

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

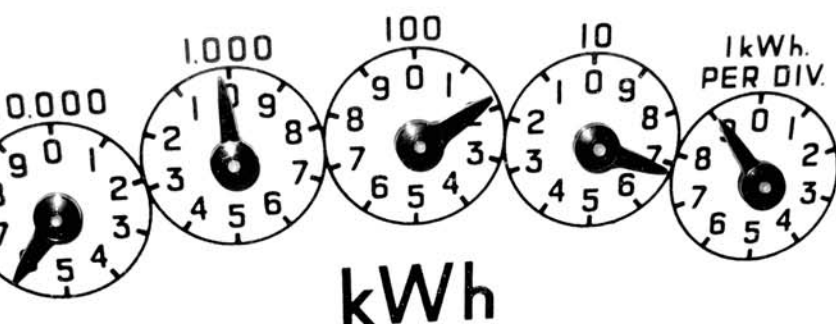
Annual Report 2006
Chief Energy Conservation Officer

Ontario Conservation at a Glance



Highlights

- Ontario electricity consumers have reduced peak demand by approximately 950 megawatts since 2004, including 328 megawatts of naturally occurring conservation.
- Consumers have reduced electricity consumption per capita by 2.5 per cent, weather-adjusted, during the period January to August 2006, compared with the previous year.
- The Conservation Bureau launched 10 programs in 2006, including a demand response program, which on August 1 delivered maximum savings of 182 megawatts, with an average of 133 megawatts over eight hours.
- Energy-efficiency 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 will phase out remaining uses of chloro-fluorocarbons in large refrigeration and air conditioning equipment and chillers, which could save between 50 and 175 megawatts of electricity.
- Conservation programs run by local distribution companies achieved 2005 savings of 121 million kilowatt hours and will result in 868 million kilowatt hour savings over the life of the installed equipment.
- Energy management companies have achieved an estimated 20 megawatts of peak demand reductions in 2005 and in 2006.
- Investment in electricity conservation in Ontario, including the activities of energy management firms and local distribution companies, is estimated at \$300 million to \$350 million per year.
- Ontario received a B+ grade from the Canadian Energy Efficiency Alliance in its 2006 national report card on energy efficiency. This grade is up from a C- in 2004 and represents a significant improvement.



November 1, 2006

The Honourable Dwight Duncan
Minister of Energy
900 Bay Street, 4th Floor
Toronto, ON M7A 2E1

Peter L. Jones
Chairman, Board of Directors
Ontario Power Authority
120 Adelaide Street West, Ste. 1600
Toronto, ON M5H 1T1

Dear Minister and Board:

I am pleased to present the 2006 annual report of the Chief Energy Conservation Officer, in accordance with the requirements under *The Electricity Act, 1998*, amended 2004.

As required under the Act, this report includes:

- a review of the Ontario government's progress in meeting its conservation and demand management targets (chapter 4)
- steps taken to implement the current year's proposals and information on the results achieved (chapter 5)
- the Conservation Bureau's proposals for the upcoming year on steps to:
 - › promote electricity conservation and load management
 - › procure reductions in demand and promote demand management
 - › facilitate the provision of services relating to conservation and load management (chapter 6)
- information on government policy or legislation that results in a barrier to the implementation of electricity conservation measures (chapter 7).

The report also includes information on the Integrated Power System Plan that is under development (chapter 2) and how the Conservation Bureau is building partnerships with the various stakeholders in Ontario's electricity sector (chapter 3). The report explains how a new era of conservation is beginning in the province of Ontario and that the foundation has been laid for a culture of conservation.

Sincerely,



Peter Love
Chief Energy Conservation Officer

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A Message from the Chief Energy Conservation Officer

A new era in electricity conservation is beginning in Ontario. This is the good news that I have the pleasure to report in this, my second annual report as Ontario's Chief Energy Conservation Officer. Research and early program results tell us that more and more Ontarians are aware of the important role that conservation and demand management can play in creating an adequate and reliable electricity system that reflects safety, and environmental sustainability and protection. What's more, many consumers, communities, businesses, institutions and governments are doing their part to actively conserve electricity in the province.



Together, we are building a solid foundation to achieve and potentially exceed Ontario's targets of 6,300 megawatts of peak electricity savings by 2025 and to create a culture of conservation in Ontario.

A culture of conservation means using electricity in a wise and efficient manner where we live, work, shop, play and learn. This culture encompasses more than awareness about conservation, although attitudes and behaviours are key parts. It also includes the way our environment is structured—the institutional, regulatory and legal infrastructure—to enable us to use electricity wisely. This will ensure that the conservation gains we make today will be sustained over time.

The Conservation Bureau of the Ontario Power Authority is a leader in the effort to maximize conservation to help meet future electricity needs and assist consumers to change the way electricity is used in the province. Achieving these targets won't happen overnight—it will take time, careful planning and the participation of all sectors in the province, as well as all levels of government. Ontario is at the beginning of this journey.

An update on the conservation activities and programs of the Ontario Power Authority, the Ontario government, local distribution companies and other market players is included in this report. We are proud of the many successful initiatives and programs the Conservation Bureau has fostered during this past year. We also recognize and support the initiatives of the Ontario government, local distribution companies and other market players that are helping Ontario to overcome its recent history of inattention to conservation. Our success is not only measured in what we have accomplished; it is also measured in what we have learned. What we have learned during the past 18 months, by doing and by working with our partners, will enable us to make our future efforts more effective in meeting Ontario's conservation targets.

Some important structural changes have occurred recently that have removed significant barriers to achieving our conservation targets—improvements to the Ontario Building Code, and centralizing in the Ontario Power Authority the coordination and funding of conservation and demand management activities by local distribution companies. These are definitely steps in the right direction that will make the overall conservation effort much more effective in the long run.

There are also other elements that are helping our efforts. We are encouraged by the enthusiasm and good participation rates for programs, particularly at the grassroots level. We are finding there are many potential delivery channels for conservation and demand management, so we can anticipate a broad-ranging market. And our partners, in particular manufacturers and retailers, are beginning to see the value proposition for energy-efficient products.

I'm pleased to report that Ontario has received a B+ grade from the Canadian Energy Efficiency Alliance in its sixth national report card on energy efficiency. The Alliance identifies government performance on energy efficiency and highlights the importance of providing the necessary mechanisms to support energy efficiency in the marketplace. This grade is up from a C- in 2004 and represents a significant improvement. This is another indicator of the new era of conservation that is beginning in Ontario.

Some barriers still remain. The many programs and messages in the market provide conflicting signals and potentially duplicate programming. There is currently no consistent method of reporting results among market participants, so measuring results remains difficult. Reliable results are important to be able to track progress and make improvements. The Conservation Bureau will take a leadership role in managing and coordinating conservation efforts, and in establishing standards for reporting results and evaluating programs.

To help achieve and exceed Ontario's conservation targets, the Conservation Bureau will continue to work toward its strategic objectives to enhance capability, acquire resources through market intervention and transform the market to a culture of conservation. We will also contribute to the development of a comprehensive Integrated Power System Plan that will address conservation across the province in addition to generation and transmission.

With all Ontarians doing their part, we can achieve a future for electricity that is bright, sensitive to the environment and supports a strong economy.

A handwritten signature in black ink, reading "Peter Love". The signature is written in a cursive, flowing style.

Peter Love

Chief Energy Conservation Officer

November 2006

Chapter 1. Introduction

This report describes the new era of conservation that is beginning in Ontario. It presents information on the players in the conservation market, how conservation results are being achieved, the Ontario Power Authority's and the Conservation Bureau's roles in 2006, how the Ontario Power Authority plans to continue to work toward Ontario's conservation targets in 2007 and what barriers exist to electricity conservation.

Ontario's electricity challenge

Ontario's electricity sector has reached one of the most challenging points in its history. Electricity consumption across the province has been growing at about one per cent yearly, and at a much higher rate in the Golden Horseshoe area. With Ontario's economic growth expected to average 2.9 per cent over the next five years, the demand for electricity supplies will continue to grow.

Over the next 20 years, approximately 80 per cent of the province's existing electricity supplies will need to be replaced with some combination of new supply, and conservation and demand management. In addition to concerns about reliability, there are increasing concerns about the impact of conventional electricity generation on the environment. In recognition of these concerns, *The Electricity Act, 1998*, which was amended by *The Electricity Restructuring Act, 2004*, states that the Ontario Power Authority shall "ensure that safety, environmental sustainability and environmental protection are considered..." in electricity system planning.

The profile of electricity conservation has grown for a number of reasons. These include growing concerns about climate change and environmental impacts caused by electricity generation;

international discussion about the decline in the economic availability of non-renewable resources (e.g., crude oil and natural gas); and the blackout of 2003, which reminded consumers how vital electricity is to our way of life. In response to these drivers, many people have continued to advocate for conservation and renewable energy. The Government of Ontario responded by establishing conservation targets, creating the Conservation Bureau and empowering local distribution companies to deliver conservation programs. These have all contributed to increasing both awareness of and commitment to conservation activities.

Investing in conservation defers or displaces some of the need to invest in new generation and transmission, and brings about many economic and environmental benefits. Customers benefit from conservation through savings in their electricity costs. On a per-megawatt basis, conservation investments are often less expensive than investments in new supply and can be implemented faster.

What is conservation and demand management?

Conservation typically refers to reducing the amount of electricity used, and demand management refers to affecting the volume and timing of electricity used. They are essential components of Ontario's electricity future. The Government of Ontario has adopted a broad definition of conservation that includes conservation behaviour, energy efficiency, demand management, fuel switching, and self generation and cogeneration.

Conservation has a significant role to play in creating a reliable, affordable and sustainable electricity system, which is necessary to maintain a prosperous Ontario. Conservation is an important part of the electricity supply mix.

Conservation programs can affect both electricity consumption and demand. **Consumption** is the volume of electricity used over time and is expressed in kilowatt hours. **Demand** is the total amount of electricity needed by the system at a given point in time and is expressed in megawatts. The electricity system in Ontario must have the infrastructure necessary to meet peak demand. In recent years, the highest demand has occurred on hot, humid summer days because of the increasing use of air conditioners. It is important for Ontario's electricity future that both demand and overall consumption are managed.

Information and results are presented in this report for the period from October 1, 2005, to August 31, 2006, where the information was available; some results that are reported on a quarterly basis were only available to June 30, 2006. For simplicity, the word "conservation"

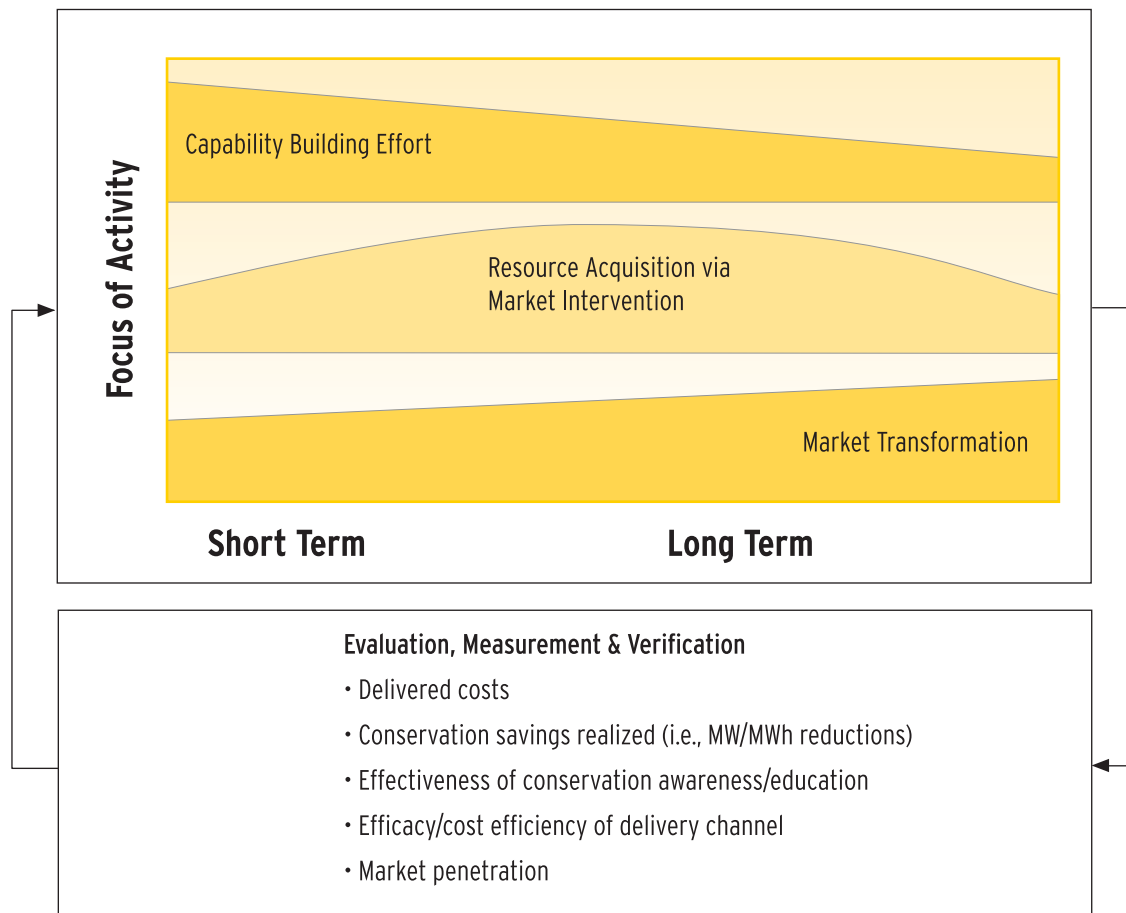
in this report is used to mean both conservation and demand management activities.

How conservation is achieved

Conservation will be achieved when consumers in all sectors—residential, commercial, institutional, industrial and agricultural—use Ontario's electricity more efficiently. To ensure that targets are met in a reliable, affordable and dependable way, the Ontario Power Authority has adopted a long-term, strategic approach to conservation that involves capability building, resource acquisition through market intervention and market transformation. A mix of these efforts will be needed to reach the long-term savings target of reducing peak electricity use by 6,300 megawatts by 2025 and to create a culture of conservation in Ontario. Figure 1.1 on the following page depicts the Conservation Bureau's conceptual approach to delivering conservation in Ontario.

Capability building has three main facets: ensuring the presence of skills and knowledge necessary to develop and deliver effective conservation programs; enhancing the skills of channel partners and other market players and increasing the information available to them; and building the capability of electricity consumers to manage their electricity consumption. An example of a capability building program element is training contractors such as air-conditioning installers to sell energy efficiency.

Figure 1.1. – Conceptual Approach to Delivering Conservation in Ontario



Source: Ontario Power Authority

Resource acquisition is when energy and capacity savings are realized through active market intervention across all sectors. Examples include offering rebates for the purchase of energy-efficient appliances or payments to commercial or industrial customers for reducing demand during peak periods.

Market transformation occurs when a desired conservation practice or product dominates the market. This may be the result of economic forces, changes to codes and standards or both. This ensures that energy and capacity savings are sustained over time and do not disappear at the end of programs. An example of a market transformation element is increasing the minimum standard for the energy efficiency of central air conditioners.

Evaluation, measurement and verification

Evaluation, measurement and verification are key components of achieving both peak savings targets and long-term capability building. All programs should include an evaluation system that will monitor and assess their success. This will require performing and distributing periodic program and process evaluations that verify project installation, measure the level of energy and peak demand savings achieved and assess the program's cost-effectiveness. The evaluation and measurement results will be used to improve or eliminate program designs and processes and to reallocate funds from poor- to high-performance programs. These evaluation efforts will contribute to ensuring that conservation programs are delivered in an economically prudent and cost-effective manner.

Conservation categories

A variety of conservation categories are available to help achieve Ontario's conservation targets. They include:

Conservation behaviour—*reduced use*

Programs in this category are aimed at changing customer behaviour to reduce the amount of electricity consumed over time using technology already in place. They provide customers with tools and information to reduce their electricity use. Turning lights off, keeping the air conditioning temperature higher and using power bars to limit power loss while appliances are off are all examples. In an industrial context, a conservation program may involve changing business processes.

Energy efficiency—*more efficient use*

Energy-efficiency programs introduce new technologies and measures that reduce the electricity used by specific end-use devices and systems without reducing the quality of services provided, i.e., the same or greater levels of service are achieved using less energy. Energy-efficiency programs seek to encourage customers or builders to invest in more efficient designs or equipment.

Demand management—*curtailed use*

Demand management programs are those that result in reduced peak electricity demand by customers from their normal consumption patterns. This is accomplished either by **load shifting**, which is moving use from one time of day to another, or **peak clipping**, which is reducing the amount of electricity used at times of high wholesale market prices or when system reliability is jeopardized.

Fuel switching—*switched use*

Fuel switching involves capital investment to switch from using electricity as a source of energy to using other fuels for a given application, carried out in a manner that reduces total energy consumption.

**Self generation or cogeneration—
*reduced use by on-site generation***

Self generation is where users install a supply source, such as solar photovoltaic panels, wind turbines, fuel cells, micro-turbines, natural gas-fired backup generators or other new and innovative technologies, to meet part or all of their electricity needs. The energy generated meets on-site needs and displaces the need for electricity from the grid. It includes applications using net metering, behind-the-meter micro-scale generation and renewable energy generation under 10 kilowatts. Wholesale generators who generate electricity solely to sell to the grid are not included in this conservation category.

Some consumers who have a need for both electricity and heat can take advantage of cogeneration technologies, where the heat exhaust from electricity generation is used for heating. The production of electricity and heat is far more energy efficient when combined into a single process. Cogeneration under 10 megawatts is considered conservation.

Conservation tools

A variety of tools is available to achieve the electricity savings potential of each of these conservation categories. These tools can be used alone or in combination. They include:

Regulatory

- energy-efficiency codes and standards
- taxes and other legal tools

Financial

- pricing mechanisms
- financial incentives
(e.g., rebates, loans and coupons)

Technology

- energy management tools, such as controls
- measures that provide energy-efficient products to consumers

Marketing

- information and audits
- marketing and awareness programs.

Table 1.1 summarizes the essential components, discussed above, necessary to achieve conservation targets. It defines the various elements that are used to build effective conservation programs to achieve electricity savings.

Table 1.1 – Anatomy of a Conservation Program

Resource to be conserved	Conservation categories	Tools	Program elements to make conservation dependable			Target outcomes	
Customer's end use by sector	Conservation	Regulatory • energy-efficiency codes and standards • taxes and other legal tools	Capability building	Resource acquisition	Market transformation	Megawatt hours consumption savings and megawatt demand savings	Culture of conservation
	Energy efficiency						
	Demand management	Financial • pricing mechanisms • financial incentives (e.g., rebates, loans and coupons)					
	Fuel switching	Technology • energy management tools, such as controls • measures that provide energy-efficient products to consumers					
	Self generation or cogeneration	Marketing • information and audits • marketing and awareness programs					

Program implementation

To ensure that conservation results are achieved, customers from all sectors across the province must be engaged. In addition, a broad spectrum of players, such as program designers, implementers, managers and partners, including channel market participants, non-governmental

organizations, local distribution companies, governments, trade allies, community groups and more, will be needed in the conservation market. To meet Ontario's targets, conventional delivery channels must be used, innovative approaches must be explored and examples from other jurisdictions must be examined.

Chapter 2. Conservation Targets

Ontario's conservation goal is to achieve as much cost-effective demand savings as possible. The Government of Ontario has set two high-level targets for conservation in Ontario, namely:

- **achieve 6,300 megawatts of savings in peak electricity use by 2025, which includes interim targets of 1,350 megawatts reduction in peak demand by 2007 and a further 1,350 megawatts by 2010¹**
- **create a culture of conservation in the province.**

There has been definite progress made toward achieving these targets, as a new era of conservation begins in Ontario. Details of this progress are described later in this report. While meeting these targets is the responsibility of all electricity consumers and participants in the marketplace, the Ontario Power Authority has been given a leadership role. The Integrated Power System Plan currently being developed by the Ontario Power Authority will outline an action plan to achieve Ontario's conservation targets by 2010, as well as provide guidance for the long term.

Until the plan is approved, *The Electricity Act* authorizes the Ontario Minister of Energy to set out specific conservation initiatives for the Ontario Power Authority to undertake. These directives authorize the Ontario Power Authority's expenditures on various programs. This is a transitional mechanism until the approved Integrated Power System Plan is in place.

Since June 2005, the minister has issued eight conservation directives to the Ontario Power Authority; seven of them identified priority areas for program activity. These directives are summarized in Table 2.1. The last, issued in July 2006, enables the Ontario Power Authority to fund conservation programs for local distribution companies. Up to \$400 million will be allocated to these programs over three years. This will provide stable and secure funding to local distribution companies for these activities, streamline program accountability and increase the Ontario Power Authority's ability to coordinate conservation activities across the province.

