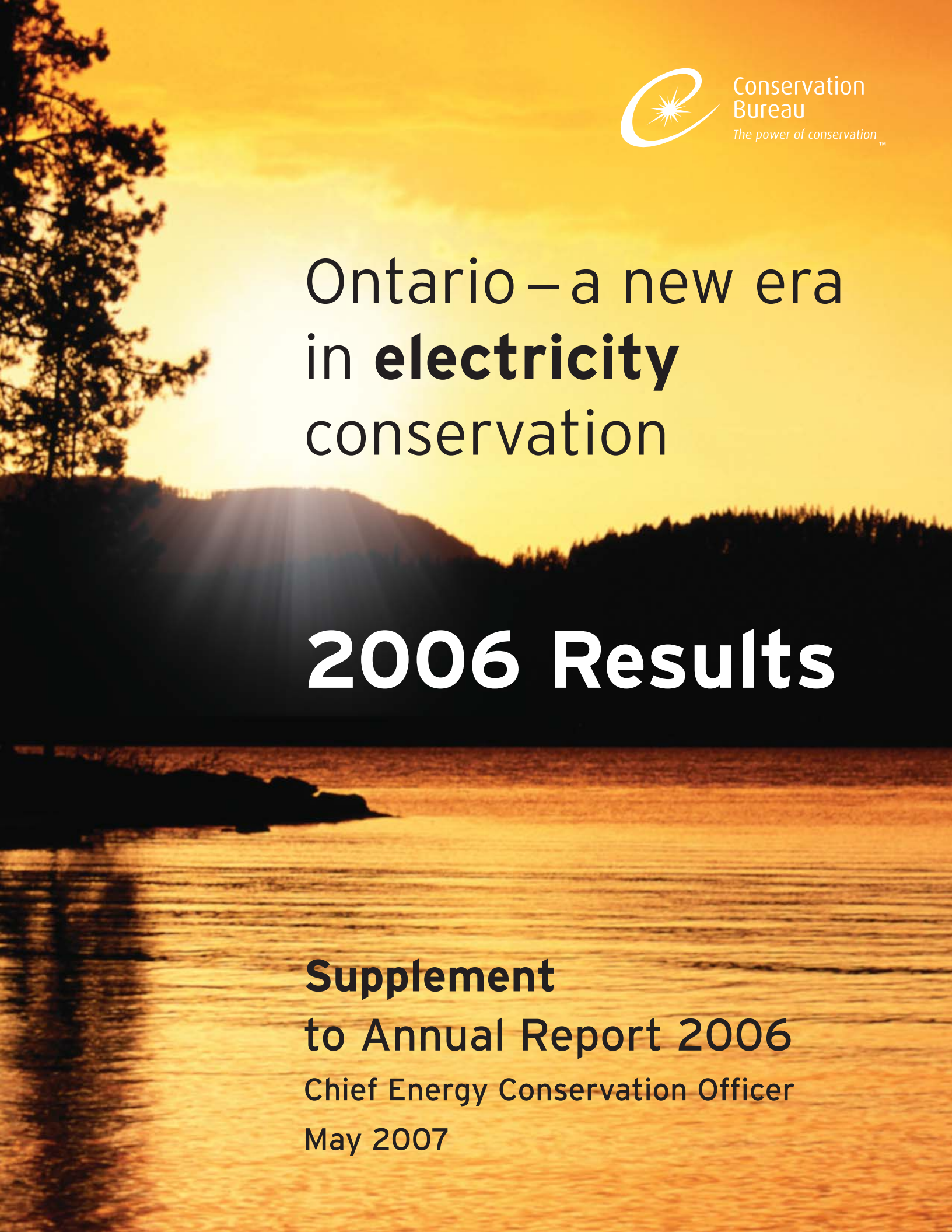


Conservation Bureau
The power of conservation™

Ontario – a new era in **electricity** conservation

2006 Results

Supplement to Annual Report 2006

Chief Energy Conservation Officer

May 2007

Chief Energy Conservation Officer
2006 Results – Supplement to 2006 Annual Report

2006 Conservation Highlights

- Ontario's electricity consumers reduced peak demand by approximately **1,080 megawatts** to the end of 2006, including 350 megawatts of naturally occurring conservation.

- The five Ontario Power Authority-coordinated conservation programs delivered in 2006 resulted in annual savings of **378 million kilowatt-hours** and a reduction in the summer peak demand of approximately **110 megawatts**.

- Ontario's local distribution companies reported achieving substantial electricity savings, including approximately **140 megawatts** of peak-demand reduction and lifetime savings of **3.5 billion kilowatt-hours**.

- The Chief Energy Conservation Officer and the Ontario Power Authority made more than **360 million media impressions** related to conservation in 2006.

- **Twenty-eight** individuals and organizations were recognized in 2006 with Certificates of Recognition for taking a leadership role in building a long-term commitment to electricity conservation.

- Amendments to the Ontario Building Code, announced in June 2006, increased energy-efficiency requirements and will save Ontario an estimated **550 megawatts** of electricity over the next eight years.

- The Ozone Depleting Substances regulation, passed in 2006, will phase out remaining uses of chlorofluorocarbons in large refrigeration and air conditioning equipment and chillers, which could save between **50 and 175 megawatts** of electricity.

- To the end of 2006, the Ontario Power Authority's Conservation Fund had provided **$2.5 million in funding** for 37 action-oriented, sector-specific electricity conservation pilot projects.

- The Technology Development Fund supported 13 projects in 2006 with a total of more than **$736,000 in funding** to promote the development and commercialization of technologies or applications that could help to reduce electricity consumption or demand.

A Message from the Chief Energy Conservation Officer

A new era of conservation has begun in Ontario. As Chief Energy Conservation Officer, one of my main duties is to report on the progress being made toward meeting Ontario's conservation goals. I do this in an annual report issued each November. However, to ensure that timely and detailed information is available on the province's conservation effort, I have decided to supplement the annual report with a spring summary of the previous year's programs, activities and results. This will provide transparency and accountability regarding the conservation effort and, I hope, stimulate further conservation action.

The need for conservation action is greater now than ever before. Not only will conservation help Ontario build a reliable, cost-effective and sustainable electricity system, but it will also improve our environment, including mitigating the effects of climate change. If we use less energy, including electricity, then we can reduce the amount of fossil fuels we use and, therefore, reduce greenhouse gas emissions. In fact, leading experts point to energy conservation as one of the key actions we can take to address climate change. They also point to energy-efficiency codes and standards as one the key policy tools to drive conservation.

I am very happy to report that Ontario's electricity consumers have reduced peak demand by approximately 1,080 megawatts to the end of 2006, including 350 megawatts of naturally occurring conservation. These results have been achieved by consumers, local distribution companies, the Ontario Power Authority, channel partners, nongovernmental organizations and governments working together. And there is more to be done.

It is up to each one of us to take conservation action where we live, play, work and learn, and to call on our friends and neighbours to do the same. It is also up to each of us to support our governments in putting in place a regulatory and fiscal framework to stimulate enduring conservation. Together we are building a culture of conservation in Ontario.

