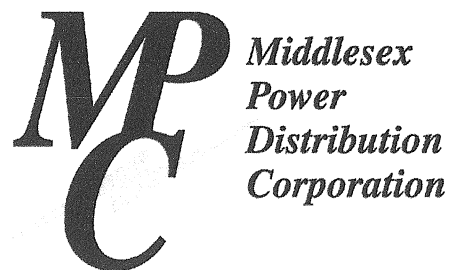
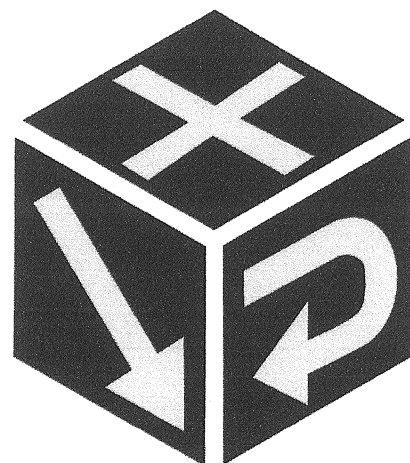
Yours truly,

Jim Hogan, CGA  
Chief Financial and Regulatory Officer  
Chatham-Kent Energy Inc.



# CONSERVATION AND DEMAND MANAGEMENT PLAN

**Turn it Off**  
**Turn it Down**  
**Trade it In**



# **Middlesex Power Distribution Corporation 2005 Conservation and Demand Management (CDM) Plan**

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# **1 Executive Summary**

Middlesex Power Distribution Corporation is committed to the initiatives undertaken by the Ontario Government to reduce the consumption and demand of electricity in Ontario. The goal is not only to reduce consumption or shift demand but also to assist our customers in achieving higher levels of energy efficiency and energy conservation.

Our plan is defined as the CDM Plan and includes initial programs designed to support, enhance and expand on Middlesex Power Distribution Corporation's efforts in public education and interval metering. The plan will also introduce other CDM programs including smart metering, real time monitoring and load control, line loss improvements, power factor correction, and load displacement.

The energy efficiency programs will use education and financial incentives to help consumers save energy. Educational programs explain the benefits of energy efficiency to consumers and service providers. These programs will also provide consumers with the information necessary to pursue energy efficiency measures, and train service providers to increase their ability to provide efficiency services. Financial incentives will be used to make the purchase of efficient technologies more economically feasible, and to encourage consumers to pursue energy efficiency measures.

Before implementation, CDM programs will be evaluated on the following criteria:

- Clearly defined project or initiative.
- Calculated annual energy savings for each project.
- Projected future energy costs and calculated annual financial savings.
- Estimated project costs.
- Evaluated merit of each project.
- Prioritized projects.
- Monitored and evaluated the performance.

This document outlines Middlesex Power Distribution Corporation's CDM plan for 2005, while taking into account the new policy directions for CDM that have occurred in the last 18 months.

The plan will include programs that implement or support:

- Energy efficiency initiatives that are economically beneficial and good for the environment
- Demand (load) Shifting
- Customer behavioural and operational changes, including the application of smart control and monitoring systems
- Smart Metering systems to encourage consumers to manage demand and energy

- Programs and initiatives targeted to low and fixed income consumers
- Education programs targeting students in local elementary and secondary schools
- Distributed energy options behind a customer's meter such as tri-generation, co-generation, ground source heat pumps, solar, wind, and biomass systems.
- Building partnerships and alliances to develop and deliver CDM programs

## 2 Middlesex Power Distribution Corporation's 2005 CDM Portfolio – The Programs

This section includes a description of the proposed programs of Middlesex Power Distribution Corporation's 2005 CDM Plan.