Developing the Integrated Power System Plan

One of the statutory responsibilities of the Ontario Power Authority is to create a long-term Integrated Power System Plan for Ontario. In May 2005, the Minister of Energy requested recommendations on Ontario's electricity supply mix from the Ontario Power Authority. The recommendations were to include conservation targets, additions of new renewable energy and an appropriate mix of electricity supply sources. In December 2005, the Ontario Power Authority submitted its *Supply Mix Advice Report*.²

Table 2.1 – Ontario Power Authority Directives, June 2005 – July 2006

Date received	Focus	Target (in megawatts)
June 15, 2005	Demand side management and demand response programs across Ontario	250
October 6, 2005	Residential low-income/social housing demand side management programs	100
October 20, 2005	Appliance exchange and efficient lighting demand side management programs	100
February 9, 2006	Demand side management and demand response programs across Ontario amendment to increase the June 15, 2005, directive to 500 megawatts	250
February 10, 2006	Toronto demand side management programs	300
March 10, 2006	Commercial buildings and municipalities, universities, schools and hospitals demand side management programs	150
March 10, 2006	Electrically heated houses and other residential upgrades demand side management programs	150
July 13, 2006	Local distribution companies' conservation and demand management funds	Not identified

Following consultations with the public, stakeholders and the electricity industry, the Minister of Energy formally responded to the recommendations in the report in June 2006 by setting out targets to be addressed in the Integrated Power System Plan, including targets for conservation and renewable resources. The text of the minister's directive is available on the Ontario Power Authority's Web site.

The government's response to the Ontario Power Authority's recommendations will form the basis for the Integrated Power System Plan. As an integrated plan, it will examine possible solutions for meeting Ontario's power requirements over the next 20 years within the context of meeting the goals set out in the June 2006 supply mix directive, including:

- conservation and demand management
- new generation, including renewable and conventional resources
- transmission enhancement and imports.

This will be the first such plan in Ontario in 15 years and is a major milestone in the development of Ontario's future electricity system. The Ontario Power Authority is the province's planning authority for electricity, charged with developing an integrated plan for the entire electricity system in Ontario and with championing energy conservation in the province. The Ontario Power Authority has no commercial interest in any specific projects; its sole objective is to plan a system that delivers the best outcome for Ontario consumers based on the policy guidelines it has been given.

The Integrated Power System Plan will implement the government's supply mix direction. The draft plan should be completed in January 2007 for public consultation, and the final plan is expected to be filed with the Ontario Energy Board in March 2007. The Ontario Power Authority launched the stakeholder consultation process for the plan in July 2006 with a feedback session that followed the release of the first discussion paper, on the plan's scope and overview. Further public consultations will be held throughout the balance of 2006 and into 2007 on various elements of the Integrated Power System Plan.

Meeting conservation targets

The key to achieving Ontario's long-term conservation goal is the transformation of the market to a culture of conservation in Ontario. This will be accomplished through transforming policies, codes, standards and markets, as well as building and enhancing capability, and developing and delivering effective programs. The Integrated Power System Plan will set out the conservation potential for the various conservation categories (conservation, energy efficiency, demand management, fuel switching and self generation), as well as a preferred mix of targets for each category from the present to 2025.

A key analytical input for this process is a national study on demand side management potential in Canada, commissioned by the Council of Energy Ministers Demand Side Management Working Group in 2005.³ The Ontario Power Authority had the results of this study tailored for Ontario, producing a detailed analysis of the energy savings for the residential, commercial and industrial sectors by end use. This study models the potential savings mainly from the energy efficiency and cogeneration conservation categories.⁴ The Ontario Power Authority undertook additional research to determine potential of other categories.

To understand the impact of these energy savings on peak demand and capacity requirements, a portfolio of end-use profiles was used to translate annual energy savings into hourly demand, based on end use and sector.⁵ Table 2.2 provides estimates of the achievable potential for two scenarios examined.

This information will help the Ontario Power Authority focus its efforts and develop programs for these conservation categories.

*Table 2.2. – Achievable Potential Savings in Megawatts**

Category		2010	2025
Low case scenario	Conservation	50	50
	Energy efficiency	431	958
	Demand management	199	674
	Fuel switching	108	503
	Self generation/cogeneration	83	117
High case scenario	Conservation	350	350
	Energy efficiency	1,032	4,583
	Demand management	546	2,384
	Fuel switching	108	503
	Self generation/cogeneration	197	1,015

Source: M.K. Jaccard and Associates, Inc. Modelling and Scenario Ontario Report, July 2006, and the Ontario Power Authority

**Potential savings are at the generator. Savings from each conservation category may not sum due to interaction effects if the same customer chooses to participate in more than one category.*

Chapter 3. The Conservation Market

The conservation market is the buying and selling of conservation goods and services by consumers, channel partners and conservation program designers and implementers. An active market is vital to ensuring that conservation becomes a reliable and dependable way of meeting the province's electricity needs.

The conservation market in Ontario is not currently well developed but will evolve and mature as the new era of conservation continues in the province. A sophisticated, well-functioning market will not be created overnight—it will take years of consistent, sustainable action and investment to create the necessary trust and capability. The Conservation Bureau has identified building and enhancing conservation capability in the market as a significant priority for Ontario in 2006 and beyond. One way of measuring success in this area is to monitor conservation awareness and action in Ontario.

The current conservation market in Ontario relies on a mix of central planning and intervention, as well as free market activity. Three main groups of market participants have been identified:

1. Governments and utilities, including conservation policy-makers, system planners, program designers, program implementers and evaluators
2. Private market and non-governmental organizations, including channel market participants who manufacture, sell, deliver and install appliances and equipment that use electricity; program designers and implementers; and energy management companies
3. Electricity consumers in all sectors—residential; commercial and institutional; and industrial and agricultural.

Status of the conservation market

The Conservation Bureau commissioned a review of the status of the conservation market in Ontario.⁶ This review involved sampling Web sites, reviewing documents, surveying organizations and interviewing individuals, and it encompassed all sectors defined by the Ontario Power Authority—residential, commercial, institutional, industrial and agricultural. The report found that the conservation market appears to be in the early stages of development. It concluded that there is a significant foundation developing for a sustainable and thriving culture of conservation in Ontario, with multiple parties participating in a variety of initiatives. These include small, single-focused local programs as well as province-wide, multi-faceted initiatives, and they reflect the fact that conservation is on the agenda of institutions, businesses and homeowners.

Anatomy of the conservation market

The Ontario conservation market is currently changing. This chapter highlights some of the energy conservation participants and how they are achieving conservation results and creating a culture of conservation. The Conservation Bureau applauds their initiatives and looks forward to working with them in the future.

Government and utilities

Ontario Ministry of Energy

The Ontario Ministry of Energy has primary responsibility for setting energy policy, including conservation targets, and for enacting regulations under the *Energy Efficiency Act* to set minimum energy-efficiency standards for selected products. The ministry is responsible for *The Electricity Act*, the *Ontario Energy Board Act, 1998*, and the *Energy Conservation Leadership Act, 2006*. It also is responsible for the Community Conservation Initiatives Program, which was launched in September 2006 and is dedicated to supporting community-based, grassroots conservation projects with a focus on education, outreach and action-oriented initiatives.

Federal Government

Natural Resources Canada's Office of Energy Efficiency provides information on energy conservation, energy efficiency and alternative fuels. The Office also regulates the energy-efficiency performance of equipment by setting minimum energy performance standards and ensuring compliance. The Office has managed a number of energy-efficiency and alternative fuels programs aimed at the residential, commercial, industrial and transportation sectors. It offers financial incentives, workshops, data interpretation and publications to help Canadians save energy. Programs offered by the Office of Energy Efficiency for homeowners include the R-2000 standard for home construction and the EnerGuide/ENERGY STAR® equipment labelling program that provides comparative information on energy-efficiency performance on a range of products. For industry, programs have included EnerGuide



East Gwillimbury, a leader in building standards

On March 20, 2006, East Gwillimbury became the first municipality in Ontario to have a minimum energy-efficiency requirement for all new residential development. Municipal policy now states that residential developers of 10 or more units must construct them with ENERGY STAR®

qualification. Typical ENERGY STAR® homes contain high-efficiency heating, hot water and air conditioning systems; insulation upgrades; higher performance windows; better draftproofing and features that reduce electricity demand by 1,000 kilowatt hours a year. These homes consume 30 to 40 per cent less energy and reduce greenhouse gas emissions by two to three tonnes per year. Shown above, Chief Energy Conservation Officer Peter Love (r.) presented a Certificate of Recognition to East Gwillimbury Mayor James R. Young.

for Industry and the Industrial Building Incentive Initiative. The Energy Retrofit Assistance program provided incentives for existing buildings and the Commercial Building Incentive Program provided incentives for new commercial and institutional buildings. The future role of the Office in promoting energy efficiency is currently under review.

Municipalities

Municipalities are program designers and implementers, as well as electricity consumers. Large cities have created municipal infrastructures to design and implement substantive conservation programs (e.g., Toronto and the Better Building Partnership). Some local programs are aggressively addressing supply constraints as well. Examples include the Town of Shelburne's Reduce the Juice program, Hamilton's Green Venture initiative, Guelph's focus on community energy planning and Peel Region's leadership in integrating energy-efficiency upgrades as part of their facilities renewal program.

East Gwillimbury is a leader in innovative environmental policy and has set a standard for all governments to follow (see sidebar). This policy ensures that residents are insulated against rising energy costs and won't have to make costly energy-efficiency upgrades in the future.

Ontario Power Authority and Conservation Bureau

The Ontario Power Authority commenced operations in January 2005. In pursuit of its mandate of ensuring an adequate, long-term supply of electricity for Ontario, it creates and implements conservation programs, ensures adequate investment in new supply infrastructure, performs long-term electricity system planning and facilitates the development of a more sustainable and competitive electricity system.

The Conservation Bureau is a part of the Ontario Power Authority and provides leadership in planning and coordinating electricity conservation in Ontario. The Conservation Bureau's main

focus is on conservation and demand management, public and legal advocacy and reporting. It helps to coordinate conservation market participants and aims to create consistency in the market, as well as serving as a reliable source of information.

In a presentation to stakeholders on the Ontario Power Authority's 2007 business plan, it was projected that 49 per cent of the Ontario Power Authority's operating budget will be dedicated to conservation activities, in order to help it to meet the challenge of Ontario's aggressive conservation targets.⁷ The Ontario Power Authority recently reorganized work assignments to better integrate conservation initiatives into the planning and operation of all its business units and reflect the size of the Ontario Power Authority's budget for conservation activities relative to its total budget. Personnel with skills in, for example, procurement, planning, program design and program management were repositioned to enhance the use of existing resources to support conservation endeavours throughout the organization.

Independent Electricity System Operator

The Independent Electricity System Operator is responsible for managing Ontario's bulk electricity system and operating the wholesale electricity market. It balances the supply of and demand for electricity in Ontario in the near term and then directs the electricity flow across the province's transmission lines. The Independent Electricity System Operator connects with all participants in Ontario's electricity system—generators, transmitters, retailers, industries, businesses, residents and local distribution companies.

Ontario Energy Board

The Ontario Energy Board is responsible for regulating natural gas and electricity utilities, including setting just and reasonable rates. It also licenses all participants in the electricity sector as well as natural gas marketers who sell to low-volume customers. In the electricity sector, the Board sets transmission and distribution rates, and approves the revenue requirement and fees for the Ontario Power Authority and the Independent Electricity System Operator. It also sets the rates for the Regulated Price Plan for residential and small business consumers.

Social Housing Services Corporation

The Social Housing Services Corporation is a not-for-profit, independent corporation created by provincial legislation in 2002 to support social housing in Ontario. It offers programs and services in energy management, bulk purchasing, insurance, investment and information to help service managers and housing providers manage housing programs. It has a central role in promoting conservation and energy-efficiency measures in the social housing sector.



Peaksaver™

Peaksaver is an innovative voluntary program by Toronto Hydro to help residents and small business customers reduce demand on Toronto's electricity system. A wireless Peaksaver switch is installed on central air conditioning units and, during peak times, a signal is sent to reduce the amount of electricity required. Without noticing a significant temperature difference, participants are doing their part to conserve energy without any further time, effort or cost. As of August 31, 2006, 22,400 customers had enrolled in the program, and 13,600 switches had been installed. The potential peak demand savings for customers with switches already installed is estimated to be 16 megawatts and could be as high as 31 megawatts once all installations for customers currently enrolled are complete.

Local Distribution Companies

Of the 91 local distribution companies in Ontario, 80 have conservation plans that have been approved by the Ontario Energy Board. The role of these companies in conservation is evolving and will continue to grow. Local distribution companies offer a direct and respected channel to consumers, are recognized as trusted sources of information, and their reach spreads across every sector.

Three coalitions have formed among the local distribution companies to coordinate their approach to conservation.⁸ The coalitions are:

- 1) The Coalition of Large Distributors, which consists of the six largest municipally owned electricity utilities in Ontario, representing approximately 1.6 million customers
- 2) Cornerstone Hydro Electric Concepts, which includes 16 local distribution companies, representing approximately 140,000 customers

- 3) Niagara Erie Power Association, which includes 11 electricity distributors in the Niagara-Erie region, representing approximately 225,000 customers.

These three groups plus Hydro One represent about 80 per cent of the residential electricity consumers in Ontario.

These coalitions have worked and supported their members in different ways, including creating steering committees and providing outreach support to smaller utilities (in the case of the Coalition of Large Distributors), and providing approved lists of initiatives from which to choose (in the case of the Cornerstone Hydro Electric Concepts). Another approach to conservation programs is co-branding. The Coalition of Large Distributors and the Ministry of Energy launched a significant initiative in 2006 under the brand "powerWISE" to promote energy conservation to consumers. The first year of powerWISE's conservation efforts resulted in enough energy

savings to power more than 12,250 Ontario homes, according to the *powerWISE 2005 Progress Report*. In 2007, the Conservation Bureau plans to build on this initiative and develop common and consistent marketing strategies to raise consumer awareness and understanding of energy consumption and to influence their attitudes and behaviours toward the wise use of electricity.

For the next three years, local distribution companies will obtain conservation funding through the Ontario Power Authority. This will allow for streamlined accountability and better enable the Conservation Bureau to coordinate program delivery across the province.

Private market participants and non-governmental organizations

Channel Market Participants

All channel market participants, including manufacturers, architects, designers, contractors, importers, suppliers, retailers, energy management companies and installers, have a role to play in the conservation market. Ensuring that

these participants know and understand conservation is crucial to moving toward a culture of conservation. The Conservation Bureau and local distribution companies procure conservation savings through channel market players.

Trade Associations

Trade associations actively work to address the needs of their members and are taking a lead role in conservation information and program delivery. They also work to improve energy-efficiency codes and standards. Trade associations provide a convenient way of accessing multiple geographically dispersed channel partners, which is helpful to program planners and administrators. For example, for the Cool Savings program, the Ontario Power Authority worked with the Heating, Refrigeration and Air Conditioning Institute to help recruit air conditioning installers across the province as delivery agents in the program.



Greening health care

The Toronto Region Conservation Authority is developing and rolling out an on-line template that provides hospitals with a standardized, practical approach to preparing energy conservation plans, which will soon be required under provincial legislation. The template will be piloted in hospitals across the province, including Baycrest Hospital in Toronto, shown here. The intent is to provide every hospital with the means to prepare its own customized energy conservation plan, based upon its current benchmarked performance and identified energy conservation opportunities. The hospitals will then be able to use the system to monitor their actual monthly energy savings.

Energy Management Companies

Energy management companies address the needs of institutions that do not have the required capital for energy-efficient building improvements by financing capital projects that are paid back through savings on utility bills. Examples of major energy management companies in Ontario include Ameresco, Direct Energy Business Services, Eco-System, H.H. Angus and Associates, Honeywell, Johnson Controls, MCW, Optimira Energy, Ozz Corporation, Siemens, Toronto Hydro Energy Services and Trane.

Demand Aggregators

Demand aggregators are firms that contract with individual customers to reduce their peak electricity demand. This reduction is achieved by providing monetary or other forms of rewards. Aggregators then sell the aggregated peak demand savings to system operators such as the Independent Electricity System Operator or the Ontario Power

Authority on a contracted basis. Two current examples of aggregators in Ontario are Milton Hydro, which participates in the Independent Electricity System Operator's Transitional Demand Response Program, and Rodan Energy, which was the successful bidder in the Ontario Power Authority's request for proposals for demand response in York Region.

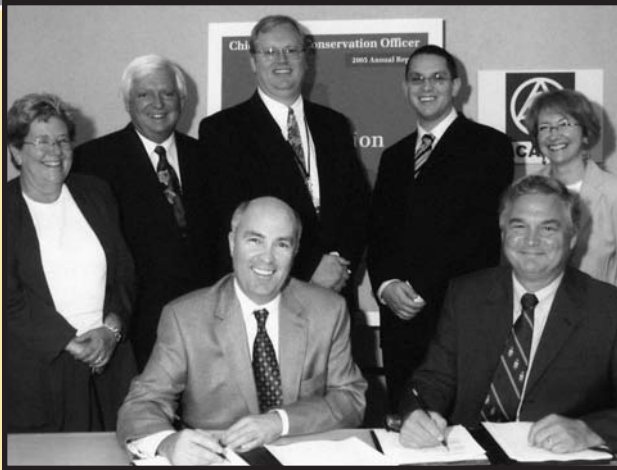
Non-Governmental Organizations

Non-governmental organizations play a key role in this marketplace as advocates, organizers, networks and program deliverers. Many are grassroots organizations that have credibility in local communities and can help build a culture of conservation in the province. The Conservation Bureau recognizes the efforts of the Canadian Energy Efficiency Alliance, the Canadian Green Building Council, the Clean Air Foundation,



Energy efficiency in commercial buildings

The Building Owners and Managers Association of Canada is the voice of the Canadian commercial real estate industry, with more than 2,500 members in regional associations across Canada. The association's Go Green Environmental Certification program is a voluntary program designed for existing or occupied buildings. It is offered by the Building Owners and Managers Association of Canada as a service to all member and non-member commercial building owners. The certification requirements include an energy audit and an energy reduction plan (www.bomagogreen.com/gg.html). The Conservation Bureau is launching a program with the Building Owners and Managers Association of Toronto to retrofit existing commercial buildings to improve their energy efficiency.



Energy Secretariat leads conservation efforts in the Ontario college system

Ontario's college system is the first public-sector system in the province to launch an energy secretariat to oversee energy conservation for the entire sector. The secretariat was created to develop action plans and manage projects to support energy efficiency in the 24 colleges across the province. Working closely with colleges, the secretariat finds

sources of funding for projects and implements specific programs to help manage energy costs. In addition, the secretariat creates opportunities for bulk purchases of services and equipment related to conservation and retrofit projects. This project is being funded by the Ontario Power Authority's Conservation Fund. Like other Conservation Fund projects, this initiative can be replicated and serve as a model for conservation efforts in the municipalities, universities, schools and hospitals sector. Celebrating the creation of this position were (l. to r., standing) Carol Anderson of Humber College, Laurie Trewartha of Power Application Group Inc., Harry Bakker of Fanshawe College, Chris Trewartha of Power Application Group Inc., Caroline Donkin and (seated, l. to r.) David Lindsay, both of the Association of Colleges of Applied Arts and Training of Ontario, and Peter Love, Chief Energy Conservation Officer.

the Clean Air Partnership, the Conservation Council of Ontario, Green Communities Canada, the Ontario Clean Air Alliance, Pollution Probe, Sustainable Buildings Canada, the Toronto Atmospheric Fund and the Toronto Region Conservation Authority for keeping conservation alive in the absence of initiatives by government and utilities and for helping to bring in this new era of conservation.

Natural Gas Distributors

Natural gas distributors have been active in the conservation market since 1995. Both Enbridge Gas Distribution and Union Gas continue to play a role in achieving electricity savings as part of their program to reduce natural gas consumption.

Electricity consumers

Consumers are at the core of the conservation market. Consumers are typically grouped into three sectors: residential, commercial and institutional (this includes municipalities, universities, schools and hospitals), and industrial and agricultural. In 2005, the residential sector consumed 33 per cent of electricity used, the commercial sector 36 per cent, and the industrial sector 31 per cent. However, the commercial sector accounted for the highest share of summer peak electricity demand in Ontario—53 per cent. The industrial sector used 26 per cent, and residential users accounted for 21 per cent of peak demand.⁹

Electricity is consumed where people live, work, play, shop and learn, by the equipment and appliances that are part of our daily lives—lights, air conditioners, cooking appliances, tools, computers, cell phones, etc.—as well as by the industries that manufacture these and all items used every day.

Figure 3.1 shows how Ontario residents consumed electricity in 2005. Figure 3.2 illustrates the various ways that Ontario residents used electricity on the days of highest consumption during the summer 2005. Consumption is the volume of electricity used, and demand is the amount of electricity needed at a given point in time. More information on Ontario’s electricity consumption by sector is available in Appendix 1.