Peter Love
Chief Energy Conservation Officer
May 2007

1. Introduction – Conservation Progress in 2006

The Government of Ontario has called for the creation of a culture of conservation in the province and set a target of reducing peak electricity demand by 6,300 megawatts by 2025. In the 2006 Annual Report, the Chief Energy Conservation Officer identified the beginning of a new era of conservation in Ontario and detailed the progress being made toward achieving these goals. It was, however, a mid-year snapshot, as full-year results were not yet available.

This report, a supplement to the 2006 Annual Report, summarizes the results of the 2006 conservation and demand management (conservation) programs and activities of the Chief Energy Conservation Officer,[1] the Ontario Power Authority[2] and local distribution companies. The report also includes a "bottom-up" analysis of progress by all major players toward meeting the province's peak-demand reduction target and provides further evidence of a new era of conservation in Ontario.

Releasing conservation results in a timely manner provides transparency in the conservation activities being funded by ratepayers. This supplement also fulfills the Chief Energy Conservation Officer's duty to report to the government and the citizens of the province on Ontario's progress toward meeting its conservation goals.

Summary of Results

The province has achieved approximately 1,080 megawatts of peak-demand savings, based on a "bottom-up" analysis of reported program results. The Ontario Power Authority's actions have directly and indirectly resulted in approximately 110 megawatts of peak-demand savings in 2006. In addition, the conservation programs of local distribution companies resulted in approximately 140 megawatts of demand reduction.

Building a culture of conservation will require permanent change in how Ontarians view and use electricity, which will result from increased awareness and knowledge, as well as changes to regulations, standards and codes. To help facilitate this change, in 2006 the Chief Energy Conservation Officer sought to raise awareness and stimulate action by demonstrating leadership through public speaking engagements, awareness programs, media presence and by recognizing success. In addition, he was active in promoting regulatory change, including supporting changes to the building code, passage of the Ozone Depleting Substance regulation and improvement of energy-efficiency standards.

To achieve electricity savings, the Ontario Power Authority designed and delivered five conservation programs in 2006: Every Kilowatt Counts, Cool Savings Rebate, Hot

[1] The position of the Chief Energy Conservation Officer was created by 2004 amendments to the *Electricity Act, 1998*. The office and the Conservation Bureau are to provide leadership for the planning and coordination of conservation in Ontario. The Conservation Bureau is a division of the Ontario Power Authority.

[2] The mandate of the Ontario Power Authority, also established through the 2004 amendments to the Act, is to ensure an adequate, long-term supply of electricity for Ontario. This objective is critical to the province's continued growth and prosperity, and conservation will play a major role.

Savings Rebate, the Secondary Refrigerator Retirement Pilot program and Demand Response 1. The primary goal of these programs was to reduce the electricity demand in the summer months when air conditioning and related loads result in excessive strain on the electricity grid.

The Ontario Power Authority also administered the Conservation and Technology Development Funds to inform the development of future conservation programs and to identify innovative programs and technologies that could help to transform the electricity market. In addition, the Ontario Power Authority's renewable energy and clean energy Standard Offer programs will also contribute to conservation success.

The Way Forward

The results of 2006 conservation programs and activities demonstrate that Ontario has begun a new era in electricity conservation. A number of lessons were also learned in 2006, including the need to:

- expand and strengthen evaluation, measurement and verification efforts;
- focus efforts to increase the market share of energy-efficient equipment and buildings;
- and continue to work with partners (e.g., manufacturers, retailers, non-governmental organizations and governments) to strengthen the delivery and practice of conservation.

2. Conservation Leadership

Public Leadership and Awareness

In 2006, Ontario's Chief Energy Conservation Officer maintained a strong province-wide presence to raise awareness about conservation and stimulate Ontarians to take action. The key messages delivered in 2006 were that conservation:

- is a cost-effective way to meet our energy needs;
- is crucial to the future of our environment;
- is essential for both province-wide and local economic prosperity;
- requires that all sectors participate and demonstrate leadership.

The Chief Energy Conservation Officer crossed the province throughout the year, speaking to Ontarians from all walks of life. Meeting with representatives from industry, business, Aboriginal communities, the low-income sector, and with primary, secondary and university students, the Chief Energy Conservation Officer called on all Ontarians to conserve where they lived, worked, learned and played. With more than 100 speaking engagements to spread conservation messages, audiences were addressed in Thunder Bay, Kenora, Sudbury, North Bay, Sarnia and Windsor, among others.

The Chief Energy Conservation Officer also recognized 28 individuals and organizations with a Certificate of Recognition for taking a leadership role in building a long-term commitment to electricity conservation. Certificates were presented in 14 cities and towns across the province, including London, Hamilton, Kingston and Ottawa.

For more information on the Chief Energy Conservation Officer's appearances in 2006 or the Certificate of Recognition nomination process, please visit www.conservationbureau.on.ca.

The Ontario Power Authority and the Chief Energy Conservation Officer used the media to build conservation awareness across Ontario. Specific initiatives included:

- a four-page advertising insert in community newspapers that was delivered to three million households;
- a documentary film on conservation that was aired on television in September;
- an intensive news media campaign, including "The Conservation Zone" columns distributed to community newspapers across the province.

These efforts, together with radio advertising and interviews, television appearances, contributions to newspaper articles and involvement with numerous panel discussions, resulted in more than 360 million media impressions for the Chief Energy Conservation Officer and the Ontario Power Authority related to conservation in 2006.[3]

To further stimulate the creation of a culture of conservation in Ontario, the Chief Energy Conservation Officer and the Ontario Power Authority delivered or supported a

[3] Media impressions tracked by Environmental Communication Options

number of programs specifically aimed at raising awareness of conservation issues and simple actions consumers can take to reduce electricity use. Examples of 2006 awareness campaigns include:

- The Ontario Power Authority's It's Up 2 You program, which targeted both businesses and residents with the message to turn up air conditioners by two degrees and promote more casual, cooler business attire. The program was supported by the Toronto Board of Trade and the Building Owners and Managers Association of the Greater Toronto Area.
- Doors Closed Ontario, a program by the Conservation Council of Ontario, which raised awareness of the tremendous amount of electricity used for air conditioning when store doors are left open and encouraged shop owners to close their doors when air conditioners are running.
- The Sustainable Condo project by EcoSmart, a traveling full-size display suite that combines smart, innovative design with state-of-the-art green building technologies, materials and products.

Promoting Legal and Policy Opportunities

Regulatory tools, such as codes and standards, are among the most cost-effective ways of achieving sustainable and reliable electricity savings. In the Ontario Power Authority's Integrated Power System Plan,[4] these tools are fundamental to achieving the government's electricity savings targets in the medium to long term. They are also vital to creating a culture of conservation. Promoting these tools will continue to be a major area of focus for the Chief Energy Conservation Officer.