For each program, the following information is provided:

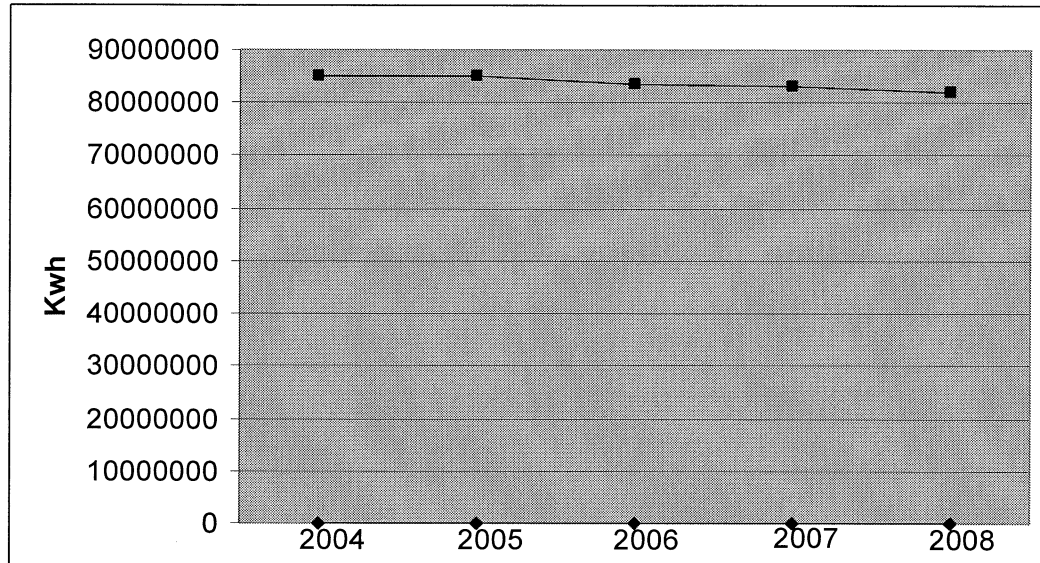
- A brief **description** of the program, its key measure, major objectives and outcomes, and the rationale behind the program.
- The **implication** of the program for Middlesex Power Distribution Corporation, its customers, and the marketplace.
- The proposed **budget** for the program, including budget assumptions.

### 2.1. *Customer Awareness Program*

Middlesex Power Distribution Corporation distributes electricity to approximately 7,000 customers, and as a local LDC has the ability to communicate to a population of approximately 30,000. There are several studies completed over the years including the "Sarah Darby Study with the University of Oxford". These studies have proven that simply educating customers about their electricity consumption habits will cause them to reduce their energy consumption. Several methods of feedback were analyzed in the studies with direct feedback achieving the highest results. This involves using tabletop interactive cost and power display units etc. that will provide real-time feedback. This should be followed by educational material that will assist customers in making wise energy choices. The energy savings from this type of program will be in the 5%-20% range.

In Middlesex Power Distribution Corporation the overall annual residential consumption is approximately 80,000,000 KWH. The graph below identifies the reduction in KWH, should an effective customer awareness program be implemented.

## GRAPH



The customer awareness program includes the following components:

Public Awareness Conservation Program;

- Turn it off
- Turn it down
- Trade it in

The program focuses on wise energy use in the home and on taking advantage of energy saving tips and government programs aimed at replacing appliances with more energy-efficient models.

The Public awareness campaigns and promotions include:

- Signs and billboards located throughout the community with conservation messages promoting Middlesex Power's three T's of conservation.
- Participation at local community trade shows promoting energy conservation and demonstrating programs available to Middlesex Power Distribution Corporation customers.
- Regular advertisement in local print media promoting conservation tips.

The Public awareness program will not provide immediate results, but will be designed to change the culture of energy use, primarily focussing on the residential market. Measuring the results of the program will be achieved over a long-term trend of declining energy consumption, and by surveying customers. The target of a reduction in energy consumption of 5% by 2007 is achievable, but will require a continuous public awareness program.

The costs of the program will be:

2004 - \$ 5,000  
2005 - \$20,000  
2006 - \$20,000

Total - \$45,000

## **2.2. Price Response Program Design**

### **2.2.1 Smart or Interval/Time of Use Meters**

Interval meters have been a component of Middlesex Power Distribution Corporation's initiatives in recent years. The above 500 kW demand group has previously been the target for interval metering. Middlesex Power Distribution Corporation is participating in the Smart meter working group with the OEB and intends to proceed with a smart meter program that is consistent with the Minister's Initiatives and the OEB's recommendations. To fully capture the demand reduction and energy savings opportunities that smart meters can offer, they must be part of an overall system that includes:

- A supportive rate structure
- Availability and testing of the technology
- Information for customers to help them to understand how they can benefit by reducing or shifting their electricity loads.