Figure 3.1 – 2005 Ontario Residential Sector Electricity Consumption by End Use

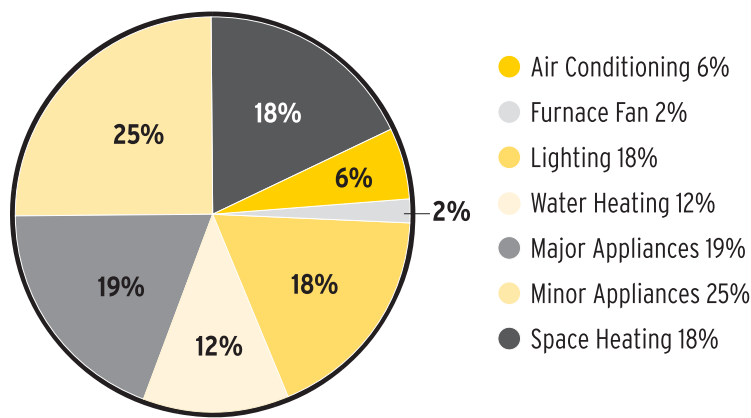
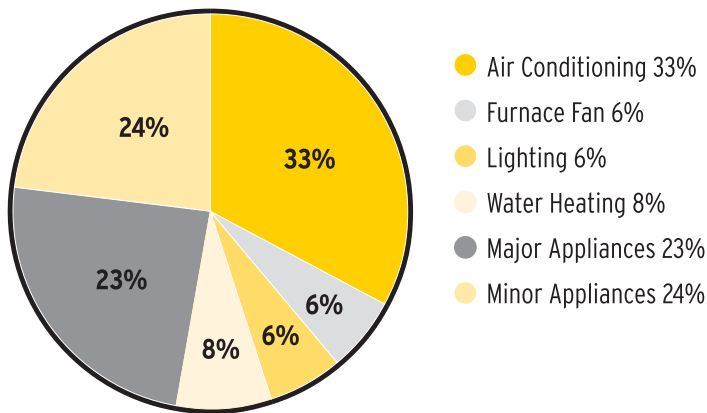


Figure 3.2 – 2005 Ontario Residential Sector Summer Peak Electricity Demand by End Use



Chapter 4. Conservation Performance in Ontario

This chapter evaluates Ontario's performance in achieving conservation targets. It includes:

- an assessment of Ontario's progress in meeting the Chief Energy Conservation Officer's challenge to reduce overall electricity consumption by 10 per cent by 2007
- an assessment of Ontario's progress in meeting the five per cent peak electricity demand reduction target by 2007
- the Ontario government's progress in meeting its 10 per cent electricity reduction target by 2007
- an update on the progress of local distribution companies and other market players, including Ontario energy management companies, in their conservation activities.

Because conservation was absent from the electricity sector for the past decade, comprehensive tracking systems do not exist to report results consistently and reliably. A major task for the Conservation Bureau going forward is to work with the rest of the Ontario Power Authority and others to improve process and impact evaluation, measurement and verification procedures, and program tracking so that there is more and better information available by which to assess success and identify new opportunities.

Ontario's progress in meeting the challenge to reduce electricity consumption

In last year's annual report, *Our Conservation Challenge*, all electricity consumers in Ontario were challenged to reduce their electricity consumption by 10 per cent by 2007. This target, along with the government's target of reducing peak electricity demand by five per cent by 2007, were highlighted in many of the more than 100 speeches delivered by the Chief Energy Conservation Officer over the past year.

Table 4.1 compares four measures of electricity consumption for 2005 and 2006, for the eight-month period January 1 to August 31.

Table 4.1 – Electricity Consumption in Ontario, January to August 2005 and 2006

	Jan-Aug 2005	Jan-Aug 2006	Change %
Actual consumption (in megawatt hours)	106,042,912	102,508,403	-3.3
Actual consumption per capita (in kilowatt hours)	8,444	8,080	-4.3
Weather-corrected consumption (in megawatt hours)	104,269,891	102,716,526	-1.5
Weather-corrected consumption per capita (in kilowatt hours)	8,303	8,096	-2.5

Source: Independent Electricity System Operator and Ontario Demographic Quarterly

Table 4.1 shows that actual consumption was down 3.3 per cent for this eight-month period, and consumption per capita was down 4.3 per cent. The weather-corrected consumption was also down by 1.5 per cent or 2.5 per cent per capita.

As this challenge was an appeal to each electricity consumer, it is appropriate to measure this target on a per-capita basis. It is also appropriate to use the weather-correction techniques to remove the impacts of weather on these statistics. Thus, the change in the weather-corrected consumption per capita is the most appropriate statistic to monitor this target and will therefore be used in the future to report on this progress. As discussed in the following section, this reduced consumption includes the impacts of naturally occurring conservation.

Ontario's progress in meeting its five per cent peak electricity reduction target

In December 2003, the government set a target to achieve a five per cent (1,350 megawatt) reduction in projected peak demand by 2007. This target was based on the Independent Electricity System Operator's expected 2007 peak demand forecast of 26,992 megawatts. The Ontario Power Authority's preliminary analysis suggests that Ontarians have reduced peak demand by 963 megawatts by summer 2006.¹⁰ These savings include 328 megawatts of naturally occurring conservation, which occurs when Ontarians invest in conservation on their own initiative and when the efficiency of the overall stock of equipment and appliances increases as older, less efficient stock is replaced by more efficient products mandated by Ontario's building and appliance standards. California, a recognized world leader in conservation, also accounts for the impact of naturally occurring conservation in its electricity forecast. The savings were also the result of conservation programs

administered by the Ontario Power Authority, local distribution companies, non-governmental organizations and others.

The forecast methodology used by the Independent Electricity System Operator to weather-adjust projections of peak demand in 2003, when the five per cent target was set, is no longer used. In its place, the Ontario Power Authority commissioned an expert from California to develop a methodology that estimates net peak savings using the actual peak recordings in megawatts for the period 2004 to 2006 and the economic growth observed over the same period. Using this methodology, the Ontario Power Authority has determined that the 2006 peak was 963 megawatts lower than the forecasted peak for 2006, after adjustments for economic growth and weather conditions from 2004 to 2006. This number has been rounded to 950 megawatts to be conservative. A description of this methodology is provided in Appendix 2.

The 2007 target of 1,350 megawatts can be achieved by a combination of activities, including Ontario Power Authority programs, new building codes and standards, private investment, local distribution company-administered programs and other programs. These efforts will be supported by the Conservation Bureau's advocacy and public awareness initiatives.

Weather normalization

Forecasters use weather normalization or correction techniques to remove the impacts of variations in Ontario's weather patterns (either extremely warm or extremely cold summers) from observed peak load data. This normalization is required because weather in Ontario can cause the peak demand to swing up or down by up to 10 per cent relative to the average weather peak demand for any particular day. This enables forecasters to compare a series of actual peak readings over a number of years on an "apples-to-apples" basis and use this data to determine how accurate their underlying forecast of demand was over a five- to 10-year period.

Weather-normalized peak readings are calculated by comparing the actual weather conditions observed on the peak day in any one year with the "normal" weather conditions for that season over a 10-year period and then adjusting the observed peak for the key day up or down. If the conditions on the peak day were 10 per cent hotter than the normal weather, then the peak value is lowered by 10 per cent. Forecasters use a combination of temperature and humidity readings, and wind and cloud-cover data to perform the actual correction in a statistical model operated by the Independent Electricity System Operator.

Provincial government's progress on in-house conservation programs

While the Ontario government has asked Ontarians to reduce their electricity demand by five per cent, it has held its own operations to a higher standard. In April 2004, the government set a target to reduce electricity consumption in buildings it owns by 10 per cent by 2007,¹¹ a reduction equivalent to 64 gigawatt hours. By March 31, 2006, the government had reduced electricity consumption in Ontario Realty Corporation¹²-operated and ministry¹³-operated buildings by 8.8 per cent, or 57 gigawatts. Additional gigawatts are projected to be saved by the end of the next fiscal year, March 31, 2007.

The bulk of the savings to date is due to the government's aggressive continuation and implementation of building retrofits and equipment upgrades in both Ontario Realty Corporation-operated and ministry-operated buildings. The savings achieved to date will be enhanced by further retrofits and upgrades, as well as a suite of additional projects, including special initiatives and other programs.

In addition to the building retrofits and upgrades being done, the Ontario Realty Corporation has undertaken a range of special initiatives that include:

- sub-metering
- deep lake water cooling
- jails and youth detention centre projects
- cogeneration.

While most of the special initiatives had yet to show savings by the end of the 2005-2006 fiscal year, some savings were achieved through sub-metering. While these initiatives were expected to be key in meeting the 10 per cent target, the target has nearly been met without them. The special initiatives will instead contribute to savings beyond this target over the coming years.

Further savings have been, and will continue to be, achieved through other programs, including:

- Ontario Realty Corporation retro-commissioning and continuous commissioning
- conservation appeal demand response protocols
- employee and public education programs
- other projects.

While savings from these other programs have not been included in calculating progress toward the 10 per cent reduction target, they serve to show a strong commitment by the Ontario government to conserve electricity.

Additional information on the government's conservation projects can be found in Appendix 3.

Table 4.2 summarizes the total gigawatt hour reductions and total percentage reductions achieved in Ontario Realty Corporation-operated and ministry-operated buildings through energy conservation projects. Consumption of electricity in government-owned buildings was reduced from the 2002-2003 baseline consumption of 644 gigawatt hours to 587 gigawatt hours in 2005-2006. Electricity consumption in Ontario Realty Corporation-operated buildings and ministry-operated buildings was reduced overall by 5.8 per cent and 13.2 per cent, respectively. In sum, a total reduction in electricity consumption of 57 gigawatt hours or 8.8 per cent has been achieved overall.

A further reduction in electricity consumption of seven gigawatts or 1.2 per cent is required to reach the 10 per cent government target by the end of the next fiscal year, March 31, 2007. As shown in Table 4.2, the government is, in fact, on target to far exceed the 10 per cent target. An additional 12.4 gigawatt hours are expected to be conserved through further planned Ontario Realty Corporation building retrofits and upgrades, an additional 41.9 gigawatt hours through further planned Ontario Realty Corporation special initiatives, and further reductions through ministry-operated building projects.

Table 4.2 – Provincial Performance Summary

	2002-2003 Baseline (GWh)	2005-2006 Consumption (GWh)	Reduction achieved	
			GWh	Per cent
Ontario Realty Corporation-operated				
Building retrofits and upgrades			21.3	
Special initiatives			0.7	
Subtotal	379	357	22	5.8
Ministry-operated				
Building retrofits and upgrades			35	
Subtotal	265	230	35	13.2
Total	644	587	57	8.8

Progress of local distribution companies' conservation activities

In March 2006, local distribution companies were required to submit annual reports to the Ontario Energy Board that described the activities and accomplishments of their conservation programs. The reporting period of these annual reports was the calendar year 2005; however, since this was the first year of reporting, the local distribution companies were asked to include results from programs initiated in 2004.

Toronto Hydro is the only local distribution company in Ontario to have publicly announced a demand reduction target—five per cent by 2007, a total of 250 megawatts.

The reporting local distribution companies had received approval from the Ontario Energy Board to spend \$161 million until September 2007. As of June 2006, these utilities reported that they had spent almost \$60 million on conservation initiatives. The annual reports indicate that many of the utilities' programs are still gearing up, and some of these start-up programs did not realize energy savings in 2005 but are expected to result in reductions in 2006 and beyond.

Numerous programs did result in energy savings in 2005—conservation programs reported 2005 savings of 121 million kilowatt hours and will result in 868 million kilowatt hour savings over the life of the installed equipment. Line loss programs, which increase the efficiency of distribution lines, saved 8.2 million kilowatt hours and will save 173 million kilowatt hours over the life of the equipment. In addition, programs were initiated to address peak load. Conservation programs were conservatively estimated by utilities to result in summer load reductions of 9.4 megawatts, 5.2 megawatts of load that is controllable and 4.4 megawatts of demand response that is dispatchable (loads that can be reduced on request). In addition, 1.4 megawatts of distributed generation (versus large, centralized generation) was installed.

To achieve these savings, in addition to the direct investment of \$38 million, utilities reported indirect investments of an additional \$2 million and have encouraged their customers to spend an additional \$12 million on conservation initiatives.

These initiatives bring direct economic benefits to the citizens of Ontario. Cost-benefit analyses of these investments to date result in a gross benefit to Ontarians of \$70 million and a net benefit of \$27 million, including costs for programs just starting up and not yet realizing benefits. Over the life of the equipment installed, the cost is estimated at \$0.05 per kilowatt hour.

Local distribution companies have introduced many programs to reduce electricity consumption and demand. Some of these programs, which were featured in a recent special issue of the Electricity Distributors Association magazine *The Distributor*, are Milton Hydro's Energy Drill Program, Enersource Hydro Mississauga's Smart Avenues, Kitchener-Wilmot Hydro's capacitor bank program, Barrie Hydro's Energy Star Awareness Program, Hydro One's PowerCost monitors, Horizon Utilities' interactive hydro gallery and energy conservation educational programs, Thunder Bay Hydro's LED traffic light conversion program, Toronto Hydro's Summer Challenge and Peaksaver programs, Guelph Hydro's Light up a Life program, Oakville Hydro's two voltage conversion projects, Enwin Powerline's incentive program for industrial customers, Chatham-Kent Hydro's Grade 5 education program on conservation, Whitby Hydro's induction lighting pilot and Ottawa River Power's Residential Energy Challenge.¹⁴

Programs implemented by the utilities are diverse and address all of their customer sectors. For example, Hydro Ottawa worked with other large distributors to deliver a co-branded mass market program to residences and small commercial establishments to promote energy-efficient products, including compact fluorescent lamps, LED Christmas lights, programmable thermostats, timers, ceiling fans and audits. In the first year of the program, Ottawa ratepayers realized

savings of 2.8 million kilowatt hours. Over the life of the measures, the program is anticipated to save Hydro Ottawa's customers more than \$1.3 million.

Smaller utilities also reported successes. For example, Enwin Powerlines, which serves Windsor, offered its large manufacturing customers an incentive to upgrade to more energy-efficient technologies, such as T8/T5 light fixtures, compact fluorescent lighting, LED exit signs, premium efficiency motors and variable speed drives. One customer who participated in the program saved almost one million kilowatt hours in 2005, received an incentive of \$13,300 for participating in the program and will realize additional savings of more than \$62,000 over the life of the lighting measures. A similar program is offered to intermediate-sized customers, and the four participants in the program who had completed their upgrades as of year-end 2005 together realized savings of just under one million kilowatt hours. Their collective savings will be even greater than those of the large manufacturers.

Other initiatives implemented by the utilities include small-scale, distributed generation, pilot smart meter installations, time-of-use and demand response programs, and improvements to local distribution company systems to reduce line losses or improve power factors.

Conservation performance of other market players

In spring 2006, the Conservation Bureau commissioned a report to estimate demand-side investments in electricity conservation in Ontario.¹⁵ The study described various market players, including local distribution companies, energy management firms, Natural Resources Canada and natural gas utilities, and their influence on conservation in the residential, commercial and industrial sectors. Energy management firms were reported to be a preferred agent of institutions, as they offer working partnerships for buildings that are characterized by consistent use and occupancy (e.g., hospitals, schools). While local electricity distribution companies have actively approached the residential market first, it was reported that they plan to increase their efforts in the commercial sector. Natural gas distributors have conservation programs for all sectors, ranging from incentives for energy-saving systems to delivery and installation of products, with the success of most of these programs dependent on the reduction of natural gas consumption. Investment in electricity

conservation in Ontario, including the activities of energy management firms and local distribution companies, is estimated at \$300 million to \$350 million per year.

Energy management companies, also known as energy performance contractors, are firms that deliver energy conservation projects in commercial, institutional and industrial operations. They enter into agreements with building owners to design and implement conservation measures, sometimes arranging the project financing costs and guaranteeing the savings stream or payback period. Measurement and verification analysis is conducted throughout the project life to ensure the energy savings are sustained. Based on data received from leading Ontario energy management company respondents to a survey by the Ontario Power Authority, more than \$200 million in energy conservation measures were implemented in 2005 and again to date in 2006. Peak demand reductions are estimated at more than 20 megawatts in both years. Their efforts are more focused on reducing electricity consumption than demand.

The Independent Electricity System Operator began a Transitional Demand Response Program in 2004 to build the Ontario market's demand response capability and infrastructure. This program will be phased out in April 2007 and replaced by the Ontario Power Authority's voluntary demand response program (see page 47).

Table 4.3 – Summary of Kilowatt Hours Saved by Other Market Players

Market Player	Kilowatt hours saved
EnerGuide for Houses Retrofit Incentive Program	9,449,949
Enbridge Gas Distribution Inc.	3,976,300
Union Gas Limited	2,860,649

The Operator also runs a number of programs, such as a dispatchable load program and the day-ahead commitment process, to improve the overall price-responsiveness of demand in Ontario's electricity market.

In June 2006, the Independent Electricity System Operator introduced the Emergency Load Reduction Program, which creates incentives for electricity consumers to help address the reliability needs of the province. Distributors, aggregators and large industrial loads can reduce electricity use during critical peak periods, while receiving payments from the Independent Electricity System Operator for participating. Load reduction can be achieved by either curtailing consumption or by increasing on-site embedded generation. On August 1 and 2, 2006, the maximum amount of energy offered was 69 megawatts and 42 megawatts respectively. As of the end of August, about 317 megawatts from 10 market participants had registered with the Operator to provide load reduction, and about 15 more megawatts are expected to be available in the near future.

Electricity savings in Ontario were also achieved by Natural Resources Canada's EnerGuide for Houses Retrofit Incentive Program and by Ontario's largest natural gas distributors, Enbridge Gas Distribution Inc. and Union Gas Limited. A summary of the savings achieved by each of these market players is shown in Table 4.3. The EnerGuide for Houses Retrofit Incentive Program generated electricity savings of 9,449,949 kilowatt hours from October 1, 2005, to June 30, 2006, by fuel-switching from electricity to natural gas and implementing electricity conservation measures. Ontario's natural gas distributors generated a total of 6,836,949 kilowatt hours in electricity savings during this period. Enbridge Gas Distribution savings totalled 3,976,300 kilowatt hours from its conservation programs.¹⁶ For the same period, Union Gas achieved electricity savings totalling 2,860,649 kilowatt hours. This number underestimates the total electricity savings achieved, as Union Gas has only been able to track and claim electricity savings from its custom projects in the commercial and industrial markets.¹⁷

Chapter 5. Conservation Bureau 2006 Activities

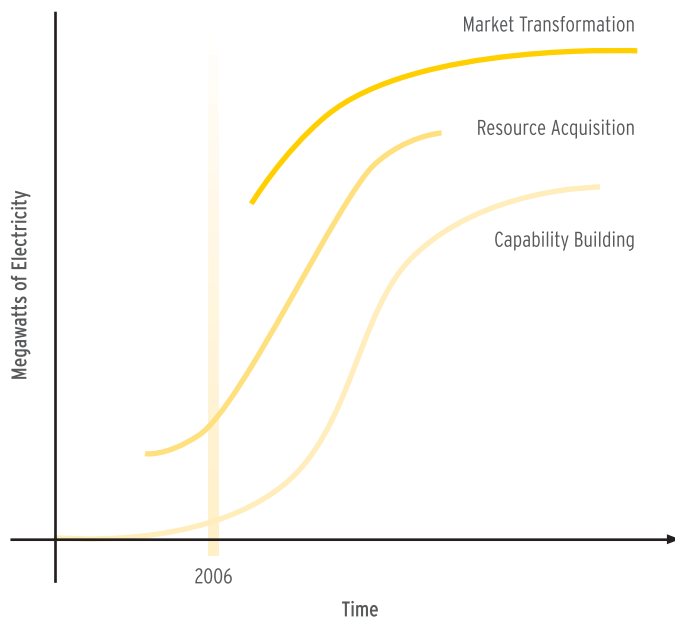
The work of the Conservation Bureau in 2006 has been focused on developing programs for immediate implementation to meet Ontario's short-term electricity demand reduction targets, while also building a base for longer-term, dependable conservation and the creation of a culture of conservation. A new era of conservation has begun in the province, partly as a result of the Conservation Bureau's efforts.

Creating a culture of conservation and achieving sustainable energy savings require a comprehensive approach to conservation. Not only must energy savings be sought (i.e., resource acquisition), but capability in the market must also be built and enhanced to ensure ongoing capacity for conservation, and the market must be transformed so that it is saturated with energy-efficient products and services. This means that targets must be set for capability building and market transformation as well as consumption and demand savings.

Capability building, resource acquisition and market transformation are separate but interdependent elements of any conservation program. A conservation program is not complete until all elements have been achieved.

As Figure 5.1 indicates, Ontario is at the beginning of the processes to build capability, acquire resources and transform markets. This current assessment of progress is illustrated by the 2006 line. There is a large potential for savings through further progress in the resource acquisition and market transformation in coming years.

Figure 5.1 – Conservation Performance Evolution



Conservation Bureau 2006 activities and programs

The Conservation Bureau's mandate is to help lead Ontario's efforts to achieve targets and to foster a culture of conservation in which energy efficiency is a way of life.

Conservation Bureau activities expanded significantly over the past nine months. Three major drivers were behind this expansion:

- The Ontario Ministry of Energy established a target to achieve 6,300 megawatts of demand reduction through conservation by 2025, which is more savings than were originally anticipated.
- The directives indicating priority areas for the Ontario Power Authority increased from three in the fall of 2005, totalling 450 megawatts, to seven in 2006, totalling 1,300 megawatts.
- Responsibility for funding and coordinating local distribution companies' conservation activities was given to the Ontario Power Authority by the government directive in July 2006.

The activities described in this chapter are for the period from October 1, 2005, to August 31, 2006, where the information was available.

Research

Successful conservation is rooted in a foundation of sound research. The Conservation Bureau undertook a number of studies and research projects to provide information about the state of the conservation market to assist in designing effective conservation programs, and to identify customer needs and best practices in program design. A summary of the research can be found in Appendix 4.

In addition to program-related research, the Conservation Bureau has undertaken some polling and focus groups to determine residential conservation awareness. For example, a baseline survey for the Every Kilowatt Counts program (see page 40) in April 2006 asked respondents what they felt was the most important issue facing Ontario at the time. It found that energy was almost as important a concern as health care (23 per cent for energy compared to 24 per cent for health care). Furthermore, energy or electricity was the most cited issue (42 per cent) when respondents were asked what comes to mind when they think about conservation. A follow-up study in July 2006, after the Every Kilowatt Counts program, indicated that in a two-month period, there was a 13 per cent increase (from 64 to 77 per cent) in the number of Ontarians who were aware of conservation initiatives.