In 2006, the Chief Energy Conservation Officer participated in the process to improve the energy-efficiency requirements of the Ontario Building Code, promoted the passage of the Ozone Depleting Substances regulation and became involved in the energy-efficiency standard-setting process for equipment.

In 2006, regulatory change resulted in tangible savings:

- In 2007, the typical new home will be 21 percent more efficient than one built under the old code, and by 2012 all new homes will be 35 percent more efficient and meet or exceed EnerGuide 80.[5] The code's increased energy-efficiency requirements will save Ontario an estimated 550 megawatts of electricity over the next eight years.
- Minimum mandatory standards for air conditioning units were improved, which is estimated to result in between eight and 20 megawatts of savings in 2006 alone.
- The Ozone Depleting Substances regulation is expected to reduce electricity demand by between 50 and 175 megawatts.[6]

[4] The Integrated Power System Plan will be a comprehensive plan for Ontario's electricity system for the next 20 years. It will identify the conservation, generation and transmission investments that are needed in the next three to five years, indicate the preparatory work required for the subsequent five years, and chart broad directions for the development of the system in the balance of the planning period.
[5] www.mah.gov.on.ca/Page681.aspx
[6] Marbek Resource Consultants, "CFC Chiller Replacement Potential Report and Addendum," February 2006

3. 2006 Conservation Performance in Ontario

Progress Toward Ontario's Peak-Demand Targets

Ontario achieved a peak-demand reduction of approximately 1,080 megawatts by the end of 2006, toward the target of 1,350 megawatts by 2007 set by the Ontario government.

In the 2006 Chief Energy Conservation Officer Annual Report, a formulaic "top-down" analysis was used to arrive at an estimate of peak-demand reduction by year-end 2006.[7] The methodology used economic growth estimates and trends in energy use to project the expected increase in Ontario's electricity demand. The results of this analysis were then compared to the actual weather-adjusted peak demand supplied by the Independent Electricity System Operator.

In the absence of actual 2006 conservation program results, the top-down analysis was accepted as an appropriate means to provide the demand reduction estimate. However, with specific conservation program results now available, a better methodology has been used to assess current progress with a "bottom-up" analysis of the results of these initiatives.

The bottom-up analysis integrates both reported and verified program results in assessing peak-demand savings. Reported savings provide estimates of program impacts based on tracked results (e.g., the number of coupons redeemed) that have been reported to the Ontario Power Authority by the program delivery agents. Reported results are based on pre-determined assumptions outlined in the Ontario Energy Board's *Total Resource Cost Guide*. Verified results have been measured by independent third parties who review the realized impacts of a conservation initiative and provide an assessment of program results. Once results have been reported or verified, they are added together to establish the projected electricity savings attributable to conservation initiatives delivered in Ontario.

Although encouraged by the results of the bottom-up analysis, the Ontario Power Authority recognizes the need to continually examine program results and further develop the evaluation strategies used to assess program impacts. Comprehensive evaluation protocols continue to be developed for future use and will increase the level of confidence in results and improve program effectiveness.

The bottom-up analysis included in this report considers the results of programs delivered by several organizations and institutions, all of which contributed to demand reductions in 2006. These organizations include the Ontario Power Authority, local distribution companies, the federal and provincial governments, energy management companies, Enwave, the Independent Electricity System Operator and natural gas

[7] Appendix 2, "Description of the peak-savings analysis method," is available in the appendices to the 2006 Chief Energy Conservation Officer's Annual Report on the Conservation Bureau Web site: www.conservationbureau.on.ca.

utilities. Demand response and generation projects facilitated through the Ontario Power Authority also contributed to peak-demand savings.

For analytical purposes, the Ontario Power Authority has divided conservation into six separate categories.

- **Conservation behaviour** – Conservation occurs when customers change their behaviour to reduce the amount of electricity consumed over time using technology already in place (e.g., by manually raising the temperature of their air conditioner by a few degrees).

- **Energy efficiency** – Energy efficiency occurs when customers reduce their electricity consumption but retain at least the same level of end-use service. Energy efficiency is the gain from investing in better appliances, equipment and buildings (e.g., replacing household electric appliances such as a refrigerator or air conditioner with higher efficiency models).

- **Demand management** - Demand management occurs when customers reduce their electricity demand during peak-use hours (peak clipping) or shift some of their demand to off-peak hours (load shifting). Demand management can occur in a number of ways. For example, when residential customers shift the use of their dishwasher and laundry appliances to off-peak hours, when certain industrial customers contractually agree to shut down an assembly line in response to an automatic signal, and when customers allow the temperature on their thermostat to be increased in the summer by a previously installed device are all examples of demand management.

- **Fuel switching** – Fuel switching occurs when customers elect to use other energy sources in place of electricity (e.g., replacing an electric water heater with a solar thermal model).

- **Self generation/cogeneration** – Self generation/cogeneration occurs when customers elect to install either a generator or a combined heat and power facility to meet all or a portion of their electricity consumption needs (e.g., the installation of solar panels). In addition, renewable energy projects less than 500 kilowatts and clean energy projects, including combined heat and power, less than 10 megawatts are also considered conservation, as defined by the Ministry of Energy.

- **Natural conservation** – Projected changes in end-use efficiency in the absence of new and incremental market interventions are defined as natural conservation.[8]

The table below summarizes the results of 2006 conservation initiatives by category.

[8] M.K. Jaccard and Associates, Inc., "Modelling and Scenario Documentation, Draft Report," September 2006

Table 3.1: Electricity Savings by Category to Year-end 2006

Category	Aggregate Peak-Demand Reductions in Megawatts
Conservation Behaviour	100
Energy Efficiency	289
Demand Management	315
Fuel Switching	--
Self Generation/ Combined Heat and Power	27
Natural Conservation	350
Total	**1,081**

The tables below summarize the contributions of the various agencies and organizations that contributed to peak-demand savings in the various categories.

Table 3.2: Energy Efficiency Electricity Savings by Contributor to Year-end 2006

Energy Efficiency Contributor	Contribution to Peak-Demand Reduction in Megawatts
Ontario Power Authority Conservation Programs (2006)	18
Local Distribution Companies' Conservation Programs (2005 & 2006)	145
Provincial and Federal Government Initiatives (i.e., Ontario Realty Corp; Federal Houses in Order)	68
Energy Management Companies	40
Natural Gas Utilities – Demand-side Management Programs	8
EnerGuide for Houses	10
Total	**289**

Sources for Tables 3.1 and 3.2: Ontario Realty Corporation, Marbek Resource Consultants, Ontario Power Authority, local distribution companies' 2005 and 2006 annual reports, natural gas utilities' demand-side management evaluation reports, Natural Resources Canada, M.K. Jaccard and Associates

Table 3.3: Demand Management Electricity Savings by Contributor to Year-end 2006

Demand Management Contributor	Contribution to Peak-Demand Reduction in Megawatts
Ontario Power Authority Demand Response 1	164
Loblaw Properties Demand Response	10
York Region Demand Response	3
Local Distribution Companies' Demand Response (2005)	4
Independent Electricity System Operator Transitional Demand Response and Dispatchable Loads	134
Total	**315**

Sources: Ontario Power Authority, IndEco, PricewaterhouseCoopers, Independent Electricity System Operator

Table 3.4: Self Generation/Cogeneration Electricity Savings by Contributor to Year-end 2006

Self Generation/Cogeneration Contributor	Contribution to Peak-Demand Reduction in Megawatts
Local Distribution Companies' Distributed Generation (2005)	1
Enwave - Deep Lake Water Cooling	26
Total	**27**

Sources: Ontario Power Authority, Enwave, IndEco

Results Achieved from Ontario Power Authority Conservation Programs

The Ontario Power Authority's approach to conservation includes procuring electricity savings through incentive and information programs, building capability in the market, raising consumer awareness, and promoting changes to the building code and equipment standards, as well as other regulatory and pricing regimes. A mix of these efforts will be needed to reach Ontario's conservation goals. To ensure that this approach is achieving real results, the Ontario Power Authority is committed to putting in place a robust system of evaluation.