New rate structures will not be available until after March 2005, however Middlesex Power Distribution Corporation wants to prepare itself and its customers for these new rate structures. Therefore, during 2004 and 2005, the focus of the CDM initiative will be on two of the components identified above: availability of the technology, and customer information and education.

### **"The Smart Meter Pilot program"**

Middlesex Power Distribution Corporation will contract Chatham-Kent Hydro to assist with our Smart Meter decision. They have been researching Smart meter technology for the residential market since January 2004. The initiatives announced by the Government to install smart meters in every home by 2010 has been taken seriously, and research has led C-K Hydro to some basic principles, which are;

1. That we are in step with the Ontario Energy board regarding the technical specifications of the Interval or Time of use meters
2. That we consider the existing metering assets and reduce the potential to strand significant metering assets
3. That the meter will support a time of use rate structure
4. That we search for opportunities to partner with other LDC's and/or companies

5. That our preference is for non-proprietary systems
6. That the communication infrastructure to support smart meters may be used for other applications, such as: load control, AMR, outage management and/or revenue generating systems.
7. That we establish ongoing cost efficiency and flexibility as a priority

The research involved in-depth reviews of various product lines and communication protocols including: power line carrier, radio, cell and landline communication. Chatham-Kent Hydro has significant experience and expertise in the area of radio communication as they have operated their SCADA system using a 900 MHZ frequency communications for many years.

Based on our metering and communications experience, and in consideration of the above 7 principles, we believe the Tantalus Inc. Smart Meter system technology closely meets the intent of the Minister of Energy.

The Tantalus Technology is a retrofit option to convert our existing watt-hour meters to smart interval meters. The communication protocol is wireless radio technology using a hybrid 900/220 MHZ system. The infrastructure technology is more economical than power line carrier systems and provides two-way communications with the customer.

Tantalus has been selected by C-K Hydro and Middlesex Power Distribution Corporation as the provider and partner in a pilot program to retrofit residential meters to interval meters with a wireless communication backbone. The pilot will also test the Automated Meter Reading (AMR) and outage management capabilities of this system. The infrastructure costs of the Tantalus system are relatively low when the potential customer benefits are considered. In addition to providing interval data to residential consumers and assisting them in developing new consumption habits, the pilot will also be used to identify system-wide operational savings. The system has the potential of significantly reducing meter reading and other customer support functions. Middlesex Power Distribution Corporation will install 50 Tantalus Smart Meters to test the system locally.

The cost of the Tantalus pilot program is:

2005 - \$50,000  
Total - \$50,000

## **2.3 Customer Price Alert Information**

Middlesex Power Distribution Corporation has offered next business day load and price information to our interval customers since market opening via the Internet. Though several of our larger customers have taken advantage of this, our goal now is to provide real time price information.

Programs to assist customers in understanding how to use their interval meters to reduce their energy costs will be offered. These programs will be immediately relevant to customers who are paying the market rates, and will benefit other customers as soon as time-of-use or market rates are available to smaller users.



A pilot program to provide price alert and encourage demand response will be implemented. The pilot will be in partnership with **NRGen Inc.** Middlesex Power Distribution Corporation will leverage NRGen's price alert technology to raise customer awareness to the wholesale market, and to engage customers in demand response activities that will see decreased demand particularly during price peak periods. It will also enable Middlesex Power Distribution Corporation to exploit new revenue opportunities, based on participation in programs such as the IMO's Transitional Demand Response Program.

The Price Alert pilot will include:

- Customer tracking of electricity consumption over the Internet. This will enable customers to see how much electricity they are using and how much it is costing them.
- An alert system, which will signal the customers up to 3 hours before the price, exceeds a predetermined amount.
- A help-line for customers to assist with understanding and using the tracking service. This service would cover telephone queries about the customer consumption tracking system, ranging from usage (e.g. what is my password?) to interpretation of the information provided.
- Provide customers who take part in the price alert with an energy audit and advice on what loads can be shifted when a price alert signal is received.
- Provide Middlesex Power Distribution Corporation with the customer support required to participate in the IMO's transitional demand response initiative.