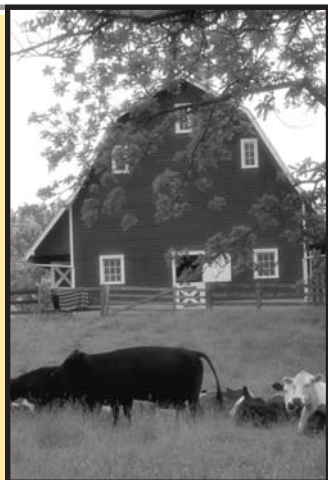
Focus groups conducted for the Ontario Power Authority have shown that the primary motivator for participants to conserve electricity was saving money, but there is also a range of experiences that affect conservation behaviour. For instance, among tenants, some view energy conservation as the right thing to do, and others do not conserve because they don't pay for their own utilities. Some people have had their conservation ethic passed down from a parent who has experienced energy shortages in other parts of the world. This research helps the Conservation Bureau to determine the markets in which to target programs and conservation awareness activities.¹⁸ A summary of polling study results is available in Appendix 5.

Pilot projects and idea incubation

The Conservation Fund provides financial assistance for sector-specific electricity conservation pilot projects that can be replicated. These projects provide the Conservation Bureau with an excellent opportunity to:

- explore new marketing and delivery channels for conservation programming
- test programming in specific sub-sectors prior to developing large-scale programs
- help build the capacity of Ontario's businesses, institutions and residents to integrate conservation into their day-to-day activities.

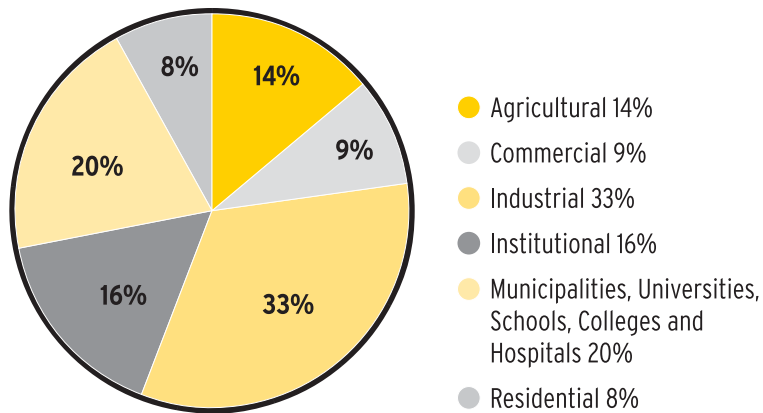
Collaborations through Conservation Fund projects are helping to develop third-party marketing channels for conservation programs. They are also assisting to build strong relationships with industry associations that can leverage their credibility with members to increase participation in conservation programming. Members appreciate help from their association to save on their electricity bills. For example, the Ontario Mining Association is developing a program to



Agricultural learning locations by AgEnergy Co-operative

This farm-based conservation program started with the selection of 20 farms for intensive energy audits, monitoring and equipment changes from a pool of farms that had already received a walk-through audit. Earlier pilots funded by the Ministry of Energy and the Conservation Bureau focused on developing an audit methodology, which was piloted on farms across Ontario. This project involves using the new audit process to monitor energy use on farms, implement energy conservation measures and share the results with farmers across Ontario.

Figure 5.2 – Conservation Fund 2006 Grant Allocations by Sector to August 31, 2006



manage leaks in compressed air systems in three underground mines in Northern Ontario. This pilot will result in a set of best practices and a program template that can be shared with the association's member companies and with other industries that use compressed air systems. This will create the momentum needed to drive these industries towards sustainable, energy-efficient business practices.

Conservation Fund projects are also helping to forge collaborations between third parties, such as those with the Ontario Ministry of Agriculture, Food and Rural Affairs and AgEnergy Co-operative. These projects have resulted in a memorandum of understanding between the Ontario Power Authority, the ministry, the Ontario Federation of Agriculture and Hydro One to collaborate on developing conservation programming for the agricultural sector. The Conservation Fund's impacts are being felt well beyond participating partners and the dollars spent.

The fund has a budget of \$1.5 million for 2006, with individual project funding ranging from \$10,000 to \$250,000. Up to August 2006, a total of \$1.083 million for 10 projects had been funded in 2006. This includes more than \$716,000 granted to seven projects in the first round of funding in March, and almost \$366,000 to three projects in the second round in July. Recently funded projects include the Toronto District School Board—Energy Drill Schools Program and the Toronto Association for Business Improvement Areas—GreenTbiz. More than \$417,000 remains for further rounds in 2006. To date, about \$2.2 million has been allocated in 2005 and 2006, and more than \$5 million has been leveraged from project partners and other funders. A list of projects funded through the Conservation Fund is available in Appendix 6. The Conservation Bureau Web site contains the fund's evaluation criteria and project approval process. The sectors funded to date in 2006 are illustrated in Figure 5.2.



GreenTbiz

GreenTbiz is a program delivery unit, operated under the auspices of the Toronto Association of Business Improvement Areas, that provides programs and services to the Toronto business improvement areas, for the benefit of its members and the environment. The aim of this delivery unit is to develop and deliver comprehensive energy conservation and environmental programs that address relative concerns and will have significant benefits and outcomes, while improving the bottom line of the businesses in these areas. Within GreenTbiz, the Conservation Fund will support the Smart Mentoring, green Talks and greenAssist programs.

Conservation programs

The Ontario Power Authority has launched 10 programs since October 2005 and has nine others currently in development. As well, the Conservation Bureau has advocated for increased energy-efficiency requirements in codes and standards, worked to identify regulatory barriers to conservation, and increased public awareness of conservation. Table 5.1 provides a summary of these programs.

Table 5.1 – Ontario Power Authority 2006 Conservation Programs

Sector	Description	Total Capacity in megawatts	Status as of August 31, 2006
Residential	Every Kilowatt Counts (spring)	8.7	launched
	Cool Savings Rebate Program	31	launched
	Secondary Fridge Retirement Pilot	1.6	launched
	Aboriginal Conservation Initiative Pilot	2.3	in development
	Every Kilowatt Counts (fall)	15	launched
	Hot Savings Rebate Program	8.0	launched
Commercial, Municipalities, Universities, Schools and Hospitals	Social Housing Phase 1	10	launched
	Low-Income Single Family	1.3	launched
	Affordable Housing Program Phase 1	0.2	in development
	Low-Income Multiple Unit Residential Building	TBD	in development
	Colleges Secretariat	TBD	launched
	Municipal Lighting Program	TBD	in development
	Energy Efficiency Contractors Network	TBD	launched
Toronto	Building Owners and Managers Association	150	in development
	City of Toronto	90	in development
	Toronto Hydro	90	in development
Industrial & Agricultural	Demand Response Program	250	launched
	Agricultural Program	2.0	research underway
	Capability Building-Demand Response	125	in development

Residential sector

The Conservation Bureau is working with manufacturers, retailers, associations, local distribution companies and energy sector organizations to develop effective conservation programs for the residential sector. Research indicates that there is significant potential for electricity savings in this sector, especially related to air conditioning and lighting. The residential sector also offers an opportunity to raise awareness and understanding about energy issues that could impact all sectors, as residents are also employees, students and consumers.

The Every Kilowatt Counts campaign was designed to achieve consumption and demand savings, build consumer capability and contribute to market transformation for the promoted products. The program provided meaningful incentives and information on easy-to-do energy-saving actions for every Ontario household. Extensive polling and focus group work was undertaken to ensure the effectiveness of the approach and to allow the Conservation Bureau to evaluate the results

of the program. In June 2006, the campaign's process was evaluated, the results of which were used to develop the next program. The fall Every Kilowatt Counts campaign was launched in late September 2006.

The Cool Savings Rebate program was developed to reduce summer peak demand and build capability within the air conditioning contractor industry to market conservation. The program provided air conditioning contractors with an on-line program orientation session, and homeowners with a rebate to encourage air conditioning replacement with ENERGY STAR^{®19}-qualified models. The number of residential central air conditioners increases annually in Ontario at a rate of one to two per cent. This growth is a direct contributor to Ontario's summer peak capacity challenges.



Every kilowatt really does count

In partnership with local electricity distributors, the Conservation Bureau's Every Kilowatt Counts program gave every resident the ability to make effective conservation decisions and provided financial incentives to save electricity and money. Every household in Ontario, including apartments and condos, received a booklet of energy-saving tips and money-saving coupons. The coupons were redeemable at 23 different hardware retailers representing more than 2,300 stores in over 400 communities. More than 300,000 coupons were redeemed from over 250,000 households for compact fluorescent light bulbs, programmable thermostats, timers and ceiling fans.



Cool savings

The Cool Savings Rebate program was offered to Ontario residents with existing central air conditioning systems. The program included tune ups, the supply and installation of programmable thermostats and the replacement of existing central air conditioning systems with ENERGY STAR®-qualified systems. Participants enjoyed peak performance

of their air conditioning units, avoided the need for premature replacement and saved on monthly electricity bills. As of August 31, 2006, 765 contractors were participating in the program, and more than 23,000 rebate claims had been submitted by Ontario residents.

Building on the success of similar programs in Ottawa, London and Chatham-Kent, the first phase of the Conservation Bureau's Secondary Refrigerator Retirement Program was launched in July 2006 in six test communities: Barrie, Kingston, Mississauga, St. Catharines, Timmins and Windsor. The local distribution companies in each of these locations actively participated in this program. Secondary fridges were removed from single family dwellings and decommissioned in an environmentally acceptable manner. Different marketing approaches and incentives were offered in each of the communities. At the end of the trial, a process and outcome evaluation will determine the most effective approach to retire secondary refrigerators on a province-wide basis. This program will reduce electricity use and contribute to transforming the refrigerator market by removing old, inefficient units. The Ontario Power Authority also supported a refrigerator retirement program run by the Niagara Erie Power Association and London Hydro's appliance recycling program.

The First Nations program includes awareness and education, focusing on low-cost initiatives, as well as an energy audit component. The Ontario Power Authority will pilot this program in six communities and then evaluate it prior to province-wide implementation. The program aims to reduce electricity consumption, provide some protection against rising energy rates and help ensure that vulnerable northern communities have the tools and knowledge to participate in the culture of conservation.

The Ontario Power Authority cooperated and jointly supported the Keep Cool project with its partners, Toronto Hydro, Home Depot and Summerhill Group. This program retired inefficient room air conditioners in Toronto during the summer 2006. Toronto Hydro reports that it collected 6,607 old room air conditioner units in two months, which they estimate reduces peak demand by just over 4.4 megawatts.



Pilot project tests consumer response to refrigerator retirement

Refrigerators are one of the biggest consumers of electricity in a household and represent a significant demand on the province's electricity system. Six communities were selected to participate in the Conservation Bureau's refrigerator retirement program. The pilot project targeted inefficient fridges—especially those older “second” fridges that have been shown to use three to four times the amount of

electricity as new energy-efficient units. The program provided in-home pick-up of these old operating units, which gave customers the opportunity to save money on their electricity bills and dispose of fridges in the most environmentally responsible fashion. The disposal, or decommissioning process, results in less than a small grocery-bag size of waste ending up in a landfill for every fridge retired.

Commercial and institutional sector

The commercial and institutional sector offers the most significant opportunities for electricity and capacity savings of all sectors. The Conservation Bureau has undertaken significant research and capability building work in the commercial and municipalities, universities, schools and hospitals sectors, and is moving into the program design and delivery phase.

The goal of the Ontario Power Authority's low-income and social housing programs is to reduce electricity consumption in this sector by 100 megawatts. These programs are also aimed at ensuring that vulnerable energy consumers are

enabled to participate in the culture of conservation and are not disproportionately impacted by rising energy rates. The programs are broken down into four categories:

1. existing social housing
2. new affordable housing
3. multi-family private rental
4. single family low-income housing.

The social housing program is delivered by the Social Housing Services Corporation and includes the installation of energy-efficient end-use products, education and awareness, and building and operational upgrades. Phase I of the program was launched in March 2006 with a target to achieve 10 megawatts of electricity reduction. The Ontario

Power Authority is providing incentives by providing financial assistance or a grant to social housing providers to make the necessary upgrades. In addition, the corporation is building an energy program delivery infrastructure, including program management services and the development of an educational campaign. As of August 2006, 33 housing providers representing 4,678 social housing units were committed to the program. Physical improvements alone will not be enough to achieve the targeted reductions. The success of this program will depend on proper equipment use and maintenance, as well as encouraging building operators and residents to adopt energy-efficient behaviours. Education and training will play a key role in every phase of the program.

The Ontario Power Authority has been working closely with the provincial and federal governments to support Ontario's Affordable Housing Program. This program is assisting in the construction of

about 15,000 new affordable units by March 31, 2010. The Ontario Power Authority's portion of the program has two key components: financial incentives to help offset the incremental cost of energy-efficient options; and a strong training and education focus to foster energy-efficient practices and behaviours in affordable housing stakeholders, including residents, building operators, service managers and housing providers.

In the Canada-Ontario Affordable Housing Program Guidelines issued in May 2006, energy-efficiency features were included as required elements for project proposals, as had been recommended by the Conservation Bureau. This means that proposals with electric heating systems in areas where natural gas is available will require a business case to justify exemption from program requirements.



First Nations community gets a major energy-efficiency retrofit

The Georgina Island Project tackles residential energy conservation from a unique community standpoint. All 100 homes will undergo energy-efficiency assessments and upgrades. Through an integrated approach, electricity demand reduction and conservation targets are achieved with home energy audits, community load

analyses and the installation of appropriate energy-saving measures such as insulation, lighting and draftproofing. Georgina Island Band members are very engaged in the program and teach conservation education at both the community and household levels. This project will serve as an excellent model for future programs with other First Nations partners. On hand to mark the launch of the program were (l. to r.) James Hall, director of conservation and demand management for Hydro One; Chief Brett Mooney of the Chippewas of Georgina Island; Bryan Young, manager of the Conservation Fund and Technology Development Fund for the Ontario Power Authority; and Brent Kopperson, executive director for the Windfall Ecology Centre.

In addition, the Ontario Power Authority is in preliminary discussions with the Federation of Rental-Housing Providers of Ontario for a program targeting multi-unit private rental buildings. It is anticipated that this program will be in place by the spring of 2007.

The Low-Income Single Family Pilot Program aims to achieve 1.3 megawatts in electricity savings by fall 2007. This program will supply and install energy-efficient products and weatherproofing measures in 2,500 electrically heated homes in Ontario. Targeted participants include low-income families, fixed-income seniors, sole support parents, disabled persons and the working poor. Program funding will be available to cover energy audits, energy-efficient appliance and lighting upgrades, water heater blankets, low-flow showerheads and aerators, as well as weatherproofing services. Education will be an

integral part of the service package, including one-on-one consultations with residents and a broader educational outreach program.

The Conservation Bureau commissioned research in the winter of 2005 on the potential opportunities in the small and medium-sized enterprises sector. It also supported Sustainable Buildings Canada and participating contractor associations in the establishment of the Ontario Energy Efficiency Contractors Network. The network was established as a delivery channel for energy-efficiency programs for the hard-to-reach small and medium-sized enterprises sector.



Greening sacred spaces

Faith and the Common Good – a Canadian interfaith project – and the Toronto School of Theology are working with an increasing number of faith communities (churches, mosques, synagogues, temples, etc.) to “green” their sacred spaces by reducing electricity

consumption and promoting a more energy-efficient lifestyle to their members. Greening Sacred Spaces offers faith communities a variety of ways to promote energy conservation. There are approximately 1,100 faith community buildings in the Greater Toronto Area, and if only one-quarter improved the energy efficiency of their place of worship, they could reduce their energy bills by 20 per cent or more. Faith groups from the Toronto and Ottawa areas are already involved, and more groups across the province have expressed interest. Shown above at St. Gabriel’s Church in Toronto, the first church in Canada that is on track to receive the Leadership in Energy and Environmental Design Gold certification for its exceptional environmental performance and energy efficiency, were (l. to r.) Ted Reeve, Director of Faith and the Common Good; Dwight Duncan, Ontario Minister of Energy; and Peter Love, Chief Energy Conservation Officer.



Parkwood Hospital slashes energy bill

Teamed with Honeywell, Parkwood Hospital, part of St. Joseph's Health Care, London, will slash \$170,000 a year from the hospital's energy costs. The \$1.2-million project upgraded the equipment and system operations across 554,643 square feet of building space. This included retrofitting and redesigning lighting fixtures, new air flow controls, optimizing existing controls of the building automation system, and installing a thermal blanket on the therapeutic pool to reduce heat and evaporation losses. Parkwood Hospital's renewal initiative is an excellent template for other Ontario health-care facilities. Above, Chief

Energy Conservation Officer Peter Love (l.) presented a Certificate of Recognition to David Crockett, vice-president of integrated services of The London Hospitals.

In late spring 2006, the Ontario Power Authority began working to develop conservation and demand response programs to support a targeted 300 megawatt reduction in electricity use in Toronto. Downtown Toronto had been identified as having critical local supply, reliability and voltage support needs. In late September, the Ontario Power Authority announced that it had reached agreements with the Building Owners and Managers Association of Toronto for 150 megawatts of electricity savings, and with Toronto Hydro and the City of Toronto for 90 megawatts each, for a total savings of 330 megawatts.

Agricultural and industrial sector

Since October 2005, the Ontario Power Authority's prime focus for the agricultural and industrial sector has been on the design and implementation of demand response programs. This was to enable programs to be put in place for the short and medium term to address Ontario's peak demand challenges, enabling the building of capacity for sustained conservation over the long term.

The first program launched in this sector was a procurement project for reliability-based demand response for York Region, managed by the Ontario Power Authority's generation development division.

Throughout the winter and spring of 2006, the Ontario Power Authority undertook extensive research and consultation to design a program that would be viable in the market, achieve the directed megawatt targets and be economically prudent. Based on feedback, the initial request for proposals was modified to become a flexible program, with Phase I running to April 2007, followed by a Phase II program that will include any significant lessons from Phase I. It is primarily intended to engage existing demand response capabilities, although facilities that would like to develop their capabilities have also expressed an interest. As a result of these efforts, strong relationships have been developed with the 60 largest industrial electricity consumers (see sidebar, next page).

The industrial 250 megawatt demand response and 125 megawatt capability building demand response programs will provide participants with three types of projects through which they can reduce the electricity load in Ontario:

1) Load Interruption Projects

These are projects in which measures are undertaken to reduce electricity consumption in response to a dispatch signal. A typical load interruption project might involve control equipment that will allow lighting and appliances such as air conditioners to be cycled on and off.



Closing Doors for conservation

Doors Closed has been a successful program encouraging stores and restaurants to keep their doors and windows closed while operating air conditioning. Participating businesses displayed signs saying "Our doors are closed but we are open" to ensure customers were aware of the program. More than 5,000 posters were distributed by 24 organizations in 15 communities.

Five municipalities signed up, as did two chambers of commerce. Preliminary results show that 64 per cent of the stores that were approached closed their doors, leading to a cool five to seven megawatt savings in demand. Above, Chris Winter, executive director of the Conservation Council of Ontario, launched the campaign in Toronto's Yorkville district. The campaign had about 40 mentions in various media, for a total of more than 10 million impressions.

Demand-response program delivering peak savings

The Ontario Power Authority began accepting applications for its demand response program in late June. In August, the program achieved a maximum rating capacity of 254.5 megawatts of demand response projects. During the month of August, some participants responded every day there was an opportunity to curtail demand, for an average of seven hours at a time. These efforts reduced electricity use by 9,018 megawatt hours in total, with an average savings of 82 megawatts per hour. August 1, 2006, a day of extremely hot weather, saw the longest consecutive period of curtailment under the program – 19 hours. While the Independent Electricity System Operator recorded the highest demand on this day, program participants contributed a maximum curtailment on August 1 of 182 megawatts per hour.

2) Load Shifting Projects

These are projects in which measures are undertaken to control the level of energy usage at a given time by shifting consumption from a peak demand period to an off-peak period. Consumers are encouraged to respond to the higher pricing levels that occur during peak demand periods. Many organizations have indicated their desire to participate in a demand response program, but they do not currently have the resources to respond in a timely manner.

3) Behind-the-Meter Generation Projects

These are projects that involve on-site, behind-the-meter generation, including back-up and emergency generation, that result in a net reduction of electricity load required by the electricity system.

Conservation awareness

Conservation awareness activities promote action on conservation in all sectors of the economy. During the reporting period, the Conservation Bureau launched a number of awareness programs, focusing on reducing summer peak consumption in the residential and commercial sectors as well as conservation throughout the year. The summer campaign began with the Every Kilowatt Counts program, launched in May 2006, to increase overall customer awareness of key ways to reduce peak electricity usage on hot summer days. The program was followed by the Conservation Bureau's summer radio message campaign. Three key messages were communicated:

- 1) Increase home and office temperatures by two degrees Celsius.
- 2) Wait until after 8 p.m. to use electrical appliances where possible.
- 3) Choose to use electricity efficiently, e.g., turn off lights when not needed.

Two summer programs aimed at the commercial sector were supported: “It’s Up 2 You” to encourage tenants to dress weather appropriately and building owners to turn air conditioning temperatures up two degrees Celsius; and “Doors Closed Toronto” to encourage stores and restaurants to close their doors to contain air conditioning, saving electricity during peak summer hours (see sidebar, page 46).