Last year, 2006, was the first full year the Ontario Power Authority facilitated the design and delivery of province-wide conservation programs. The goals of these programs were to:

- reduce overall and peak electricity demand;
- increase awareness of the importance of and opportunities for improving consumer energy efficiency;
- and lay a foundation for the development of a culture of conservation.

The Ontario Power Authority developed and coordinated five core conservation and demand management programs in 2006:

Mass Markets:

1. Every Kilowatt Counts (spring and fall)
2. Cool Savings Rebate
3. Hot Savings Rebate
4. Secondary Refrigerator Retirement (pilot)

Business Markets:

1. Demand Response 1

Mass market initiatives targeted residential consumers and focused on achieving electricity savings. However, the programs also aimed to build the capability of channel partners to sell conservation and to increase the market share of high-efficiency products in the marketplace.

The Demand Response 1 program for business markets encouraged participants to reduce their electricity consumption during peak-demand periods to improve system reliability.

Successful program implementation relied heavily on developing meaningful partnerships. In delivering these programs, the Ontario Power Authority worked with:

- local distribution companies
- retail partners
- industry associations
- manufacturers.

These relationships resulted in effectively designed province-wide programs, significant retail presence and an adequate supply of program measures to meet demand.

The table below summarizes the overall impacts of the Ontario Power Authority-coordinated conservation programs in 2006.

Table 3.5: Results of 2006 Ontario Power Authority-Coordinated Conservation Programs

		Mass Markets Actuals	Business Markets Actuals	Total Portfolio Results
A	Total Annual kWh Savings (000's)	377,681	-	377,681
B	Total Lifecycle kWh Savings (000's)	2,451,967	-	2,451,967
C	Total Summer Peak MW Savings	17.91	93	110.91
D	Total Winter Peak MW Savings	82.62	93	175.62
E	Total Program Expenditures ($000's)	$30,896	$3,277	$34,173
F=(E/A)	Cost/kWh Savings (1st Year)	$0.08	-	$0.09
G=(E/C)	Cost/MW Saved (Summer) ($000's)	$1,725	$35	$308
H	Total Participants	3,978,781	-	3,978,781
I	Program TRC Benefits ($000's)	$149,760	-	$149,760
J	TRC Costs ($000's)	$32,909	-	$32,909
K=(I/J)	TRC Ratio	4.55	-	4.55

kWh = kilowatt-hours; MW = megawatts; Participant = actual measure or unit delivered or installed; TRC = total resource cost, a cost-benefit test that measures net cost, including that of participants and utilities, with benefits as avoided costs of generation.

Mass Markets Program Analysis

Every Kilowatt Counts

The Every Kilowatt Counts program worked to cultivate a culture of conservation with Ontario's residential consumers and to motivate consumer behaviour. It did this by providing educational material on the efficient use of electricity and by providing coupons redeemable for instant rebates on energy-efficient products within major retail chains and independent stores.

The Every Kilowatt Counts program was delivered through two campaigns in 2006, spring (May–August) and fall (October-November). The table below summarizes the reported results of the Every Kilowatt Counts program in 2006.

Table 3.6: Results of 2006 Every Kilowatt Counts Program

		Spring	Fall	Total Reported Results
A	Total Annual kWh Savings (000's)	136,261	221,722	357,983
B	Total Lifecycle kWh Savings (000's)	713,605	1,517,887	2,231,492
C	Total Summer Peak MW Savings	0.9	3.3	4.2
D	Total Winter Peak MW Savings	27	53.1	80.1
E	Total Program Expenditures ($000's)	$8,480	$10,440	$18,920
F=(E/A)	Cost/kWh Savings (1st Year)	$0.06	$0.05	$0.05
G=(E/C)	Cost/MW Saved (Summer) ($000's)	$9,422	$3,163	$4,504
H	Total Participants	1,404,529	2,529,066	3,933,595
I	Program TRC Benefits ($000's)	$43,206	$92,254	$135,460
J	TRC Costs ($000's)	$9,684	$11,518	$21,202
K=(I/J)	TRC Ratio	4.46	8.01	6.39

kWh = kilowatt-hours; MW = megawatts; Participant = actual measure or unit delivered or installed; TRC = total resource cost, a cost-benefit test that measures net cost, including that of participants and utilities, with benefits as avoided costs of generation.

The specific measures for which coupons were offered and their associated redemption rates for the two campaigns are summarized in the table below:

Table 3.7: Coupon Redemptions by Measure for 2006 Every Kilowatt Counts Program

Spring			Fall		
Measure*	**Incentive**	**Redemptions**	**Measure***	**Incentive**	**Redemptions**
▪ ENERGY STAR® CFLs	$5 (2 pack)	483,132	▪ ENERGY STAR® CFLs	$3 (any pack)	539,203
▪ Electric timers	$5	37,518	▪ Seasonal LEDs (strings of 50 plus)	$5	477,612
▪ Programmable thermostats	$15	16,320	▪ Programmable thermostats	$15	50,536
▪ ENERGY STAR® ceiling fans	$25	12,415	▪ Dimmers	$3	24,895
			▪ Indoor motion sensors	$7	8,933
			▪ Programmable baseboard thermostats	$15	7,501

These measures were selected based on their demonstrated electricity savings potential, relative ease of installation, availability and application to all households and cost-effectiveness. CFLs = compact fluorescent light bulbs, LEDs = light-emitting diode lights

More than 2,100 home improvement, department, big-box, grocery and drugstore retail locations participated in the spring campaign, and more than 3,000 retail sites participated in the fall campaign. Coupons were included as part of a direct-mail package that was delivered to 4.58 million Ontario households in 80 local distribution companies' territories during both campaigns. Coupons were also made available at participating retail locations for instant redemption.

The Every Kilowatt Counts initiative contained a capability-building component, as consumers were educated on simple-to-do, low- or no-cost energy-savings opportunities through the direct-mail package (available in 14 languages for the spring campaign and 17 languages for the fall), radio spots, print ads and billboards. Messages incorporated into the package included recommendations to increase the temperature of air conditioners by two degrees, ensure blinds are closed and shades are drawn in the warmer months and unplug appliances when not in use.