The number of participants and the comparison of the customers' load profiles and demand response will measure the effectiveness of the price alert pilot during the trial period.

The overall cost of the Price Response Program design is estimated at:

2005 - \$10,000

2006 - \$10,000

Total - \$20,000

## **2.4 The Commercial/Industrial Energy Efficiency Program**

Middlesex Power Distribution Corporation will develop an Energy Efficiency Program targeting Commercial and Industrial customers who have a greater impact on the overall efficiency of the distribution system. Improving energy efficiency of the larger customers will translate into a more efficient distribution system with a higher power factor and lower system losses. This program will include:

- Initiating energy audits of a few selected customers. Soliciting volunteers to participate in the audits with a commitment to address deficiencies and provide feedback to measure the success of the programs.
- Developing protocols and procedures appropriate to different sectors (e.g. institutional, educational or commercial).
- Implementing a program that will include an initial audit; training for involved staff members, and occasional follow-up once the program is in place, to ensure smooth operation. The program will include an evaluation of power factor improvement and energy savings that resulted.
- Evaluation and refinement of protocols, procedures and notification procedures, based on the results of the program, for broader rollout in 2006.

Middlesex Power Distribution Corporation will search for additional funding sources, which could be accessed to offset the costs of developing and piloting the Energy Efficiency Program.

Though grant funds are not available directly for Middlesex Power Distribution Corporation, there are programs such as the Green Municipal Funds (GMF) which provide grants of up to \$350,000 for planning, feasibility studies and/or field tests related to environmental infrastructure projects in six service areas: buildings/facilities, energy services, sustainable in community development, water services, transportation services and waste management.

Natural Resources Canada, through its Energy Innovators Initiative (EII), provides grants of up to \$25,000 and \$250,000 for the energy retrofit planning and implementation, respectively. This Energy Retrofit Assistance (ERA) program is available only to commercial businesses and public institutions that are EII members.

Overall, the cost of developing and piloting The C/I Energy Efficiency program is estimated at:

2005 - \$10,000

2006 - \$15,000

Total - \$25,000

## **2.5 Distribution System Optimization and Line Loss Reduction**

Reducing distribution system line losses will make the system more efficient and will contribute to demand and energy conservation. Some initial evaluation has concluded that a reduction in line losses of approximately 1% will reduce Middlesex Power Distribution Corporation's monthly demand by approximately 500 KW. A more efficient distribution system will also translate to lower costs to customers.

A Voltage conversion program is one initiative that will reduce distribution system line losses. This involves eliminating the 4000-volt distribution stations and supplying customers directly from the 27,600-volt system. This eliminates the transformer losses of the substations. Middlesex Power Distribution Corporation will partner with Chatham-Kent Hydro to complete a study and produce a guide that can quantify the loss savings by conversion dollars spent and/or KVA converted.

The study will progress as follows:

1. Choose 3 or 4 existing 4 kV Feeders.
2. Calculate existing losses based on loading data from meter read information from Harris.
3. Re-design the system as if a conversion were about to take place.
4. Calculate new losses based on the new design.
5. Perform the study for individual feeders and for one whole substation and feeder system.

Based on the assumption that the analysis will justify voltage conversion projects, a strategy will be developed to accelerate voltage conversions.

The initial expenses will be to complete the analysis identified above. Should the analysis demonstrate significant reduction in demand and consumption, Middlesex Power Corporation Distribution will accelerate the voltage conversion program, by approximately 10% annually.

Other loss reduction initiatives will involve an analysis of the power factor of our larger customers. If our customer's power factor is improved, it translates to a more efficient distribution system. The audits referred to in item # 2.4 of this plan will also focus on power factor status and improvement recommendations. Incentives will be provided to customers to make power factor corrections either through higher penalties for poor power factor or a contribution by Middlesex Power Distribution Corporation to install power factor improvement equipment.

Overall costs of the Line loss Improvement program will be:

2006 - \$50,000  
2007 - \$50,000  
Total - \$100,000

## **2.6 Distributed Generation and Renewable Energy Program**

In the OEB preliminary guidelines for Electricity Distributor Conservation and Demand Management activities, distributed energy options like co-gen, wind and biomass systems are the type of new expenditures the Minister of Energy is encouraging to help meet the energy conservation targets. Middlesex Power Distribution Corporation is in an area of the province that has been targeted as a prime area for investment in wind energy.