In May 2006, the Conservation Bureau published a four-page newspaper insert on the Conservation Fund and Conservation Bureau activities in the *Toronto Star* and *Metroland* newspapers across the province. The insert, delivered to more than three million households, introduced the public to the role of the Conservation Bureau, celebrated the partnerships in energy conservation the Conservation Bureau has forged with organizations across Ontario, and encouraged the public to become partners in conservation. In addition, the Conservation Bureau developed a documentary film on creating a culture of conservation in Ontario that was broadcast on prime time television in September 2006.

To ensure that ongoing conservation awareness activities and programming result in behavioural change, the Conservation Bureau is developing a set of best practices in social marketing that can be used in the design and implementation of all Conservation Bureau programs for residential electricity consumers.²⁰ This study is currently underway and a report is expected later this year.

The Conservation Bureau has tracked its earned media from daily newspapers, community newspapers, television, radio, Internet and magazines, which provides a measure of the Conservation Bureau’s exposure in the media. From October 2005 to August 2006, the total number of mentions from these media outlets was 718, resulting in an estimate of more than 68 million impressions.²¹ Conservation Bureau print advertising for the same period totalled more than 1,000 mentions, resulting in an estimated 164 million impressions with readers. Included in the advertising was a four-page Conservation Fund insert (described above). This is estimated to have achieved more than six million impressions. The Conservation Bureau’s 2006 summer radio message campaign, which communicated key tips to conserve electricity, was aired multiple times in July 2006 on several popular Toronto radio stations. The campaign is estimated to have generated more than 23 million impressions among adults aged 25 to 54. The Refrigerator Retirement Program media coverage in July 2006 in daily and community newspapers, television, radio, Internet and magazines received an estimated four million media impressions.

The Conservation Bureau has prepared more than 14 newspaper columns called “The Conservation Zone” and distributed them to community newspapers throughout Ontario. The columns are intended to engage and empower Ontario residents to take steps to use less electricity in their homes, emphasize partnership and inform consumers of other positive initiatives underway. Readers enter The Conservation Zone to find conservation news and tips to save money at home and at work. Topics have included energy-efficient appliances, lighting, landscaping, insulation, and no-cost and low-cost ways to save electricity. Each column opens with the commitment to develop a culture of conservation in Ontario. In 2006, the columns generated more than 66 million media impressions.

Total media impressions from all vehicles are estimated to be more than 300 million for this period.

From November 2005 to September 2006, the Chief Energy Conservation Officer presented 23 Certificates of Recognition (see Appendix 7) to acknowledge the leadership role taken by individuals and organizations that have made long-term commitments to conserve electricity in Ontario. Recipients are given a local and regional profile to highlight the importance of celebrating success in conservation. Their activities may include the promotion of environmental stewardship, leadership or implementing energy-saving solutions. It is important to recognize these accomplishments to make consumers aware of what’s being achieved in various sectors. They can also inspire others to take initiative to reduce electricity consumption or demand where they have influence.

Ontario’s Chief Energy Conservation Officer has engaged in numerous educational campaigns and activities to spread the conservation message across Ontario. From October 1, 2005, to August 31, 2006, the Chief Energy Conservation Officer had more than 100 speaking engagements across the province. In June and July 2006 alone, he attended more than 30 speaking or media activities across the province to further conservation messages.

Coordination with local distribution companies

The Ontario Power Authority has been working closely with local distribution companies, the Ministry of Energy and others to clarify respective roles and responsibilities in the delivery of conservation programs, and to increase the Conservation Bureau's ability to coordinate conservation initiatives across the province. In spring 2006, the Conservation Bureau sought stakeholder input on these issues. Feedback from local distribution companies, environmental groups and business interests was used by the Ministry of Energy to develop its policy. This process led to the ministerial directive in July 2006 that enabled the Ontario Power Authority to fund and coordinate local distribution companies' conservation programs.

The main goals of the initiative are to provide assurance to the local distribution companies that they have a role in conservation program delivery, streamline and simplify regulatory accountability for conservation, and enhance the Conservation Bureau's ability to coordinate conservation programs in the province. Funding of \$400 million over three years will be available for local distribution companies to provide a set of standard programs in their territories, or to create unique or innovative programs. In setting up the process to oversee the funding, the Ontario Power Authority has established advisory groups consisting of local distribution companies and other stakeholder groups.

The Ontario Power Authority has also been working and coordinating informally with local distribution companies on the implementation of programs, particularly the Every Kilowatt Counts and refrigerator retirement programs. The Conservation Bureau's ability to coordinate conservation activity in the province is expected to increase with the issuance of the July 2006 funding directive and the development of the Integrated Power System Plan.

Evaluating and tracking

To ensure that programs are effective and economically prudent, process and impact evaluations, measurement and verification are necessary components. Currently, all Ontario Power Authority programs incorporate these processes. A set of general guidelines for these evaluations is being developed.

The Conservation Bureau tracks program results to report progress to Ontarians and to evaluate and improve program design. In 2006, sample "conservation scorecards" were developed for stakeholder feedback. Two versions were put forward: a program evolution scorecard and a high-level program performance scorecard (details can be found at www.powerauthority.on.ca).

The Conservation Bureau received useful input on the scorecards and will use this feedback to continue to develop and refine its reporting system to ensure that it provides relevant information for assessing performance.

Consultation on regulatory barriers to conservation

To assist the Conservation Bureau's efforts to identify regulatory barriers to conservation, a forum was held for non-governmental organizations in April 2006, to seek stakeholder input and identify strategic opportunities for action. Participants included the Canadian Environmental Law Association, the Clean Air Foundation, the Conservation Council of Ontario, Environmental Communication Options, Green Communities, Greenpeace, Greensaver, the Pembina Institute, Pollution Probe, Share the Warmth, the Sierra Club and the World Wildlife Fund Canada.

The objectives for the forum were to establish priorities for action, identify opportunities for the Conservation Bureau and non-governmental organizations, identify complementary opportunities and enhance relationships.²²

The participants discussed high-level strategic policy barriers. Several legislative and policy issues within and outside the Conservation Bureau's mandate were identified and are discussed below, along with updates.

The scale of financing mechanisms for conservation was thought by stakeholders to be significantly lower than that for more traditional energy supply infrastructure. Initiatives to address this barrier by both the Conservation Bureau and local distribution companies are just beginning. The amounts spent and results achieved can be expected to increase significantly over the coming years. The amount of funding available to local distribution companies for conservation, for example, has been increased from \$161 million to \$400 million over three years.

Stakeholders also identified the lack of a holistic decision-making process as a barrier. To address this, the Conservation Bureau is working to better coordinate roles with local distribution companies, other market participants and the Ontario Energy Board. The objective is to establish a coordinated provincial conservation plan.

Equipment and building code standards were also identified as an area that needs improvement. As noted in Chapter 7 of this report, the Conservation Bureau sees advocacy as a priority and has committed staff and allocated resources to this work for 2007.

Data and information collection and availability was also determined to be a barrier. This is expected to be resolved over time. The Conservation Bureau is working in a capability building stage, for both information (research underway) and program delivery (building market capability). Results from programs and activities will most likely be available next year since many of the programs were launching at the time of writing this report.

In terms of general guidance and process issues identified by stakeholders, the Conservation Bureau heard and agrees that it needs to continually engage the public in its activities and focus more on educational components going forward.



Energy efficiency at the Conservation Bureau office

The two largest uses of electricity in office buildings are for cooling and lighting. The Conservation Bureau initiated a campaign this summer called “It’s Up 2 You” in partnership with the Building Owners and Managers Association of Toronto, to encourage landlords to raise the temperature of their office space by two degrees. In support of this campaign, the Ontario Power Authority raised the temperature in its offices from 22 degrees to 24 degrees.

One of the key deciding factors in selecting the Richmond-Adelaide Complex in Toronto as the Ontario Power Authority’s headquarters was Oxford Properties’ adoption of deep lake water cooling. This method of cooling replaces the electricity-intensive chillers that typically air condition office towers and provides an example of the innovative solutions that will help manage the province’s electricity challenge. Above, Chief Energy Conservation Officer Peter Love (r.) turned a valve at 120 Adelaide St. W. in Toronto to begin deep lake water cooling in the building, assisted by Joe Silva of Oxford Properties.

The Ontario Power Authority has retrofitted its ceiling lighting by installing efficient ballasts and lights and reduced the number of ceiling lights. The overall impact was to reduce lighting consumption to 0.5 Watts per square foot. This compares to the Ontario average of 2.5 Watts per square foot.

As a result of these changes, the Ontario Power Authority uses less than half the energy used even under the “best practices” standard for general office space.

Chapter 6. Conservation Bureau 2007 Proposals

The Electricity Act seeks to create an electricity system that is adequate, reliable, safe and that considers environmental sustainability and protection. To achieve this goal, the Ontario government has established two conservation targets, as discussed earlier:

- reduce peak demand by at least 6,300 megawatts by 2025, with interim targets of 1,350 by 2007 and an additional 1,350 by 2010
- create a culture of conservation in Ontario. The Conservation Bureau interprets a culture of conservation as one in which all energy consumers make wise, efficient and productive choices where they live, shop, play, learn and work. The culture includes legal, economic and social infrastructure, as well as consumer awareness and action.

Meeting these targets requires:

- targeting both peak demand and consumption. To reduce peak demand by 6,300 megawatts by 2025 in a reliable and dependable manner, the Ontario Power Authority must develop programs to reduce both overall electricity consumption and demand.
- ensuring that all customer sectors are involved in conservation. Reducing overall consumption in all sectors will assist in creating a culture of conservation by ensuring that all sectors have a stake in conservation.
- enabling low-income and other difficult-to-reach consumers to participate in programs. This ensures that all consumers can participate in the culture of conservation and provides protection to vulnerable consumers.

In 2003, the government set a target to reduce peak demand in Ontario by 1,350 megawatts by 2007. The analysis in Chapter 4 shows that peak demand dropped in 2006 by approximately 950 megawatts, leaving a further 400 megawatts to be achieved in 2007. The remaining reduction

will be achieved by a combination of activities, including Ontario Power Authority programs, new building codes and standards, private investment, programs administered by local distribution companies and other programs. These efforts will be supported by the Conservation Bureau's advocacy and public awareness initiatives.

The Conservation Bureau's proposed approach for achieving these conservation targets will further enhance the new era of conservation in Ontario. This approach is threefold.

1. Creating and delivering conservation initiatives informed by the best available market knowledge through a multitude of channels.

The Ontario Power Authority's initial focus will be on reducing summer peak demand through demand response, and commercial and residential cooling and lighting programs. In addition, the Ontario Power Authority will work on reducing electricity consumption through programs aimed at low-income consumers, electrically heated homes, residential appliances and the agricultural sector. While summer peak demand is a key focus for Ontario, reducing overall energy use is important to build a base for long-term sustainable conservation. These areas of focus are responsive to government direction and provide benefits beyond energy savings. This focus helps ensure that all Ontarians can contribute to the culture of conservation, provides some protection for vulnerable consumers against the rising cost of energy and helps ensure that electricity savings are maximized across all sectors.

2. Developing needed infrastructure and market mechanisms to deliver and measure sustainable electricity savings by forging partnerships with a broad range of industry and community organizations, and establishing a protocol for electricity program measurement, verification and evaluation.

One of the Ontario Power Authority's priorities is to build market capability with a focus on large industrial consumers, the municipalities, universities, schools and hospitals sector, and contractors serving the residential and small and medium-sized enterprise sectors. These capability building objectives will be both woven into resource acquisition programs and developed as stand-alone programs.

The Ontario Power Authority will also complete the development of program evaluation, measurement and verification mechanisms in 2007.

3. Championing the building of a culture of conservation to achieve sustained commitment to conservation through targeted awareness, education and social marketing campaigns, and by advocating for policy and regulatory changes to promote energy efficiency.

The Ontario Power Authority will focus on increasing awareness among buyers and suppliers of where to find more efficient options and develop the means to achieve greater efficiency. It will also determine ways to deliver effective feedback on the results of conservation investment with a focus on building a recognizable brand for conservation.

The Conservation Bureau will focus its activities on raising awareness in the mass market, and recognizing ongoing conservation success of consumers. Advocacy efforts will centre on increasing the energy-efficiency requirements of standards related to heating, ventilation and air conditioning, lighting, building code and standby power. In addition, the Conservation Bureau will investigate the potential electricity savings that can be gained from policies and legislation designed to limit carbon dioxide emissions, as well as marginal cost pricing.

2007 programs and activities

In 2007, the Ontario Power Authority is planning to design and deliver programs in all sectors. Residential programs will target energy-efficiency and conservation activities with an emphasis on summer peak and sustainable savings. The programs are designed to reach all residential customers and will include Every Kilowatt Counts and Cool Savings, as well as programs aimed at the social housing sector, low-income households and First Nations communities. Commercial and institutional programs will initially be targeted at customers in the Toronto area to alleviate immediate supply concerns. Programs are delivered through program administrators and rely on capability building efforts. Planning is underway to broaden commercial and institutional programs to serve the entire province and to include all segments of the market. Programs include the Building Owners and Managers Association large commercial building retrofit program, the City of Toronto retrofit and demand response program, and capability building demand response in small and medium-sized commercial enterprises. Industrial programs have initially targeted demand response results to address the near-term challenge. Demand response programs continue to be developed and introduced in the marketplace. This requires

the development of capability among industrial customers to participate. Efforts are also underway to design energy-efficiency and conservation programs for the industrial sector.

In addition to the programs discussed above, the Ontario Power Authority has also developed a renewable energy standard offer program and has issued a request for proposals for combined heat and power. Both of these projects may generate behind-the-customer-meter savings that can be included in the government's conservation targets.²³ These projects were launched in 2006, but activity is expected to continue into 2007.

The conservation targets are ambitious—achieving them will require effort on all fronts. The Conservation Bureau proposes an aggressive implementation strategy involving a range of delivery channels across the province, including local distribution companies, natural gas utilities, non-governmental organizations, community groups, all levels of government, and market players at all points along the marketing channel.

Local distribution companies will be a key conservation delivery channel in 2007. The Ontario Power Authority will set up the funding for local distribution companies' conservation programs in 2007. This will fund local distribution companies to deliver conservation programs in their territories. The rules for applying for funds and a suite of standard programs for delivery by local distribution companies are being designed with extensive input from stakeholders and two groups: the Program Design Advisory Group and the Program Operations Advisory Group. These groups have representatives from the local distribution companies, consumer and environmental groups, as well as the Independent Electricity System Operator and the Ontario Energy Board. Funds are expected to be granted in 2007 so local distribution companies can deliver standard programs as well as successful local and pilot programs. These conservation programs will be coordinated with Ontario Power Authority programs to reflect system needs and conservation potential identified in the work for the Integrated Power System Plan.

To ensure that the Conservation Bureau is achieving results and learning from experience, it will create a standardized process for evaluating, measuring and verifying the results of conservation programs. Effective process and impact evaluations, measurement and verification will enable program administrators to provide credible and objective information on the programs' effect on electricity use and load, make recommendations to improve program performance, and assess future opportunities to save energy through new or different programs. In addition, the Conservation Bureau will work to improve mechanisms for reporting on conservation achievement.

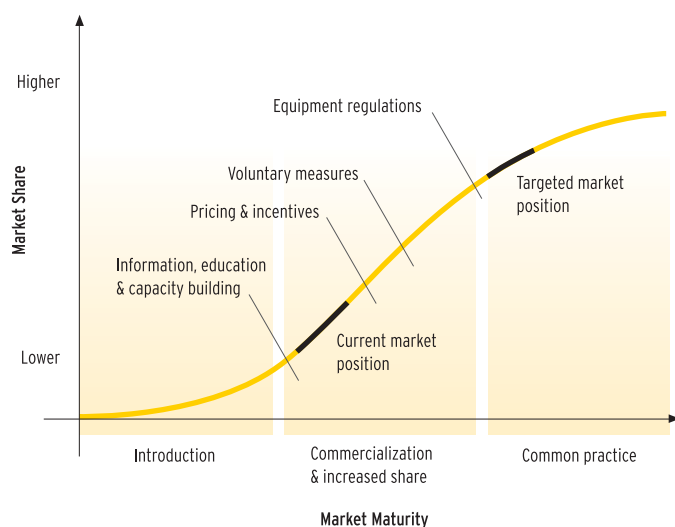
In developing these 2007 proposals, the Conservation Bureau was guided by the government's directives, as well as Ontario's conservation experience and research.²⁴ The Ontario Power Authority will leverage the breadth of approaches and conclusions from these various studies to develop a robust portfolio that will be evaluated to improve its understanding of conservation potential in Ontario over time. There were significant common messages emerging from the research, for example, that commercial air conditioning, heating, ventilation and lighting; and residential air conditioning are key areas of potential for energy efficiency.

Chapter 7. Regulatory Opportunities and Barriers

Energy-efficiency standards, building codes and other regulatory tools are powerful instruments to help Ontario meet its conservation targets and ultimately achieve market transformation to a culture of conservation. Achievements in this area are a definitive sign that a new era of conservation is beginning in Ontario.

To ensure that conservation is a reliable way to meet some of Ontario's future electricity needs, consumption and demand savings must be achieved in the short and medium term. At the same time, capability must be built and the market must be transformed to sustain these savings reliably over time. Legal and policy tools are important mechanisms for achieving these targets. Mandatory energy-efficiency standards in regulations stimulate and promote market transformation and eliminate the possibility of the market reverting to lower energy-efficiency levels when incentive-based programs cease.

Figure 7.1. – Market Transformation to an Energy-Efficient Market



Source: B.C Ministry of Energy, Mines and Petroleum Resources, 2005²⁵

The electricity savings achieved by eliminating the least-efficient products through regulatory changes can be translated into lower utility bills for consumers and businesses. In addition, other legal and policy steps can create incentives for energy savings (e.g., price signal or carbon liability tax) or remove barriers to conservation (e.g., land use policies).

Changing codes and standards, and advocating for other regulatory changes, are lengthy processes that require working cooperatively with multiple stakeholders and interests. To be most effective, the Conservation Bureau must work with other jurisdictions and think in terms of long-term market transformation strategies to achieve the required energy savings and create a culture of conservation. Figure 7.1 illustrates the components of market transformation to a more energy-efficient market.

The importance of codes, standards and regulatory tools is widely recognized. The Government of Ontario, in its supply mix direction to the Ontario Power Authority in June 2006, specifically acknowledged the role of codes and standards in achieving the conservation targets. Also, the experience in California, which has been active in conservation efforts for more than 20 years, is that energy-efficiency codes and standards are responsible for approximately 50 per cent of its energy savings.²⁶ Academics and consultants recognize the importance of codes and standards as well as other regulatory tools, including pricing and taxation mechanisms, in achieving sustained conservation gains.²⁷

The Conservation Bureau seeks opportunities and partnerships; it does not enforce. It identifies legal and policy barriers to conservation and advocates for change; the Conservation Bureau does not police. It encourages individuals to conserve through province-wide programs and more energy-efficient standards; it does not regulate.

The Conservation Bureau continues to liaise with governments and regulating bodies to encourage the adoption of more energy-efficient codes and standards.

Provincial energy and conservation policy

In the Chief Energy Conservation Officer's 2005 annual report, four recommendations were made regarding government energy policy. Appendix 9 provides an update on actions taken related to these recommendations, as well as on others made in the 2005 report.

While the government is making progress on conservation, there is an opportunity and a need for more consistency and coordination across ministries. Both the Ministries of Energy and of Public Infrastructure Renewal have dedicated significant resources to the conservation portfolio; however, this is not the case with all ministries. For example, the Ministry of Municipal Affairs and Housing rolled out an affordable housing program that initially did not include mandatory energy-efficiency targets. After discussions with the Conservation Bureau, a recommendation for energy efficiency was added to the funding offer. The Ministry of Municipal Affairs and Housing and the Conservation Bureau are working on a program to provide energy-efficient appliance upgrades for new affordable housing. However, this kind of piecemeal approach is not sufficient. The government must be, and must be seen to be, a leader in conservation. This means all contracts and all new construction must be energy efficient and promote new and green technologies. Not only does this provide leadership, in many cases it makes good economic sense.

2006 Recommendations on provincial energy and conservation policy

1. All new government building construction should use the 2011 Ontario Building Code energy-efficiency requirements as a minimum. New and green technologies should also be explored.
2. Government procurement contracts must specify high energy efficiency as a minimum requirement.
3. The government should continue to actively seek stakeholder advice on conservation targets through stakeholder groups as appropriate and other mechanisms.
4. The Conservation Action Team should act on its expanded role and leverage other cross-ministerial forums to provide consistency and coordination of conservation policy and action across the government.
5. The government should publish its energy and conservation policy in one summary document.

Energy-efficiency standards in Ontario

In the Chief Energy Conservation Officer's 2005 annual report, three recommendations were made regarding energy-efficiency standards. Appendix 9 provides an update on actions taken related to these recommendations.

Aggressive energy-efficiency standards are paramount to achieving reliable electricity savings in the short and long term. This will also mean lower utility bills for the consumer. The Ontario *Energy Efficiency Act* establishes energy-efficiency standards to eliminate the least efficient products from the Ontario marketplace. The Act has established minimum efficiency levels for more than 50 product categories that consume 80 per cent of the electricity used in the residential sector in Ontario and 50 per cent of the electricity used in the commercial/institutional sector. The regulations cover a wide spectrum of products, including household appliances, furnaces and boilers, water heaters, lighting products, air conditioners, heat pumps, chillers and commercial products (e.g., motors, transformers and vending machines). Regulations under the Ontario *Energy Efficiency Act* apply to newly manufactured products offered for sale or lease in Ontario.²⁸ The standards are based on those developed in the Canadian Standards Association process.²⁹

Existing standards also need to be re-examined on a regular basis, with revisions made to the minimum energy-efficiency requirements as technology evolves over time. For example, minimum energy-efficiency standards for refrigerators have been improved three times since the first standard was introduced.