To establish a baseline to assess the impact and effectiveness of these capability-building, educational elements, Oraclepoll Research conducted a public opinion survey to assess Ontarians' conservation awareness and practices, both before and after the program was delivered. This baseline study included a survey of 1,500 randomly selected Ontarians for both the spring and fall campaigns. Post-program research conducted by Oraclepoll indicates that the direct-mail package was the preferred means of educating consumers.

The table below presents the high-level results of Oraclepoll's research for selected criteria of the spring 2006 Every Kilowatt Counts campaign.

Table 3.8: Oraclepoll Research Results for Spring 2006 Every Kilowatt Counts Campaign

Incentive-Based Results	April (Pre) % Yes	June (Post) % Yes	Variance
Do you have a programmable thermostat installed?	39	49	↑ 10%
Do you always/often install CFLs when changing light bulbs?	52	58	↑ 6%
Do you have a ceiling fan installed?	61	63	↑ 2%
Capability-Building Results	**April (Pre) % Yes**	**June (Post) % Yes**	**Variance**
Do you always/often turn up the temperature on your air conditioner's thermostat?	44	50	↑ 6%
Do you close your blinds in warmer months?	62	70	↑ 8%
Do you unplug appliances when they are not in use?	31	37	↑ 6%
Do you look for ENERGY STAR® labelling when purchasing?	66	70	↑ 4%
Do you always/often turn off lights when leaving a room?	79	80	↑ 1%

The fall survey found similar results, which indicates that the Every Kilowatt Counts program was effective in encouraging action on efficiency measures and in motivating conservation-related behaviour.

Full program reports with a comprehensive overview of these initiatives have been completed by The MEARIE Group (spring) and Energyshop.com (fall). The reports will be available on the Ontario Power Authority Web site shortly: www.powerauthority.on.ca .

The Cool Savings Rebate Program

To limit the impacts of residential air conditioning on peak demand, the Cool Savings Rebate program encouraged homeowners who were looking to replace an existing central air conditioner to purchase an ENERGY STAR®-qualified model. As well, without regular maintenance, an existing central air conditioner loses approximately five percent of its original efficiency for each year of operation. To ensure systems run optimally, the program provided an incentive to homeowners with central air conditioning to have their system serviced or maintained prior to the cooling season. Incentives were also provided for programmable thermostats, which enable homeowners to appropriately regulate their air conditioning use.

The table below summarizes the reported results of the Cool Savings Rebate program in 2006.

Table 3.9: Results of 2006 Cool Savings Rebate Program

		Reported Results
A	Total Annual kWh Savings (000's)	10,417
B	Total Lifecycle kWh Savings (000's)	131,086
C	Total Summer Peak MW Savings	10.67
D	Total Winter Peak MW Savings	0
E	Total Program Expenditures ($000's)	$10,217
F=(E/A)	Cost/kWh Savings (1st Year)	$0.98
G=(E/C)	Cost/MW Saved (Summer) ($000's)	$958
H	Total Participants	35,174
I	Program Benefits ($000's)	$9,545
J	TRC Cost ($000's)	$9,271
K=(I/J)	TRC Ratio	1.03

kWh = kilowatt-hours; MW = megawatts; Participant = actual measure or unit delivered or installed; TRC = total resource cost, a cost-benefit test that measures net cost, including that of participants and utilities, with benefits as avoided costs of generation.

Designed by the Ontario Power Authority in conjunction with the Heating, Refrigeration and Air Conditioning Institute of Canada, the program targeted the more than two million households in Ontario that have central air conditioning. The program was delivered from April to October 2006 (June 30 was the cut-off date for the system tune-up incentive to encourage participation before the cooling season began).

The specific measures included in the program and their associated participation rates are shown in the table below:

Table 3.10: Participants by Measure for 2006 Cool Savings Rebate Program

Measure	Incentive	Participants
▪ Air conditioner tune-up	$50	9,816
▪ ENERGY STAR® air conditioner installations	$500	14,393
▪ Programmable thermostats	$75 (up to)	10,965

A secondary objective of the initiative was to build capability and conservation awareness within the heating, ventilation and air conditioning contractor community. The program also provided training to the contractors on how to effectively market and correctly install measures included in the program, enabling contractors to become effective delivery agents of the program. These objectives were aided by an online orientation and training tool and a standardized tune-up checklist to be used by all participating contractors.

As with the Every Kilowatt Counts program, Oraclepoll completed a pre- and post-program survey to assess the extent to which the program had an impact on consumer behaviour. Following the program's implementation, an additional six percent of respondents indicated that they annually maintain or service their air conditioning units.

The Heating, Refrigeration and Air Conditioning Institute undertook a complete review of the 2006 Cool Savings Rebate Program, which will be available on the Ontario Power Authority Web site shortly: www.powerauthority.on.ca.

The Hot Savings Rebate Program

The Hot Savings Rebate program was developed as an extension to the Cool Savings initiative and focused on reducing the residential electricity demand associated with space heating and cooling. As with the Cool Savings program, incentives were provided to homeowners to replace their existing air conditioning system with ENERGY STAR®-qualified models and to install a programmable thermostat. For the heating season, the Hot Savings Rebate program also provided an incentive to consumers who replaced their existing furnace with a high-efficiency model equipped with an electronically commutated motor. This furnace rebate targeted the 2.5 million homes in Ontario with a low- or mid-efficiency natural gas furnace.

The table below summarizes the reported results of the 2006 Hot Savings Rebate program.

Table 3.11: Results for 2006 Hot Savings Rebate Program

		Reported Results
A	Total Annual kWh Savings (000's)	3,686
B	Total Lifecycle kWh Savings (000's)	55,818
C	Total Summer Peak MW Savings	1.77
D	Total Winter Peak MW Savings	1.18
E	Total Program Expenditures ($000's)	$1,107
F=(E/A)	Cost/kWh Savings (1st Year)	$0.30
G=(E/C)	Cost/MW Saved (Summer) ($000's)	$625
H	Total Participants	4,777
I	Program Benefits ($000's)	$2,572
J	TRC Costs	$1,225
K=(I/J)	TRC Ratio	2.10

kWh = kilowatt-hours; MW = megawatts; Participant = actual measure or unit delivered or installed; TRC = total resource cost, a cost-benefit test that measures net cost, including that of participants and utilities, with benefits as avoided costs of generation.

The program encompassed the entire heating season and was delivered from October 2006 to March 2007. Because of the timing of the program, results are yet to be finalized, as tracking reports are still being collected and tabulated. Table 3.11 above represents results up to December 31, 2006. Following the full tabulation of results, a post-program survey will be conducted to further measure the success of the initiative.

Program cost-effectiveness, as shown in row K of Table 3.11, will continue to improve as the upfront costs associated with program design are further spread over additional program benefits generated in the latter months of program delivery.

The specific measures included in the program and their associated participation rates for the first three months of the program's delivery are shown in the table below.