Middlesex Power Distribution Corporation is considering renewable energy sources that would fit with Middlesex area's environment and economy. We have had discussions with America's Wind Energy Inc. (AWE) who offers low cost wind turbines that can be used for small load displacement uses up to 80 KW.

Middlesex Power Distribution Corporation will partner with Chatham-Kent Hydro in a renewable energy program. In order to determine the value of or the most effective location a wind generation program will require wind propagation studies and location analysis. Chatham-Kent Hydro is considering the installation of one of the small units provided by AWE as a load displacement unit in partnership with our Municipality. The data from this installation may be used in lieu of an expensive propagation study to assist Middlesex Power Distribution Corporation in the decision to move forward with larger wind generation projects.

Middlesex Power Distribution Corporation will also analyze other renewable energy sources including the use of solar panels on our substations.

2005 costs: - \$ 5,000

2006 costs - \$ 5,000

Total - \$10,000

## **2.7 Low and Fixed Income Customer Program**

Initially this program will focus on identifying "all electric" customers in this group and develop programs to reduce energy consumption costs. Programs will include building retrofits and fuel switching.

Low and Fixed Income Customers can reduce energy consumption if they utilize the information and incentives available for:

1. Taking no cost, energy-saving actions. (**Turn it off**)
2. Installing low-cost, energy-saving measures. (**Turn it Down**)
3. Investing in energy-efficient equipment, appliances and building shell retrofits. (**Trade it in**)

## **2.8 Program Development Research**

Research will be required to assist in the design of new CDM programs for 2005 and beyond. The research program will involve identification of priority research areas, investigation of these areas, and documentation of findings.

Middlesex Power Distribution Corporation has identified three areas where it may wish to research opportunities in the short term:

- Technologies for automatic load shedding from appliances, such as pool filters or air conditioners by putting these under the control of the utility. The research will include a review of where they have been implemented, and the associated programs that have been designed around them (e.g. whether or how customers can override thermostat adjustments, financial incentives offered to customer, etc.)
- Identification of distribution system standards and determination of how these might contribute to reducing electricity losses. These could include consideration of how to optimize the power system, using load flow software, or investigating standards for low-loss transformers.

These, and possibly other, research areas will be considered and the specific work to be undertaken will be selected.

The research study for the CDM Plan is budgeted at:

2005- \$10,000

## **2.9 All Sector Programs**

### **2.9.1 Municipal Street lighting**

The Municipality has streetlights that are all maintained by Middlesex Power Distribution Corporation via a Service Level agreement. An analysis will be completed of the streetlights to determine if they are efficient.

There are primarily 3 types of streetlights used by Municipalities. They are:

Mercury Vapour – (least efficient) 25 – 50 lumens per watt

Metal Halide – (moderately efficient) 50 –115 lumens per watt

High pressure Sodium (most efficient) – 40-140 lumens per watt

Upon completion of the analysis Middlesex Power Distribution Corporation will work with Strathroy Caradoc to implement a streetlight conversion program.

Middlesex Power Distribution Corporation will also work with the Municipality on a conversion of the traffic light fixtures to high efficient LED lighting. The Municipality currently installs LED traffic lights in new installations but has not considered replacement the existing fixtures. Middlesex Power Distribution Corporation plans to complete a study on the benefits of converting these fixtures.

Costs for a streetlight/traffic light conversion program

2005 - \$ 5,000

2006 - \$ 5,000

Total - \$10,000

### **2.9.2 Lighting & Appliances**

The lighting and appliance programs will be designed to (1) improve consumer awareness of the energy and non-energy benefits of efficient lighting and appliances, (2) increase the availability and demand for these products, and (3) promote emerging technologies. The programs will include:

- Promoting ENERGY-STAR rated products
- Offering direct rebates (financial incentives) to consumers to purchase energy efficient products
- Educating consumers and distributors of energy efficient products using web-sites, bill inserts, newsletters, educational workshops, and on site auditing
- Showcasing new technologies at consumer locations and events