Since January 2004, new and updated energy-efficiency standards have been brought in for the following electrical products: household ranges, clothes washers, dishwashers, water heaters, thermostats, motors (1–200 horsepower), ground source heat pumps, transformers, exit signs, incandescent lamps, chillers, fluorescent lamp ballasts, commercial and residential air conditioners and heat pumps, commercial lighting and commercial refrigeration. The regulation of minimum efficiency levels for electrical products across the province is expected to generate additional annual electricity savings of 2,000 gigawatt hours, or an equivalent of 450 megawatts of load reduction, between the years 2004 and 2025.³⁰

Of particular note was the February 15, 2006, amendment under the Ontario *Energy Efficiency Act* to set new minimum efficiency values for residential air conditioners that are less than five tons in cooling capacity. This means that only air conditioners with a Seasonal Energy Efficiency Ratio rating of 13 or higher that were manufactured after February 15, 2006, can be offered for sale, sold or leased in Ontario. Load reduction from this amendment alone is estimated to be between eight and 20 megawatts across the province for this calendar year (depending on weather and customer usage patterns). This is estimated to increase to up to 70 megawatts annually by the year 2010. To date, Ontario remains the only province in Canada to adopt this regulation.

The Government of Ontario has a long history of participation in the standards development process. However, the extent of this participation has varied over time. In recent years, while staff time has been committed to standards work, there has not been a sustained investment in standards development. Given the importance of standards to long-term and sustainable conservation, the government must make a sustained financial and human resource commitment to standards development.

Honouring commitment



Ed Grzesik (c.), Coordinator, Technical Support, at the Ontario Ministry of Energy, received the Canadian Standards Association 2006 John Jenkins Award from Daniel Gagnier (l.), chair of the board, CSA Group, and Douglas Hatch, chair of the CSA Group board of directors awards committee. The award is the association's most prestigious honour and recognizes those who have rendered distinguished service in the development, advancement and application of voluntary standards.

Mr. Grzesik has worked tirelessly for 27 years to create and advance energy-efficiency standards, serving on some 92 association committees, including chairing the Advisory Committee on Energy Efficiency since 1990. He is considered a pillar of the standards community and has helped shape the standards development landscape. The Chief Energy Conservation Officer congratulates Mr. Grzesik on receiving this honour and thanks him for his tireless efforts to promote energy efficiency.

California has been a world leader in the development of building and appliance standards since 1978, when it developed the first-ever standards for key domestic appliances, including refrigerators and central air conditioners. California has upgraded its standards every three to five years since then and was responsible for developing a new generation of appliance standards for communication equipment, home entertainment systems and cool roofs in 2002, in response to blackouts during the state's electricity emergency of 2000 and 2001.

In total, Ontario is in harmony with California standards for 95 per cent of consumer products.³¹ Ontario matches the California regulation in eight product categories: air conditioners, refrigerators, clothes dryers, ranges, dishwashers, freezers, water heaters and clothes washers. The province has regulations in development to match California standards in three product lines: whole house fans and residential exhaust fans, residential pool pumps and torchieres. Ontario and California currently both have regulations in development for lighting and furnace electricity use. California has a regulation that will come into effect in July 2007 for power supplies and consumer audio and video equipment; a similar regulation in Ontario is in development.

A recent U.S. report³² identified 15 products for which near-term standards on a national basis could cut national electricity demand levels by 12,000 megawatts by the year 2020. Eight of the 15 products are currently not regulated in Ontario. Although the remaining seven are regulated, the report recommends an increase in the minimum energy-efficiency requirements. Applying these savings on a per-capita basis to Ontario could potentially result in savings of about 500 megawatts.³³

One of the fastest growing sources of electricity consumption is from standby power losses from consumer and business appliances that are not being used. There are four power modes in most of these products: in-use mode (appliance is performing its normal function), active standby mode (turned on but not in use), passive standby mode (off but can be activated by a remote control) and off mode. Any appliance with a clock or that responds to a remote control draws standby power. Even external power supplies draw power when the equipment is fully charged or not plugged into the charger. These losses can range from one to six watts per electronic appliance (for home audio systems, DVD players, cell phone chargers) to more than 10 watts for a satellite television receiver. The electricity used to power small appliances in homes has risen by 63 per cent from 1990 to 2003; this increase is in sharp contrast to a decrease of 12 per cent to power major appliances over the same period.³⁴

A 2001 study by Dalhousie University estimated the average total standby loss per household in Canada at 41 watts. In some countries, these standby losses are estimated to be as high as 87 watts per household, more than double the conservative estimate for Canada.³⁵ In Ontario, the demand for standby power has been estimated to grow, in a business-as-usual scenario, by 26 per cent by 2010 and by 57 per cent by 2020.³⁶ The Ministry of Energy now estimates that with the appearance of additional new consumer electronic systems in the home, that average has likely doubled.³⁷

This level of standby power loss would be equivalent to more than 360 megawatts of electrical demand. For the commercial and institutional sector, standby power consumption has been estimated to be two to three times as large as the residential losses.³⁵

The Ministry of Energy continues to review a range of standards for building components including windows. Work began in 2005 on harmonizing the A440.2-04 window performance standard with the United States National Fenestration Rating Council standard and is expected to be complete by the end of 2006. The ministry expects to begin the consultation process later this year on whether or not to include a referenced minimum level for all residential windows sold in the province (for use between heated space and non-heated space) with a regulation under the Ontario Energy Efficiency Act. The government addressed energy-efficiency standards in windows for new homes in revisions to the Ontario Building Code.

2006 Recommendations on energy-efficiency standards in Ontario

6. Ontario should continue to match California's standards and work with California and other leading jurisdictions on the introduction of new standards in the future.
7. Ontario should work with other jurisdictions to adopt a one-watt standard for load losses associated with standby losses.
8. Ontario should incorporate the A440.2-04 window performance standard for replacement windows into the Ontario *Energy Efficiency Act*.

Ontario Building Code

The Ontario Building Code applies to all new construction, as well as substantial renovation and change of use. The code is administered by the Ministry of Municipal Affairs and Housing and enforced by municipalities.

In the Chief Energy Conservation Officer's 2005 annual report, two recommendations were made regarding the Ontario Building Code. Appendix 10 provides an update on actions taken related to these recommendations.

In February and April 2006, the Ministry of Municipal Affairs and Housing invited public comment on a package of proposed technical changes to the building code to increase energy efficiency of buildings and houses.³⁷ These consultations were fast-tracked to ensure that they could be included in the 2006 round of building code amendments. As part of these consultations, the Chief Energy Conservation Officer submitted a series of recommendations in a document entitled "The Power of Building Better." These recommendations included, among others:

- that all new homes built under the Ontario Building Code should meet or exceed 80 on the energy efficiency EnerGuide scale for Houses. The scale provides a tool for rating the energy efficiency of a home from one to 100 and looks at all forms of energy.

- that non-residential new buildings (not covered by Part 9 of the building code) be built to a standard of 25 per cent better than the Model National Energy Code for Buildings.

The Chief Energy Conservation Officer was a strong advocate for changes to the building code and met with many government officials on this topic.

The Government of Ontario introduced the 2006 Building Code with the filing of Ontario Regulation 350/06 in June 2006 (see Appendix 8). The 2006 building code includes more than 700 technical changes, including significant increases in the energy-efficiency requirements for buildings.³⁸ Further code changes related to energy efficiency will be phased in. The code's increased energy-efficiency requirements will save Ontario an estimated 550 megawatts of electricity over the next eight years, according to the Ministry of Municipal Affairs and Housing.

In 2007, a typical home will be 21 per cent more energy efficient than one built under the current building code. This improvement will be achieved by more efficient windows (67 per cent increase in efficiency), higher insulation levels (29 per cent increase in efficiency for ceilings, 12 per cent

increase for walls and 50 per cent increase for foundation walls) and higher efficiency furnaces.

Effective December 31, 2008, the building code will require that new houses be constructed with near-full-height basement insulation. In addition, as of December 31, 2011, it will require new houses to meet standards that are substantially in accordance with EnerGuide 80. It will also require that new non-residential and larger residential buildings meet standards that are substantially in accordance with energy-efficiency levels 25 per cent higher than the Model National Energy Code for Buildings.³⁹

The collective challenge now is to ensure that these targets are met and exceeded where feasible. It is also a challenge to develop a vision beyond 2011 for homes and buildings. The development of codes and standards is an ongoing process; it is necessary to continually envision the next stage, and work with the market to achieve it. The government and the Conservation Bureau must ensure that the market has the support it needs to reach the new energy-efficiency targets.

2006 Recommendations on the Ontario Building Code

9. Develop a market transformation strategy to ensure achievement of the Part 2 target by 2011.
10. Develop a market transformation strategy to ensure achievement of the Part 9 target by 2011.
11. Put in place a process to ensure ongoing facilitation of green technologies.
12. Begin discussion on how to ensure that energy efficiency is considered in renovations.
13. Begin to develop a vision for the Ontario Building Code beyond 2011.

Other regulatory opportunities and barriers

In the Chief Energy Conservation Officer's 2005 annual report, recommendations were made regarding some other legal barriers and opportunities. The Ministry of Energy achieved significant progress with the Ozone Depleting Substances regulation and the *Energy Conservation Leadership Act, 2006*, described here, both of which were a higher priority than other items noted in last year's report. However, some actions were undertaken related to the other recommendations, which are detailed in Appendix 9.

- *Ozone Depleting Substances regulation*

The Conservation Bureau played a key role in ensuring that this regulation was approved. In January 2006, the Conservation Bureau joined many others, including the Building Owners and Managers Association; the Heating, Refrigeration, and Air Conditioning Institute; and Friends of the Earth, in advocating that the government pass the Ozone Depleting Substances regulation. The regulation phased out remaining uses of chlorofluorocarbons in large industrial, commercial and institutional refrigeration and air conditioning equipment and chillers. Realizing that this regulation would protect the environment as well as create energy-savings opportunities, the Conservation Bureau commissioned two studies to calculate the potential electricity megawatt savings in Ontario from this regulation. The studies found that the province could save between 50 megawatts and 175 megawatts, depending on associated programs.³⁹

In June 2006, proposed amendments to Ontario's Refrigerants Regulation were posted on the Environmental Bill of Rights Registry. The Conservation Bureau is working with government and industry to develop programs to support this regulation by providing incentives to companies to remove old chlorofluorocarbons-using equipment, and replace it with new energy-efficient or alternate technologies. More information on the Ozone Depleting Substances regulation can be found in Appendix 10.

- *Energy Conservation Leadership Act, 2006*

In November 2005, the Minister of Energy introduced the *Energy Conservation Leadership Act, 2006*. Under this Act, the government is empowered to pass regulations requiring ministries, agencies and broader public sector organizations to prepare energy conservation strategies on a regular basis and report on energy consumption, proposed conservation measures and progress. The legislation also provides the framework for the government's commitment to install 800,000 smart meters in Ontario homes and businesses by 2007 and to have them installed in all homes and businesses by 2010.

One relatively untapped resource for energy savings lies in urban design. The Ministry of Municipal Affairs and Housing's 2005 Greenbelt Protection Plan offers an opportunity to explore this area of potential. Electricity savings should be considered in the implementation of the plan. The importance of these issues was highlighted for the Conservation Bureau by the non-governmental organization representatives who attended a spring 2006 forum on legislative barriers to conservation (see page 52).

2006 Recommendations on other regulatory opportunities and barriers

14. Develop meaningful regulations under the *Energy Conservation Leadership Act, 2006*, to address barriers to conservation and to promote leadership by the broader public sector in energy conservation.
15. Review land use policies to establish density requirements in existing and future developments.
16. Consideration should be given for site design and the implementation of energy efficiency and renewable energy in land use policies.
17. Ensure that electricity savings are considered in the implementation of the 2005 Greenbelt Protection Plan.

Summary of recommendations

In summary, the Chief Energy Conservation Officer makes the following recommendations to the Government of Ontario to take advantage of opportunities and further reduce barriers to conservation and energy efficiency in the province:

Provincial energy and conservation policy

1. All new government building construction should use the 2011 Ontario Building Code requirements as a minimum. New and green technologies should also be explored.
2. Government procurement contracts must specify high energy efficiency as a minimum requirement.
3. The government should continue to actively seek stakeholder advice on conservation targets through stakeholder groups as appropriate and other mechanisms.
4. The Conservation Action Team should act on its expanded role and leverage other cross-ministerial forums to provide consistency and coordination of conservation policy and action across the government.
5. The government should publish its energy and conservation policy in one summary document.

Energy-efficiency standards in Ontario

6. Ontario should continue to match California's standards and work with California and other leading jurisdictions on the introduction of new standards in the future.
7. Ontario should work with other jurisdictions to adopt a one-watt standard for load losses associated with standby losses.
8. Ontario should incorporate the A440.2-04 window performance standard for replacement windows into the Ontario *Energy Efficiency Act*.

Ontario Building Code

9. Develop a market transformation strategy to ensure achievement of the Part 2 target by 2011.
10. Develop a market transformation strategy to ensure achievement of the Part 9 target by 2011.
11. Put in place a process to ensure ongoing facilitation of green technologies.
12. Begin discussion on how to ensure that energy efficiency is considered in renovations.
13. Begin to develop a vision for the Ontario Building Code beyond 2011.

Other regulatory opportunities and barriers

14. Develop meaningful regulations under the *Energy Conservation Leadership Act, 2006*, to address barriers to conservation and to promote leadership by the broader public sector in energy conservation.

15. Review land use policies to establish density requirements in existing and future developments.
16. Consideration should be given for site design and the implementation of energy efficiency and renewable energy in land use policies.
17. Ensure that electricity savings are considered in the implementation of the 2005 Greenbelt Protection Plan.

In conclusion

It's the dawn of a new era in conservation in Ontario. The province has two important targets to achieve in the coming years: to reduce peak electricity demand by 6,300 megawatts by 2025 and to create a culture of conservation that will ensure the regular wise use of electricity resources by all Ontarians today, tomorrow and well into the future. Ontario has already begun this journey, and the Conservation Bureau is helping to lead the way with a solid plan to achieve significant, sustainable reductions and to foster a culture of conservation. But these targets will not be met without the participation of all Ontarians.

The Chief Energy Conservation Officer encourages everyone to actively engage in meeting the conservation challenge. Review your consumption at home, at school or at work, and decide what you can do to conserve electricity. It's in the best interest of all Ontarians.

References and notes

Chapter 2

- 1 From Ministry of Energy directive, June 13, 2006
- 2 To assist in developing the conservation targets included in the *Supply Mix Advice Report*, the Ontario Power Authority retained Ralph Torrie and ICF Consulting to identify conservation and demand management potential.
- 3 The working group comprised representatives from Natural Resources Canada, provincial and territorial governments, the Canadian Gas Association, the Canadian Electricity Association, the Canadian Renewable Energy Alliance and the National Energy Board. Marbek Resource Consultants Ltd. and M.K. Jaccard and Associates completed the study jointly. The analysis was conducted using the Canadian Integrated Modelling System, supported by Marbek demand side management tools and databases.
- 4 The numbers for megawatt savings presented in Table 2.2 are preliminary and depend on load shapes. Further analysis of load shape is underway, and the results will be shared as they become available. For more information, please see the Ontario Power Authority's load forecast, and conservation and demand management discussion papers, available at www.powerauthority.on.ca.
- 5 Work done by Navigant Consulting Inc.

Chapter 3

- 6 Coffey, Fisch & Associates, Energy Conservation Review, Ontario: February 2006 (available on www.conservation-bureau.on.ca), and energy participants are listed on www.powerauthority.on.ca (Corporate Information/ Ontario's Energy Landscape).
- 7 The presentation of the Ontario Power Authority's 2007 business plan is available at www.powerauthority.on.ca/Storage/25/2025_2007_Business_Plan_Stakeholder_Presentation_060803final.pdf.
- 8 The Coalition of Large Distributors includes Enersource Hydro Mississauga, Horizon Utilities, Hydro Ottawa Limited, PowerStream Inc., Toronto Hydro-Electric Systems Ltd. and Veridian Connections.

Cornerstone Hydro Electric Concepts includes Centre Wellington Hydro Ltd., Collus Power Corp., Grand Valley Energy Inc., Innisfil Hydro, Lakefront Utilities Inc., Lakeland Power Distribution, Midland Power Utility Corp., Orangeville Hydro Ltd., Orillia Power Distribution Corp., Parry Sound Power, Rideau St. Lawrence, Wasaga Distribution Inc., Wellington North Power Inc., West Coast Huron Energy Inc., Westario Power and Woodstock Hydro Services.

The Niagara Erie Power Association includes Brant County Power Inc., Brantford Hydro, Fortis Incorporated Power Group, Grimsby Power Inc., Haldimand County Hydro Inc., Horizon Utilities Corporation, Niagara Falls Hydro, Niagara-on-the-Lake Hydro Inc., Norfolk Power Inc., Pen West Utilities Limited and Welland Hydro-Electric System Corp.

- 9 Derived from M.K. Jaccard and Associates, Inc. Modelling and Scenario Ontario Report, July 2006.

Chapter 4

- 10 The data used to calculate the peak savings level was provided by Andrew Trachell of the Independent Electricity System Operator. He also provided input and assistance on developing the methodology to adjust the peak savings readings for weather and economic growth effects over the period analyzed.
- 11 The 10 per cent reduction is based on a 2002–2003 electricity consumption baseline of 37.9 gigawatts for Ontario Realty Corporation-operated buildings and a 26.5 gigawatts baseline for ministry-operated buildings.
- 12 The Ontario Realty Corporation provides a broad range of real estate services, including construction project management, facilities management, portfolio management and asset rationalization to the Ontario government. It is the strategic manager of the provincial government's real estate portfolio: around 6,000 buildings, comprising some 50 million square feet of space.
- 13 Ministry-operated buildings are run by the Ministries of Natural Resources, Transportation, Health and Long-Term Care, Community Safety and Correctional Services, Community and Social Services and Education.
- 14 Electricity Distributors Association, *The Distributor*, special issue, Aug./Sept. 2006. Available online at www.eda-on.ca.
- 15 H.R. Bach, Energy Profiles Limited, An Estimate of Investment in Energy Conservation in the Residential, Commercial and Industrial Sectors Within the Province of Ontario, May 2006.

- 16 Enbridge programs included a program that supported the installation of high-efficiency gas furnaces with electric variable speed motors in existing homes and resulted in 1,595,201 kilowatt hours saved, and a program to support the purchase and installation of programmable thermostats for homes, which resulted in 990,303 kilowatt hours saved. Two of the programs offered by Enbridge to their customers are incentives for customers to participate in the EnerGuide for Houses Retrofit Incentive Program; as a result some of the savings included in the Enbridge electricity savings may also be included in the federal EnerGuide for Houses electricity savings.
- 17 The tracked electricity savings through Union Gas custom projects program covered applications where savings were linked to unique building specifications, uses and technologies. This may have involved new technologies, design concepts or process improvements. The program targets channel partners in the design and engineering communities as well as key commercial and distribution contract end-use customers (multiple facility end users such as national accounts, retail chains, property management firms, non-profit housing authorities, school boards, municipalities and industrial facilities). The custom project program includes financial incentives and educational support.

Chapter 5

- 18 In addition, the Conservation Bureau's work is informed by the analytical work performed by the power system planning group of the Ontario Power Authority, and the recent national study sponsored by the Canadian Gas Association and the Canadian Electricity Association, and conducted by M.K. Jaccard and Associates and Marbek Resource Consultants.
- 19 ENERGY STAR® is a program run by the federal government that recognizes the most energy-efficient appliances on the market.
- 20 Summit Blue Consulting is conducting this study.
- 21 Conservation Bureau, 2006. The number of impressions for print media is at least twice the circulation numbers. The enumeration of media clippings is inherently inaccurate. Many media outlets are not captured by media monitoring services. This is a sector-wide problem.
- 22 LURA Consulting assisted the Conservation Bureau with this successful forum.

Chapter 6

- 23 The supply mix directive included customer-based generation of less than 10 megawatts as conservation.
- 24 The external research included the load forecast and conservation potential study completed by M.K. Jaccard and Associates for the Integrated Power System Plan and market scans of various sectors.

Chapter 7

- 25 B.C. Ministry of Energy, Mines and Petroleum Resources, *Energy Efficient Buildings—A Plan for B.C.* available at www.empr.gov.bc.ca/AlternativeEnergy/EnergyEfficiency/default.html.
- 26 California Energy Commission, Funding and Savings for Energy Efficiency Programs for Program years 2000 through 2004, July 2005.
- 27 Marbek Resource Consultants and M.K. Jaccard and Associates, Demand Side Management Potential in Canada: Energy Efficiency Study, May 2006.
- 28 Ontario Ministry of Energy Web site (Conservation Legislation). www.energy.gov.on.ca/index.cfm?fuseaction=conservation.legislation.
- 29 Energy-efficiency standards are primarily developed through the Canadian Standards Association (CSA) process. The CSA is a not-for-profit membership-based association serving business, industry, government and consumers in Canada and the global marketplace. The development of standards within CSA follows a consensus-building process with representatives from several sector areas. In response to the Canadian energy crisis of the 1970s, the CSA created the Performance, Energy Efficiency and Renewables (PEER) program. The CSA has more than 65 published standards in the PEER program covering the performance and energy efficiency of electrical, gas and oil-fired equipment and appliances; construction product efficiency; and design and installation requirements for renewable energy sources. Strategic direction for the PEER program comes from the Steering Committee on Performance, Energy Efficiency and Renewables. The actual work of standard development is done by six technical committees and 50 to 60 sub-committees supported by approximately 1,000 volunteer individuals.
- 30 Standards Unit, Ministry of Energy, 2006.
- 31 Ministry of Energy 2006 submission to the Canadian Energy Efficiency Alliance.
- 32 The American Council for an Energy Efficient Economy, *Leading the Way: Continued Opportunities for New State Appliance and Equipment Efficiency Standards*, March 2006.