Table 3.12: Participants by Measure for 2006 Hot Savings Rebate Program

Measure	Incentive	Participants
▪ Programmable thermostats	$75 (up to)	1,685
▪ ENERGY STAR® air conditioner installations	$500	630
▪ Replacement furnace -- high-efficiency models equipped with an electronically commutated motor	$100 (up to)	2,462

As with the Cool Savings program, a secondary function of the initiative was to build capability and conservation awareness within the heating, ventilation and air conditioning contractor community, as well as provide the necessary training to develop skills to effectively market and install the included measures.

For more information on the Hot Savings Rebate program, please visit www.conservationbureau.on.ca.

Secondary Refrigerator Retirement Pilot

The Secondary Refrigerator Retirement Pilot program was offered to six select regions in Ontario from July to September 2006. The program targeted the removal of non-essential, energy-inefficient refrigerators from residential customers. To qualify, refrigerators must have been a minimum of five years old, larger then 10 cubic feet and in working condition. The lessons learned will be used to further develop the program in future years.

The table below summarizes the reported results of the 2006 Secondary Refrigerator Retirement Pilot program.

Table 3.13: Results for 2006 Secondary Refrigerator Retirement Pilot Program

		Reported Results
A	Total Annual kWh Savings (000's)	5,595
B	Total Lifecycle kWh Savings (000's)	33,571
C	Total Summer Peak MW Savings	1.27
D	Total Winter Peak MW Savings	1.34
E	Total Program Expenditures ($000's)	$652
F=(E/A)	Cost/kWh Savings (1st Year)	$0.12
G=(E/C)	Cost/MW Saved (Summer) ($000's)	$513
H	Total Participants	5,235
I	Program TRC Benefits ($000's)	$2,092
J	TRC Costs ($000's)	$1,211
K=(I/J)	TRC Ratio	1.72

kWh = kilowatt-hours; MW = megawatts; Participant = actual measure or unit delivered or installed; TRC = total resource cost, a cost-benefit test that measures net cost, including that of participants and utilities, with benefits as avoided costs of generation.

The pilot incorporated various promotional and marketing techniques as well as incentive levels. Following the program's completion, scenarios were evaluated by identifying customer response and overall program participation on the various offerings. The evaluation of the pilot program concluded with an analysis of lessons learned and a proposed business case on the most cost-effective, province-wide program roll-out in future years to remove the estimated 1.15 million energy-inefficient secondary refrigerators remaining in Ontario homes.

To participate, interested parties called the 1-800 number or accessed the self-service Web site to schedule a pick-up appointment. At the agreed-to time, a contractor would remove the eligible fridge, render it unusable and deliver it to the decommissioning facility. Throughout the process, strict audit controls were enacted to prevent working

refrigerators or their component parts to be sold following pick-up. These audit controls also helped to authenticate participation results. The contractor who removed the refrigerator from the participant's home and the decommissioning agent who officially retired the refrigerator were both responsible for tracking results.

Although not considered a part of the pilot, six local distribution companies within the Niagara-Erie region requested the Ontario Power Authority's support to maximize the operational and cost efficiencies of their own refrigerator retirement programs. As these local distribution companies had fixed budgets, the Ontario Power Authority committed to support budget overruns where program participation exceeded targets. These programs resulted in 1,406 refrigerators being retired, with annual kilowatt-hour savings of 1.5 million and total lifecycle kilowatt-hour savings of more than nine million.

Energyshop.com undertook a complete review of the 2006 Cool Savings Rebate Program, which will be available on the Ontario Power Authority Web site shortly: www.powerauthority.on.ca.

Business Markets

Demand Response 1

In June 2005, the Ontario Minister of Energy directed the Ontario Power Authority to procure 250 megawatts of demand response. Following extensive consultation with industry and subject experts, the Demand Response 1 program was established in June 2006. The first in a suite of three demand response market offerings, this program allows eligible participants to receive a financial incentive for reducing their electricity consumption during peak-demand periods when a high wholesale electricity price exists or when system reliability is jeopardized. The full suite of demand response programs will be ready for market by spring 2007.

The table below summarizes the verified results of the Demand Response 1 program in 2006.

Table 3.14: Verified Results of 2006 Demand Response 1 Program

		Verified Results Aug - Dec 2006[9]
A	Total Nameplate Capacity (MW)	266
B	Total Curtailment Opportunities	97
C	Average Demand Response (MW)	93
D	Peak MW 2006 Curtailment	182
E	Total Curtailment Payments	$3,277,000
F=(E/C)	Cost per MW	$35,237

MW = megawatts

Each month, the Ontario Power Authority posts the strike price, representing the minimum amount that a participant can offer to curtail electricity demand for that month. If unfavourable to a participant, they may submit a revised strike price signifying the exact amount of demand they are willing to curtail in that month. It is at the discretion of the Ontario Power Authority to either accept or decline the proposed strike price, which cannot be below the Ontario Power Authority's determined floor. If declined, the participant will not receive any incentive for curtailment activity during that month.

Curtailment opportunities arise when the Independent Electricity System Operator's three-hour-ahead dispatch price matches or exceeds the Ontario Power Authority-approved strike price of the participant. At this time, participants interested in curtailment must submit a notice to the Ontario Power Authority informing of their intent to partake.

[9] The Demand Response 1 program ran for only five months in 2006. A 12-month program would double the available opportunities for curtailment and, thus, the average cost per megawatt curtailed would also approximately double.

As a voluntary program, participants are not required to engage in demand reductions at every opportunity. It is at the discretion of the participant as to when and for how long they will curtail demand. However, when the participant does curtail demand, they are eligible to receive an incentive for their effort.

To receive this incentive, participants must have demand curtailment verified by a measurement and verification consultant, who is responsible for verifying the amount reduced and the amount owing to the participant for curtailment delivered.

Future demand response programs will be contractual, rather then voluntary. Contractual demand response will eliminate uncertainty around deliverable curtailment and enable more effective management of the electricity system.

PricewaterhouseCoopers is undertaking a process review of the Demand Response 1 program, which will be posted to the Ontario Power Authority Web site when available: www.powerauthority.on.ca .

Results Achieved from Local Distribution Companies' Conservation Programs

In 2006, Ontario's local distribution companies reported substantial overall electricity savings for both consumption and demand, achieved through a large number of diverse and innovative conservation programs. These programs delivered conservation and efficiency improvements to both customers and to the local distribution companies themselves. Lifetime savings of 3.5 billion kilowatt-hours is reported, with first-year savings at 520 million kilowatt-hours and peak-demand reduction of approximately 140 megawatts.[10]

Local distribution company conservation programs covered all sectors – residential, commercial, industrial and institutional – as well as important sub-sectors, including low-income and social housing communities. Additionally, programs targeted efficiency improvements to both the distribution system and local distribution company holdings.

Ontario local distribution companies reported results on more than 580 programs for 2006. Some of these programs consisted of multiple initiatives and could easily have been characterized as multiple programs under an umbrella name.