### **2.9.3 Heating, Ventilation and Air Conditioning (HVAC) Systems**

HVAC programs will be designed to: (1) encourage the replacement of inefficient systems with efficient ones, (2) increase consumer recognition of ENERGY-STAR products, (3) increase training of trade professionals in efficient HVAC systems, (4) support the improvement of efficiency standards. These programs will include:

- Educating consumers through web-sites, bill inserts, newsletters, educational workshops, on site auditing and call centre
- Providing efficiency information to HVAC contractors and distributors,
- Offering direct rebates (financial incentives) to residential customers for energy efficient HVAC projects

### **2.9.4 High Efficiency Motors**

The High Efficiency Motor program will be designed to: (1) promote optimal motor system design and sizing, (2) facilitate consumer purchase of efficient motors and (3) increase the understanding of motor life-cycle costs. These programs will include:

- Educating consumers through web-sites, bill inserts, newsletters, educational workshops, on site auditing and call centre
- Providing efficiency information to motor contractors and distributors,
- Offering direct rebates (financial incentives) to residential customers for energy efficient HVAC projects
- Offering information and assistance to encourage optimal system design and life-cycle cost analysis

### **2.9.5 Building Retrofits and Renovations**

The Retrofit and Renovation program will be designed to: (1) increase energy efficient investments at the time of retrofit, renovation, or sale, (2) link interested customers with providers of energy retrofit services and (3) increase the knowledge of professionals who perform energy efficient retrofits.

Many different market participants can increase the likelihood of an energy efficiency retrofit. These programs not only target residential and commercial customers who either own or are buying a building (including multifamily houses, large energy customers, and governments) but also trade professionals (including engineers, designers, contractors, and energy consultants), real estate agents, mortgage professionals, and home inspectors. These programs will include:

- Providing energy efficiency information to customers planning to buy, sell or renovate a building. Efficiency information on windows, equipment, motors, lighting, appliances, etc.
- Making energy audits available to customers to assist them in determining their efficiency retrofit needs.
- Providing product energy efficiency information and assistance for trade professionals through workshops, libraries, and trade shows.
- Offering direct rebates (financial incentives) customers for energy efficient retrofit/renovation projects.

#### **2.9.6 New Construction**

The New Construction program will be designed to (1) increase the number of energy efficient new homes and buildings being built, (2) promote construction exceeding the R2000 home design, (3) raise awareness and benefits of energy efficient home when applying for a mortgage, (4) promote energy efficiency in the professions of architecture and engineering

Market participants include consumers looking to buy new homes and decision makers in new construction projects; builders, contractors, and manufacturers; real estate agents and mortgage professionals; and architects, engineers and students. Programs include:

- Targeting information to customers to promote energy efficient homes and buildings
- Recognizing new developments that include exemplary energy efficient homes.
- Offering energy efficiency information to trade professionals.
- Offering energy efficiency information sales agents to enable them to more effectively sell efficiency upgrades to home-buyers

Costs of all sector programs: (some of the costs will be included in the Customer awareness programs)

2005 - \$10,000

### **3.0 Customer Energy Specialist**

To ensure Middlesex Power Distribution Corporation's commitment to deliver CDM programs, Middlesex Power Distribution Corporation will contract the services of Chatham-Kent Hydro's Energy Services Specialist to:

- Develop, implement, manage and measure results of the CDM programs undertaken by Middlesex Power Distribution Corporation.
- Evaluate new and existing energy efficiency technologies
- Provide energy efficiency training and educational programs
- Provide customers technical advice and guidance with respect to energy technologies
- Monitor and evaluate CDM programs

### 3 CDM Budget Summary

Table 1 presents a summary of the total Middlesex Power Distribution Corporation CDM budget for 2005 –2007.

Additional funding will be provided directly or indirectly by other programs. These include programs offered by Natural Resources Canada, the Federation of Canadian Municipalities, and through the contribution of various program participants.

**Table 1**

Customer Awareness Program	\$ 45,000
Smart Meter Pilot Program	50,000
Price Alert Pilot	20,000
C/I Energy Efficiency Program	25,000
System Losses Reduction Program	100,000
Renewable Energy Program	10,000
Research	10,000
All Sector Programs	20,000
<b>Total CDM Program</b>	<b>\$ 280,000</b>