- ³³ 500 megawatts is derived from multiplying 12,000 megawatts by the Ontario population divided by the U.S. population, 12,540,000/296,410,000.
- ³⁴ Natural Resources Canada, *2003 Survey of Household Energy Use Summary Report*, December 2005.
- ³⁵ Standby Power – The Phantom Menace, presentation by Natural Resources Canada, May 4–5, 2006.
- ³⁶ Anna Zyzniewski, Natural Resources Canada, Standby Power in the Residential Sector in Canada and Future Trends, 2002.
- ³⁷ Opportunities for Energy Savings in Consumer Electronics, 2002 ACEEE Summer Study – Informal Session, August 2002. Standby Power Use: How Big is the Problem? What Policies and Technical Solutions Can Address It? standby.lbl.gov/ACEEE/StandbyPaper.pdf.
- ³⁸ www.obc.mah.gov.on.ca/userfiles/HTML/nts_4_27461_1.html. Full regulation can be found at: http://www.obc.mah.gov.on.ca/userfiles/HTML/nts_4_27475_1.html.
- ³⁹ www.obc.mah.gov.on.ca/userfiles/HTML/nts_4_27461_1.html.
- ⁴⁰ Marbek Resource Consultants, CFC Chiller Replacement Potential Report and Addendum, February 2006.

About the Ontario Power Authority

The Ontario Power Authority was established under *The Electricity Restructuring Act, 2004*, and commenced operations in January 2005. It is a not-for-profit corporation without share capital and is governed by an independent Board of Directors, with its activities and programs directed by a Chief Executive Officer. The Ontario Power Authority reports to the Ontario Legislative Assembly through the Minister of Energy and is licensed and regulated by the Ontario Energy Board.

In pursuit of its mandate of ensuring an adequate, long-term supply of electricity for Ontario, the Ontario Power Authority creates and implements conservation and demand management programs, ensures adequate investment in new supply infrastructure, performs long-term electricity system planning, and facilitates the development of a more sustainable and competitive electricity system.

More information is available at **www.powerauthority.on.ca**.

About the Conservation Bureau

The Conservation Bureau is part of the Ontario Power Authority. Its mandate is to develop, coordinate and stimulate electricity conservation and demand management by planning, designing and implementing comprehensive programs that foster a culture of conservation across the province.

Visit our Web site at www.conservationbureau.on.ca to find:

- the Chief Energy Conservation Officer's annual reports
- information on Conservation Bureau initiatives
- Conservation Fund guidelines and information
- residential conservation programs
- commercial and institutional conservation and demand management programs
- industrial and agricultural conservation and demand management programs
- current Conservation Bureau requests for proposals
- and more.

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32.7 kilograms of water-borne waste not created



40,133 litres of wastewater flow saved



532 kilograms of solid waste not generated



1,048 kilograms net of greenhouse gases prevented



32.7 kilowatt hours of energy not consumed



544 kilograms of air emissions not created



80.85 cubic metres of natural gas not used



Equivalent to not driving **2,092 kilometres** in an average car



Equivalent to planting **8.1 trees**

APPENDICES TO

2006 CHIEF ENERGY CONSERVATION OFFICER ANNUAL REPORT

1. Ontario electricity demand and consumption
2. Description of peak-savings analysis method
3. Details of government progress on in-house conservation programs
4. Conservation Bureau research and studies
5. Polling study results
6. Conservation Fund projects
7. Certificates of Recognition
8. Energy efficiency in the 2006 Ontario Building Code
9. Follow-up on 2005 recommendations
10. Background on Ozone Depleting Substances Regulation

APPENDIX 1.

ONTARIO ENERGY CONSUMPTION

Figure 1

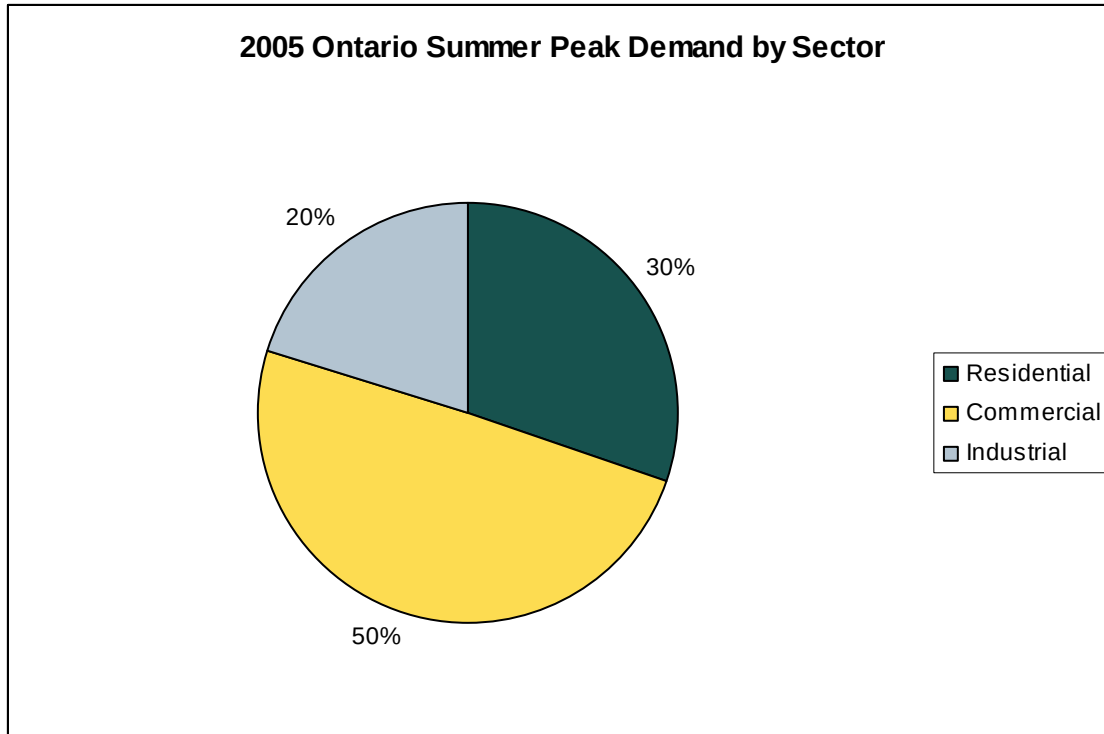


Figure 2

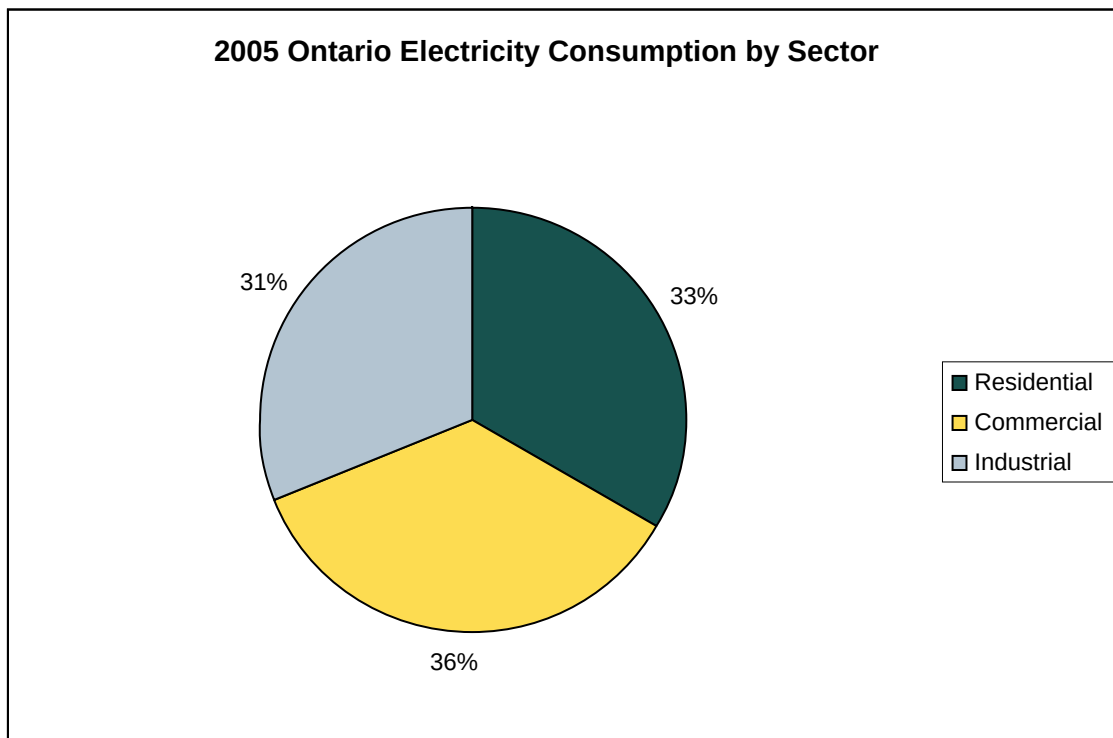


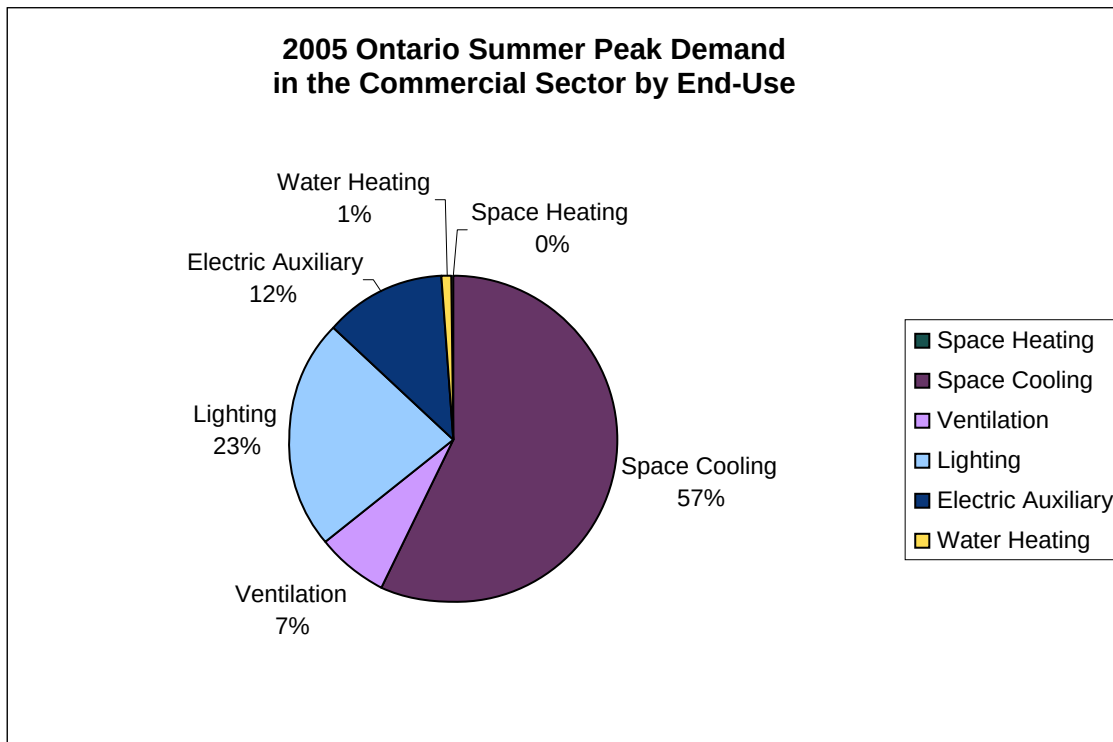
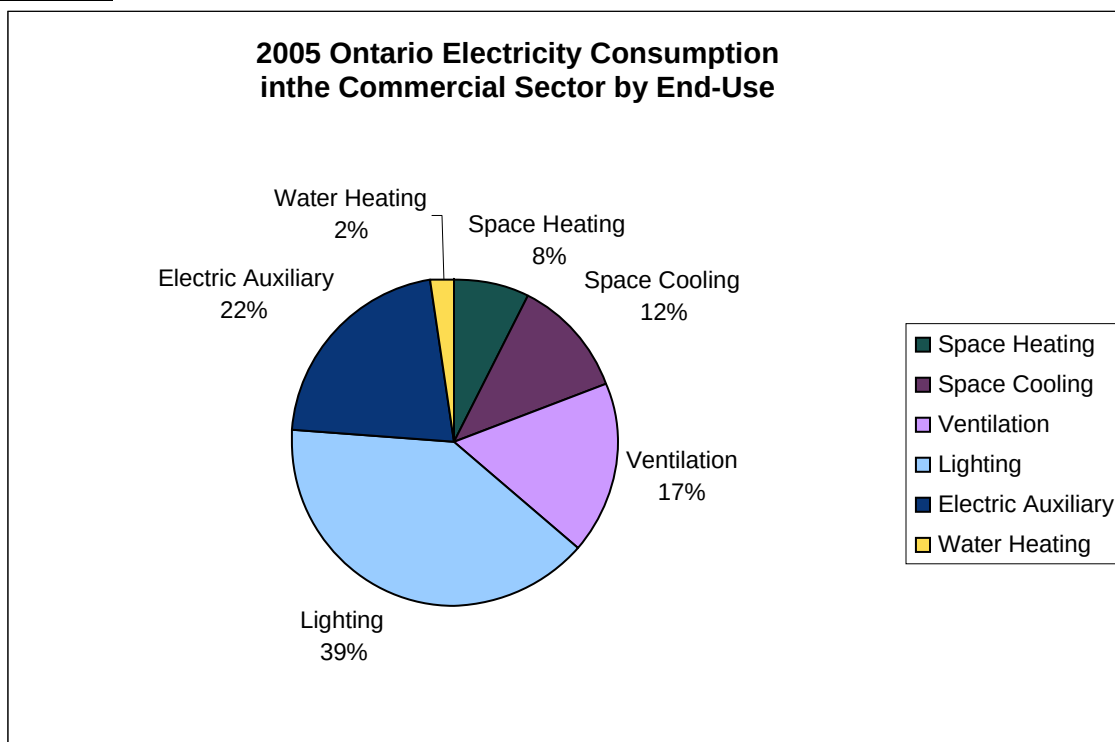
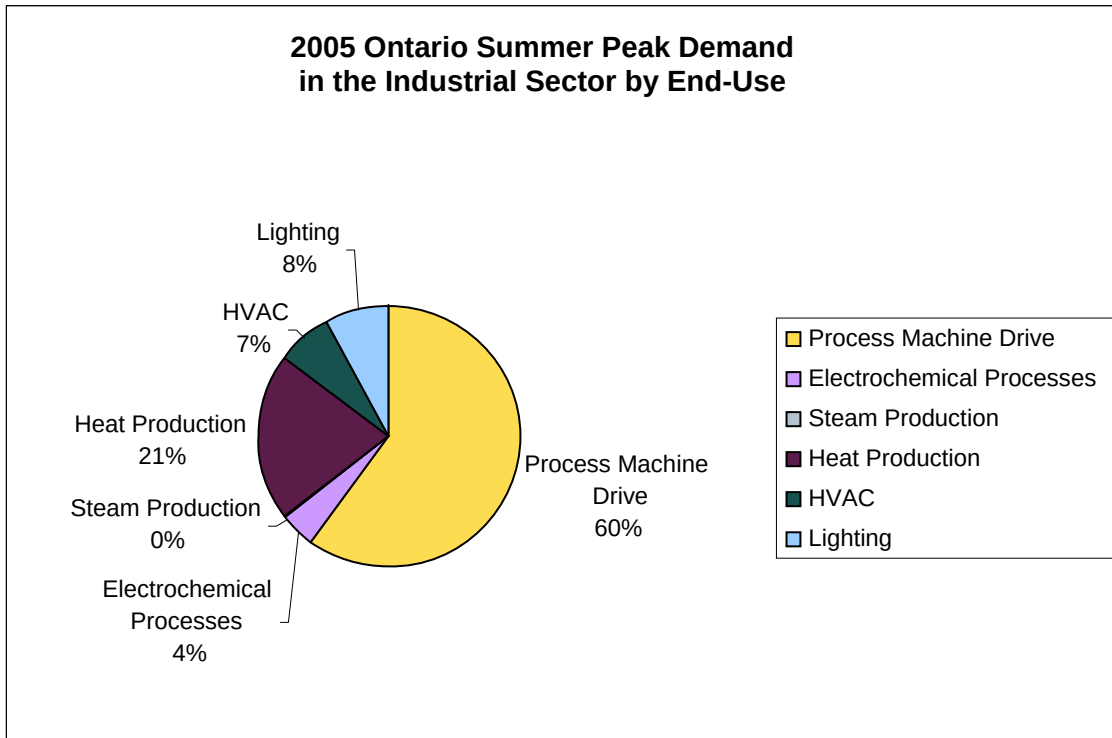
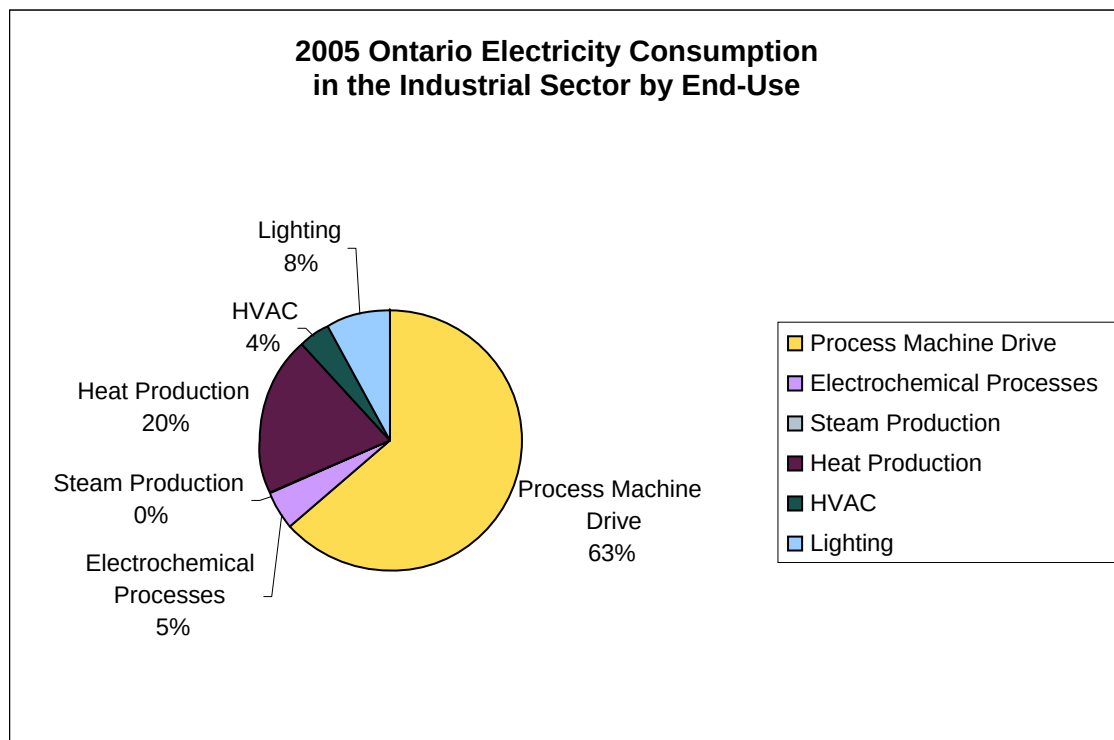
Figure 3**Figure 4**

Figure 5**Figure 6**

Derived from M.K. Jaccard and Associates, Navigant Consulting Ltd., and the Ontario Power Authority.

APPENDIX 2

DESCRIPTION OF THE PEAK SAVINGS ANALYSIS METHOD

Source: Mike Messenger, Ontario Power Authority, September 2006

An analysis of peak savings achieved in Ontario from 2004 to 2006

In December 2003, the government set a goal of achieving a five per cent (1,350 megawatts) reduction in projected peak demand from conservation by 2007. This was based on its decision to call for a five per cent reduction in the Independent Electricity System Operator's expected 2007 peak demand forecast of 26,977 megawatts.¹ Ontario electricity users have made significant progress toward achieving that goal based on the Conservation Bureau's analysis of weather-adjusted peak readings from 2004 to 2006 and of program evaluations of peak savings. The Conservation Bureau estimates that Ontario electricity users have achieved roughly 950 megawatts of the 1,350 megawatts in savings as of summer 2006. These findings are based on both a top-down analysis of trends in economic and energy use for the last three years, and a simple comparison of the actual peak observed during the extreme summer day of August 1, 2006, and the Independent Electricity System Operator's extreme weather peak forecast.