The most common programs delivered by local distribution companies in 2006 were coupon or financial incentive programs, and information and outreach programs. Other commonly reported programs include workshops and seminars, giveaway or exchange programs, distribution system improvements and smart metering pilots or research. Twenty-one programs were focused on social housing, and 17 on low-income customers.

These results are based on data reported to the Ontario Energy Board in the local distribution companies' 2006 conservation annual reports. The data are from 67 reports, which represent the efforts of 72 local distribution companies. Thirteen annual reports were not available at the time this analysis was completed but represent a small share (four percent) of conservation delivery agents.

The data in these reports reflects information as reported by individual electricity distributors. The reliability of this information depends on the distributor's interpretation of information requirements as stipulated by their individual Ontario Energy Board decisions. The data has not been validated.

[10] IndEco, "2006 LDC CDM program results," May 2007, available on the Conservation Bureau Web site: www.conservationbureau.on.ca.

The table below presents program results by four program categories:

- energy-focused – primarily conservation
- demand-focused – demand management, demand response, distributed generation and load displacement
- local distribution company-focused – power factor corrections (these may be based on actions at customer sites and line loss reductions)
- other – including program administration, research and smart meters.

Table 3.15: 2006 Conservation Results of Local Distribution Companies by Program Type

	Energy Focused Reported Results	Demand Focused Reported Results	Distribution System Focused Reported Results	Other Reported Results	Total Reported Results
Total Annual kWh Savings (000's)	498,472	5,550	17,206	0	521,228
Total Lifecycle kWh Savings (000's)	3,219,905	86,831	230,282	0	3,537,019
Total Summer Peak MW Savings[11]	87	49	5	0	141
Total Winter Peak MW Savings	55	8	0.2	0	64
Total Program Expenditures ($000's)	$35,032	$21,321	$13,819	$1,831	$72,002
Levelized Cost/kWh Savings	$0.011	$0.246	$0.060	0	$0.020
Cost/MW Saved (Summer) ($000's)	$402	$433	$2,908	0.00	$510
Net TRC Benefits ($000's)	$150,587	$46,029	-$5,467	-$1,828	$189,321
TRC Ratio	3.27	3.24	0.64	0.00	2.82

kWh = kilowatt-hours; MW = megawatts; TRC = total resource cost, a cost-benefit test that measures net cost, including that of participants and utilities, with benefits as avoided costs of generation.

[11] IndEco has conservatively estimated the peak-demand savings for Toronto Hydro's Summer Challenge program at 47 megawatts; Toronto Hydro reported only megawatt-hour results. This brings total summer peak-demand reductions delivered by local distribution companies to 141 megawatts, which is different from the results of other analyses for local distribution company demand-reduction impacts in 2006.

4. Other 2006 Conservation Activities

The following initiatives began in 2006 and are expected to yield electricity savings results in 2007.

Small Renewable Energy Projects

The Ontario Power Authority launched the Renewable Energy Standard Offer Program in November 2006. The intent of the program is to help Ontario meet its renewable energy supply targets by providing a standard pricing regime and simplified eligibility, contracting and other rules for small renewable energy electricity generating projects. Projects that are less than 500 kilowatts are considered conservation initiatives.

Since its inception, the program has received an exceptional response. As of April 2007, the Ontario Power Authority had executed 65 contracts, totalling 330 megawatts of electricity from solar, wind, waterpower and bio-energy sources. Of that number, 22 contracts for less than 500 kilowatts each will contribute a total of 153 kilowatts toward the conservation targets.

Combined Heat and Power Conservation Projects

Combined heat and power technology produces both electricity and thermal energy (such as steam and hot water) from a single fuel, most commonly natural gas, at a plant located at or near the end-point of use.

Combined heat and power technologies are efficient because of the ability to recover valuable waste heat produced by electricity generators. Capturing this energy allows it to be used to supply additional loads (such as space, water or process heating) within a facility and offsets the need to power these required processes separately.

Moreover, as combined heat and power plants are located in close proximity to the point of use, they have lower line and distribution losses than those associated with traditional generating equipment.

In 2006, the Ontario Power Authority executed seven combined heat and power contracts throughout Ontario, representing 414 megawatts of generating capacity. Two of the contracts, outlined below, are considered to be conservation projects as they are less then five megawatts in capacity.

Durham College District Energy Project (2.3 megawatts)

The Durham College District Energy Project is a natural gas-fired, 2.4 megawatt combined heat and power facility that will be located at Durham College in Oshawa. In addition to behind-the-meter electricity production, hot water will be provided to Durham College for space heating and hot water supply. The combined heat and power site will be located immediately adjacent to the existing Durham College high-voltage substation. The plant will consist of a single natural gas-fired, reciprocating engine-generator set that emits low nitrogen oxides. A single heat recovery heat exchanger is also included to capture thermal energy from engine exhaust. Noise abatement measures inside the plant will ensure sound levels are kept within established limits.

Warden Energy Centre (5 megawatts)

The Warden Energy Centre is a natural gas-fired, five megawatt combined heat and power facility that will be integrated into the existing district energy system operated by Markham District Energy. In addition to electricity production, the thermal energy recovered from the facility will be used to heat and cool the Markham downtown core, known as the Markham Centre, consisting of commercial, residential and institutional buildings. The key components of the facility include two low-emission, reciprocating engine, natural gas generators. A heat exchanger ensures delivery of heat from the water heat loop to the high-temperature heat loop within the facility. Heat from the exhaust gas is also recovered and combined with the heat recovered from the jacket water for delivery to the district energy system.

The Ontario Power Authority is currently developing a Clean Energy Standard Offer Program, which is expected to be launched in June 2007.

Conservation Fund

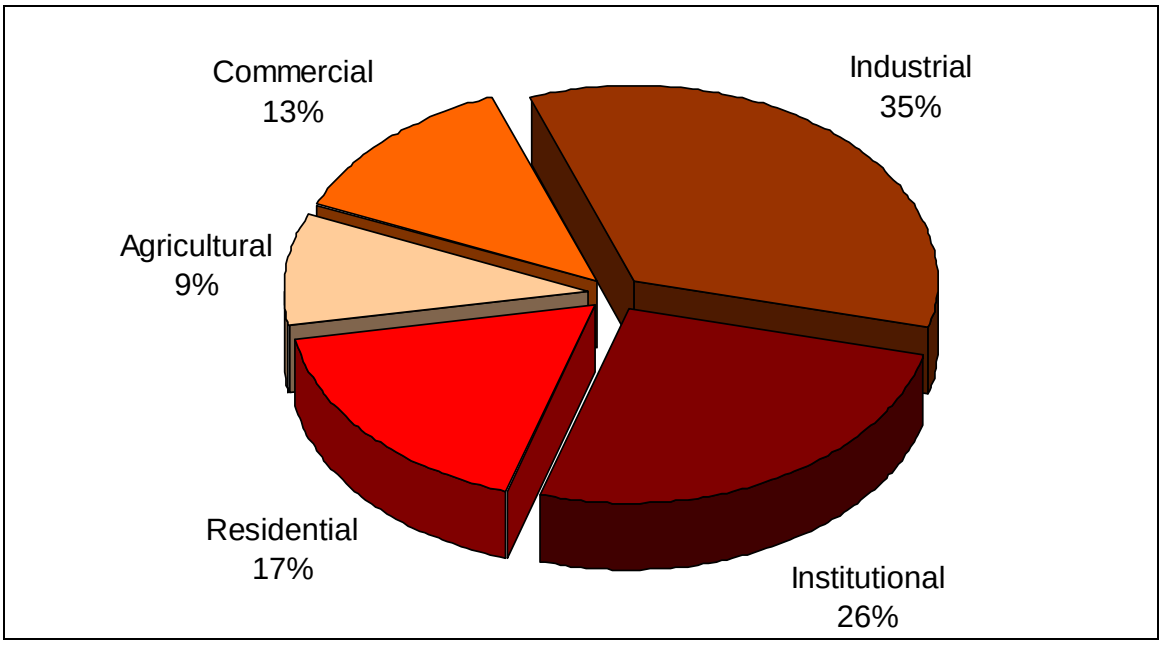
Successful and sustainable conservation is founded on solid research. In 2005, the Conservation Fund was established to provide funding for action-oriented, sector-specific electricity conservation pilot projects. Its goals are to:

- build marketplace capability for the design, delivery, marketing and uptake of conservation programs;
- test new or unique conservation program elements;
- and use the results from pilot projects to help inform the development of future conservation programs.

In 2006, the Conservation Fund committed $1.3 million toward a broad range of sector-specific projects in mining, forestry, agriculture, small business, schools, hospitals and religious consumer segments. Strategic partnerships were also leveraged through the Fund, resulting in an additional $2.6 million in total support being made available for the development of these future conservation opportunities.

From the inception of the Fund in 2005 to the end of 2006, the Ontario Power Authority provided $2.5 million in funding for 37 projects. The breakdown of sector-specific funding is indicated in Figure 4.1 below.

Figure 4.1 – Conservation Fund Allocations to Year-end 2006



For 2007, the Conservation Fund budget is $3 million. To date, about $1.5 million of 2007 funding has been awarded to seven projects.

The Ontario Power Authority works closely with Fund recipients to develop and monitor the projects. The lessons that are learned help inform the development of future

Ontario Power Authority conservation programs. Examples of two Conservation Fund pilot projects that have helped develop conservation programs are outlined below.

Chill Out: Appliance Exchange Program

London Hydro launched a comprehensive appliance exchange program with a target of close to 3,500 refrigerators, freezers and air conditioners. Participants received cash incentives to turn over their inefficient appliances in exchange for energy-efficient models. This program included a primary refrigerator exchange program (homeowners and multi-residential buildings); a secondary refrigerator bounty program (homeowners); freezer disposal (homeowners) and a room air conditioner bounty program.

The lessons learned from this pilot informed the design of the 2007 Great Refrigerator Roundup program.

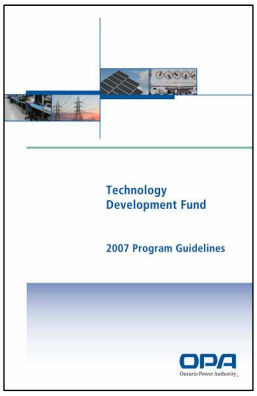
First Nations Conservation Project: Chippewas of Georgina Island

Windfall EcoWorks managed a conservation project targeting the residents of the Chippewas of Georgina Island First Nation reserve, located two kilometres off the southeastern shore of Lake Simcoe. A five-percent electricity demand reduction was achieved by performing home energy audits and a community load analysis, installing appropriate energy-saving measures and creating education opportunities at the community and household level.

Based on the findings of this project, an Ontario Power Authority program has been developed for Aboriginal communities in Ontario to be delivered in 2007, making conservation programs accessible to yet another segment of Ontario's residents.

The first annual review of the Conservation Fund is available on the Ontario Power Authority Web site, along with comprehensive detail on the pilot projects funded to date: www.powerauthority.on.ca.

Technology Development Fund



In 2006, the Ontario Power Authority established the Technology Development Fund to provide funding for projects that promote the development and commercialization of technologies or applications that have the potential to improve electricity supply, conservation or demand management.

The ongoing development of new technologies that can help reduce electricity consumption or demand or provide additional cleaner and/or renewable supply options is a key element of a sustainable, reliable electricity system.

However, since the restructuring of Ontario's electricity market, there has been limited research and development activity in the sector. Policy uncertainty has severely curtailed capital investment, and, as a result, technology progress is limited at a time when Ontario is embarking on unprecedented system planning and reinvestment. The Fund was developed to address this gap.

Applications for financial support from the Fund are made exclusively through one of the Fund's two managing institutions - the Ontario Centres of Excellence for projects involving partnerships with academia and CEA Technologies Inc. for projects not involving partnerships with academia.

The roles of these managing institutions are to:

1. attract promising projects consistent with Ontario Power Authority guidelines;
2. bring these projects to the attention of Ontario Power Authority staff to ensure a fit with the organization's objectives;
3. manage the application process, including working with the applicant to develop a proposal;
4. assemble completed application packages for presentation to the Grant Award Committee;
5. manage the reporting, invoicing and progress of all approved projects.

The Technology Development Fund provides support to these institutions and they, in turn, pool these funds with those of other financial backers to maximize the leverage of these contributions. Ontario Power Authority funding in 2006 leveraged additional support from other sponsors at a rate of approximately $10 to $1.

In 2006, $736,572 in funding was approved for 13 projects. This funding leveraged more than $8 million in partner support. For 2007, the Fund has a budget of $1 million.

The Ontario Power Authority provides guidance to both CEA Technologies Inc. and the Ontario Centres of Excellence regarding funding priorities based on current research commissioned by the Ontario Power Authority for its Integrated Power System Plan or by third parties.

An example of a project funded in 2006 is outlined below.

Developing a Non-Polluting Air Conditioner

Carleton University's engineering department received $99,000 from the Technology Development Fund to investigate and develop heat-driven refrigeration technology for use in home air conditioning, refrigeration and heat pump systems. The total value of the project is $570,000.

The four-stage project, scheduled for completion by March 2008, will produce a prototype based on a double mechanism sorptive refrigeration system. The system involves a solid-liquid-vapour heating process that uses significantly less electricity to lower cooling temperature than is possible in current refrigeration systems, which rely on a vapour recompression cycle.

Unlike most current refrigeration systems, this technology requires no ozone-depleting refrigerants and reduces electricity consumption.

Because this system can work in a moving environment, it has potential applications in the automotive, fishery and aerospace industries.

Developing and commercializing new, energy-efficient ways to keep cool would help reduce Ontario's peak demand and increase system reliability, especially on hot summer days when Ontario's electricity demand is at its highest.

For further information on the Technology Development Fund, please visit the Ontario Power Authority Web site: www.powerauthority.on.ca.