The Conservation Bureau recognizes that any top-down peak savings estimates should be confirmed by program specific measurement and evaluation of the actual peak savings achieved by all of the entities who have run or are running conservation programs during this period. Independent evaluation of specific program savings was not conducted in the last two years. In the absence of this measurement and evaluation, the Conservation Bureau has chosen to provide the best estimate available at the time after reviewing three possible estimation methods. At the same time, the Conservation Bureau has initiated a process of developing peak savings evaluations of the existing conservation programs so that more information will be available to assess progress toward the savings goal in next year's annual report.

Top-down analysis of actual peak demand and savings trend -- 2004-2006

Peak savings are defined as the difference between the level of peak demand observed in each year and the level of peak demand that would have occurred if the efficiency of the province's energy use had remained frozen or constant at the values observed when the goal was set in late 2003. The observed growth in Ontario's domestic product from 2004 to 2006 was used to produce a "business-as-usual" peak projection with efficiency levels held constant. These levels are then compared to the weather-adjusted level of peak demand observed. This method of translating actual peak demand levels into peak savings using economic and weather adjustment was used extensively in California during its electricity crisis of 2001 and 2002 and represents

¹ Since this forecast was adopted in 2003, the Independent Electricity System Operator has changed its method of adjusting its actual peak data to compare to account for variations in weather. As a result the Independent Electricity System Operator no longer produces an expected peak demand forecast that can be compared to demand trends today. No one can compare the weather conditions on actual peak days in 2006 to the Independent Electricity System Operator expected peak forecast since it no longer exists. The closest parallel we can find to current conditions is the Independent Electricity System Operator extreme weather forecast produced in 2004 of 27,435 MW for 2006 that can be compared to the peak day reading of 27,005 MW on 8/1/2006

the best practice in the field. A net peak savings estimate was also calculated, which subtracts out the naturally occurring level of energy and peak savings that occurred from 2004 to 2006 as a result of stock turnover, consistent with the method used in the Ontario Power Authority load forecast prepared for the Integrated Power System Plan.²

Table 1 shows the estimate annual gross and net peak savings achieved using peak data from 2004 to 2006.³

Table 1 Trends in peak demand adjusted for weather, economic growth and efficiency effects in Ontario

	2004	2005	2006 (*)
	MW	MW	MW
Actual peak demand	24,979	26,160	27,005
Peak normalized for weather	24,618	25,823	25,078
Projected peak with frozen efficiency and estimated GDP	24,618	25,307	26,041
Gross peak savings effect= row 3- row 2			963
Less naturally occurring CDM			328
Net peak savings			635

*27,005 megawatts was Ontario's highest peak demand reading during the summer of 2006. However, the Independent Electricity System Operator models suggest the highest weather-adjusted peak occurred on July 17, 2006. Actual peak demand on this day was 26,092 megawatts, which was weather-adjusted to 25,078 megawatts. (From Andrew Trachelle of the Independent Electricity System Operator, September 11, 2006)

Data Sources for Table 1

1. Actual peaks and weather normalized for peak demand observed from 2004 through 2005 were taken from the Ontario Power Authority electricity forecast. 2006 weather-adjusted peak value is from Independent Electricity System Operator's analysis of 2006 daily peaks: Andrew Trachelle.
2. Economic growth for the period 2004-2006 taken from National Resources of Canada national and provisional account data provided to the Ontario Power Authority by M.K. Jaccard Associates, in the *Modelling and Scenario Documentation Report* (September 8, 2006). These numbers were checked against Ontario Ministry of Finance Annual Economic Outlook, November 2005.
3. Rate of natural conservation was taken from the Reference Forecasting Model for Ontario produced by M.K. Jaccard and Associates for the period 2005-2010. (See Ontario Power Authority load forecast discussion paper)

² For details see, Staff Report: California Summer Electricity Outlook: 2002 - 2004 - Documentation of Baseline Assumptions and Principal Uncertainties http://www.energy.ca.gov/reports/2001-11-20_700-01-003.PDF

³ The Ontario Power Authority also compared the actual demand in 2006 experienced on August 1st (27,005 MW) to the Independent Electricity System Operator forecast of peak demand under extreme weather conditions (27,435 MW) from 2003. This method suggests a net peak savings of 430 MW without correcting for differences between the actual weather on August 1, 2006 and the conditions used in the Independent Electricity System Operator forecast from 2003. The Ontario Power Authority decided not to select this method because the differences in actual economic growth and weather conditions observed versus those in the original Independent Electricity System Operator forecast make this comparison impossible.

The calculations in Table 1 suggest the province has already made substantial progress toward reaching its peak savings goal. The estimated level of peak savings using this method ranges from 635 to 963 megawatts in 2006. The gross peak estimate includes the following effects:

1. Customers taking energy-efficiency actions on their own
2. Customers responding to mass media appeals to reduce usage during peak periods
3. Conservation programs run by the local distribution companies and the Conservation Bureau
4. Direct access customers responding to changes in the hourly Ontario energy prices
5. The incremental impacts of equipment and appliance efficiency standards.

The net estimate subtracts out the level of conservation that is naturally occurring as a result of stock turnover from less to more efficient buildings and appliances. To complement this top-down estimate, the Ontario Power Authority plans to evaluate the program-specific peak savings for any conservation programs targeted at peak reductions. Evaluation planning is underway, but the results for this summer's programs will not be available until at least December 2006.

Brief Summary of the Peak Savings Method 1

1. Take actual peak demand levels observed for 2004-2006 and adjust actual values to weather normalized value using the IESO seasonal adjustment method.
2. Extrapolate 2007 weather normalized peak by extrapolating the trend observed from 2004-2006 data.
3. Construct a frozen efficiency forecast of peak demand using economic growth data to create the pure baseline or what would have happened in the absence of energy efficiency or conservation effects.
4. Estimate gross peak savings (reductions in kW/ unit of output) by subtracting the weather normalized peak forecast from the frozen efficiency forecast for each year.
5. Estimate net peak savings by removing the level of naturally occurring efficiency improvements estimated in the Ontario Power Authority load forecasting model. This rate is equivalent to .77 per cent/year from 2004 to 2006. This corrects for the level of savings or energy-efficiency trends set in motion before current savings goals were set in late 2003.

APPENDIX 3

DETAILS OF GOVERNMENT PROGRESS TO IN-HOUSE CONSERVATION TARGETS

Each type of government conservation project is discussed in more detail below.

Building retrofits and upgrades

The provincial government is aggressively conserving energy in government-owned buildings by conducting building upgrades to improve energy efficiency. More than 100 detailed energy audits have been conducted in buildings province-wide to determine retrofit and energy-saving measures. Based on these audits, energy conservation improvements have been implemented that have involved one or more of the following projects:

- lighting retrofits and lighting control systems
- installation of building automation systems
- heating upgrades
- ventilation and air conditioning system improvements
- replacement of aging chillers
- mechanical (steam converters and hot water tanks)
- plumbing (including boilers and domestic hot water)
- windows (caulking, replacements)
- doors and building envelope improvements
- elevator upgrades.

Minor changes to facility operations (for example, limiting office space lighting from 6 a.m. to 8 p.m. and changing facility cleaning schedules to encourage early shut down) also contributed significantly to energy consumption reductions.

Within the Ontario Realty Corporation-operated buildings, a total of 285 building upgrades and retrofit projects have been completed since the beginning of the 2004-2005 fiscal year, some of which were phased in from previous years while others were completed in their entirety during the two-year time frame. Total expenditures for this time period were \$54,329,324 resulting in annualized total electricity savings of 27,365,315 kilowatt hours or 27.3 gigawatt hours. Expenditures for all projects planned through 2008 are projected to total \$73,500,867 with electricity savings of 39,732,517 kilowatt hours. Table 1 summarizes the annualized total kilowatt hour reductions achieved through Ontario Realty Corporation retrofit and upgrade projects since the announcement of the target, and the total costs of those projects completed and in progress.

Table 1: Annualized Building retrofits and upgrades- ORC operated buildings

	2004-2005	2005-2006	Subtotals (	2006-2007 (projected)	2007-2008 (projected)	Subtotals (projected)	Totals (achieved and projected)
Projects underway	149	258					
Projects completed	106	179	285				
Project costs	\$25,200,000	\$29,129,324	\$54,329,324	\$17,966,876	\$1,204,667	\$19,171,543	\$73,500,867
Estimated kWh reduction	13,600,000	13,765,315	27,365,315	12,183,769	183,433	12,367,202	39,732,517

Note: 1,000,000 kWh = 1 GWh

Building retrofits and upgrades, as well as other projects, occurring in ministry-operated buildings have totalled 35 gigawatt hours as at the end of the 2005-2006 fiscal year. A breakdown of activities undertaken to achieve these savings is not yet available.

In summary, electricity savings from building retrofits and upgrades completed as of the end of the fiscal year 2005-2006 totalled 56.3 gigawatt hours (21.3 gigawatt hours in Ontario Realty Corporation-operated buildings and 35 gigawatt hours in ministry-operated buildings).

Special initiatives

Sub-metering

In September 2005, sub-metering installations began to monitor gas, water and electricity consumption in each building on a real-time basis in all large government facilities. By enabling property managers to adjust building operations for any negative trends, anomalies or inefficiencies, sub-metering had resulted in savings of 700,000 kilowatt hours by the end of the 2005-2006 fiscal year. A further 1,396,000 kilowatt hour reduction is expected upon completion of the project over the coming two years, for a grand total expenditure of \$4,232,277. In the next phase of the project, interval meters will be installed for each tenant, and occupancy sensors will be installed on each floor of these buildings.

Deep lake water cooling

In May 2005, the provincial government entered into an agreement with Enwave Energy Corporation to proceed with deep lake water cooling for Queen's Park to begin in April 2007. This technology has provided a significant reduction in electricity use. Deep lake water cooling uses water from Lake Ontario to provide a reliable, efficient and sustainable source of cooling for offices, and it helps reduce the demand on Ontario's electricity grid. For an expenditure of \$735,000, this technology will reduce the government's electricity use in its first year of operation by just under 9,800,000 kilowatt hours annually, which is enough energy to power approximately 1,000 homes. It is estimated that this initiative will save the government \$4.5 million over the next 30 years.

Jails and youth detention centres

The Ministry of Community Safety and Correctional Services undertook audits to identify energy conservation measures in Ontario's jails and youth detention centres. Based on these, the

ministry will spend a projected total of \$11,462,000 to have Ontario Realty Corporation retrofit their centres. Measures implemented are expected to result in a total reduction of 9,368,144 kilowatt hours. Retrofits include upgrades to heating, ventilation, air conditioning, hot water boilers, building automation systems and lighting systems.

Co-generation

A total of \$7,788,764 is expected to be spent to develop three cogeneration sites: Stone Road Complex, Guelph; 777 Memorial Avenue, Orillia; and the Ontario Police College, Aylmer. At each site, electrical turbines powered by natural gas have been or will be installed to generate onsite electricity. The waste heat produced by the engines is captured and then used to provide supplemental space heating, air conditioning and hot water. These cogeneration projects together are projected to reduce electricity consumption in government buildings by 21,368,030 kilowatt hours. One of the three projects will be completed during the 2006-2007 fiscal year while the remaining two will be completed in the 2007-2008 fiscal year. Further cogeneration projects will take place based on available funding.

Table 2 summarizes the total expenditure and the total kilowatt hour reductions achieved and to be achieved through Ontario Realty Corporation's special initiatives. While only 700,000 kilowatt hour savings have been achieved to date, further major savings will soon be realized.

Table 2: Special initiatives

	Total expenditure (projected)	Estimated kWh reduction 2004-2006 (achieved)	Estimated kWh reduction 2006-2008 (projected)
Sub-metering	\$4,232,277	700,000	1,396,000
Deep lake water cooling	\$735,000	-	9,800,000
Jails and youth detention centres	\$11,462,000	-	9,368,144
Co-generation	\$7,788,764	-	21,368,030
Total	\$24,218,041	700,000	41,932,174

Other programs

Retro-commissioning and continuous commissioning

Retro-commissioning and continuous commissioning of buildings ensures that existing building operations are systematically evaluated and maintained to perform in conformity with their designed intent. Retro-commissioning takes place in buildings that have not been commissioned since opening. This is currently underway in 10 locations in the Greater Toronto Area and southwest Ontario. An additional 16 sites are under consideration in the same area. Operations and maintenance costs in these buildings have been reduced by 7 per cent to 12 per cent at a total cost of \$398,343 (\$0.20/sq.ft.) in the Greater Toronto Area and \$296,526 (\$0.31/sq.ft.) in southwest Ontario.

Continuous commissioning, involves ongoing optimization of heating, ventilation and air conditioning system operation and controls. This is underway in the A. Grenville & Wm. Davis Courthouse in Brampton and at One Stone Road Complex in Guelph. At a cost of \$18,000 per project, with support from Natural Resources Canada and Profac internal staff, continuous commissioning leads to energy savings of 15 to 30 per cent.

Conservation appeal demand response protocols

Since June 2005, instead of waiting for the Independent Electricity System Operator to issue a power warning or conservation appeal at times of strained supply, the Ontario Realty Corporation proactively puts into effect extensive conservation measures when

- a) a smog advisory is announced or
- b) outside temperatures are expected to rise above 26 degrees Celsius.

When either of these conditions is in place, facility managers in all government-owned buildings immediately implement the following measures of the conservation appeal protocol:

- take 25 per cent of the elevators out of service
- turn off all non-essential lighting (for example, lobby lights, cafeteria and non-essential corridor lights)
- shut off non-essential pumps and fans
- allow building temperatures to rise to 26 degrees Celsius.

Employee and public education programs

Along with inviting the public to help in attaining conservation goals, the government is engaging the 62,000 Ontario Public Service employees in government-wide conservation education efforts. Initiatives include:

- a campaign entitled Ideas to solicit suggestions for energy conservation from employees
- monthly educational newsletters, distributed by building operators, on best conservation practices
- communication with building managers and operators through retro-commissioning and continuous commissioning training programs.

Other projects

Ontario Realty Corporation is working with private-sector landlords to reduce energy use in leased space. As well, Ontario Realty Corporation is implementing a program to shut down electricity service to surplus and vacant buildings.

The government aims to continue to reduce electricity consumption in its buildings beyond 2007 by implementing the following programs:

- photo-luminescent exit lighting
- Queen's Park steam turbine
- dimmable ballasts
- wind power.

APPENDIX 4.

CONSERVATION BUREAU RESEARCH & STUDIES AS OF AUGUST 2006

The reports can be found on our website, www.conservationbureau.on.ca/ Culture of Conservation/ Conservation Bureau Reports and Studies

Agviro. **Market Profiles & CDM Opportunities for Agricultural Operations.** April 2006.
Addendum, Appendices A (Tables), B (Farm Organizations), C (Barriers to Implementation), D (Poultry & Livestock Electrical Fan Metrics), E (Summary of Survey Results), F (Incentive Programs), G (Electrical Energy Metrics).

Summary: An effective conservation and efficiency market analysis for agricultural enterprises to identify and evaluate key areas for conservation and demand management.

Bach, Energy Profiles Limited, **An Estimate of Investment in Energy Conservation in the Residential, Commercial and Industrial Sectors Within the Province of Ontario,** May 2006.

Summary: An estimate of demand-side investments in electricity conservation in Ontario. The study describes five market players and their influence on conservation in the residential, commercial and industrial sectors.

Bridgepoint Group Ltd. **Energy Conservation and Efficiency in Ontario's Municipal Sector.** March 2006.

Summary: An environmental scan of Ontario municipalities regarding their energy savings, attitudes towards energy efficiency and conservation, and an identification of barriers to energy conservation in this sector. This report includes the results of the environmental scan and recommendations for an effective conservation strategy for Ontario's Municipalities.

Coffey, Fisch & Associates Inc. **Energy Conservation Review.** February 2006.
Appendices A (Market Participants), B (Utility Websites), C (Utility Survey), D (Other Jurisdictions)

Summary: A review of the energy conservation landscape in the province of Ontario. The review encompassed all sectors as defined by the OPA (residential; commercial/institutional; and industrial/agricultural).

Conservation Bureau. **Submission to Finance on PST Exemptions.** January 2006.

Summary: The Conservation Bureau made three principle recommendations to the Finance Subcommittee to amend the *Retail Sales Tax Act* to exempt energy-efficient technologies and appliances.

Conservation Bureau. **The Power of Building Better - Ontario Building Code Paper.**
Submission by Peter Love, Chief Energy Conservation Officer of Ontario, March 27, 2006 (revised April 3, 2006).

Energy Profiles Limited. **Report on Energy Investment.** May 2006.

Summary: An estimate of investment in energy conservation in the residential, commercial and industrial sectors within the province of Ontario.

Enerlife Consulting. **DSM with Private, Multi-Residential, Low-Income Sector.** April 2006.

Summary: A high-level review and assessment of the private multi-residential sector in Ontario. This report identifies housing types, geographic distributions, ownership information, energy use and conservation potential specifically related to the low-income resident population in this sector. The purpose of this report is to inform program design principles and the delivery framework for the low-income sector of the private multi-residential market.

Enerlife Consulting. **Private, Multi-Residential Sector Summary Study.** Final report completed March 31, 2006.

Summary: High-level review and assessment of the private multi-residential sector in Ontario to identify housing types, geographic distribution, ownership information, energy use and conservation potential specifically related to the low-income resident population in this sector. The results of this report outline program design principles and the delivery framework for the low income sector of the private multi-residential market.

Fort Williams First Nation. **Comprehensive Approach to Energy Conservation for the Aboriginal Community in Ontario.** March 2006

Summary: First Nations have been identified as a distinct group for which the Conservation Bureau would like to develop and deliver conservation and demand management programs. This study identified program concepts, possible delivery mechanisms and alternative strategies to effectively communicate to the various First Nations and gain their participation in such programs.

ICF Consulting. **Electricity Demand in Ontario – A Retrospective Analysis.** November 2005.

Summary: Analysis of Ontario's electricity use. This report looks at electricity demand trends and implications at the sector level in Ontario, focusing on the period from 1990 through 2003.

IndEco Consulting. **Low Income Energy Program Concepts.** October 2005.

Summary: A study on program concepts for a province-wide, low-income energy conservation retrofit initiative (including social housing, private multi-residential rental and homeowners). The report identifies general program principals, energy saving measures, energy conservation education plans, communication strategies and potential program partners.

Kelleher Environmental. **Refrigerator Retirement and Replacement Programs.** May 2006.

Refrigerator Retirement and Replacement Programs - May 2006 - Appendixes

Refrigerator Retirement and Replacement Programs - May 2006 - Case Study Appendix

Summary: A research study on appliance retirement and replacement programs based on experience and best practices in North America. The results of this report may be used to influence the design of a province-wide refrigerator change-out program.

Kinetrics. **Market Profile & CDM potential for Large Industry.** June 2006.

Summary: A market analysis for large industrial operations in Ontario. The key objective was to identify technology or market areas that present opportunities for implementation of energy efficient measures. Energy CDM and demand response analysis and recommendations for large industries are provided. The results of this report may be used as a framework for developing future program delivery models.

Low Income Energy Network and Conservation Bureau. **Multi-Residential Stakeholder \ Consultation.** February 2006.

Summary: Prior to the Enerlife Consulting study on the private, multi-residential sector, this stakeholder consultation was conducted to engage stakeholders on energy efficiency in the residential market. The session helped to identify the key barriers to achieving energy efficiency in the multi-residential sector, as well as inform stakeholders on the programs that are offered as part of the 100 MW low-income and social housing directive.

LURA Consulting. **Low-Income Multi-Residential Energy Efficiency Stakeholder Consultation & Appendices.** February 2006.

Summary: On February 2nd, 2006, the Conservation Bureau hosted a stakeholder consultation session on barriers to energy efficiency in low-income private, multi-unit buildings in the province. This report summarizes the event, including discussions on barriers and opportunities for energy conservation and key presentations made during the day.

Marbek Resource Consultants. **CFC Chiller Replacement Potential Report & Addendum.** February 2006.

Summary: Examines the potential energy and demand impacts of converting and/or replacing all existing CFC-based chillers in Ontario. This report develops a technical estimation of the peak demand and energy reduction impacts of various replacement and conversion scenarios.

Marbek Resource Consultants. **Commercial Office & Retail Market Opportunity Assessment.** December 2005.

Summary: A market assessment study of the energy conservation and demand management opportunities in the large office and retail market segments of the commercial building sector in Ontario. This report provides a detailed examination of this segment's main end-use technologies and infrastructure, as well as an overview of the major market players. The market and technical information provided could present opportunities for an effective conservation program for this sector.

Marbek Consulting. **Market Assessment for Small Businesses in Ontario.** Final Report was submitted in June 2006.

Summary: Provides a detailed profile of small Ontario businesses, an assessment of the market structure and the main end-use technologies currently employed in this sector.

Marbek Resource Consultants. **Market Profile and Conservation Opportunity Assessment for Small Businesses.** May 30, 2006.

Summary: This report provides a detailed profile of small businesses in the province of Ontario, including a complete assessment of the market structure and the main end-use technologies currently employed in this sector. The information provided in this report may form the basis for an effective conservation program for this sector.

Natural Resources Canada (NRCan) and Conservation Bureau. **Distributed Energy Economic Analysis Report.** July 2006.

Summary: This analysis forecasts the economic implications of building new capacity to meet demand growth and generation replacement. It also accounts for peak time network losses. The final output of this work consists of energy mix scenarios for assessing distributed energy economic consequences.

SeeLine Group Inc. **Energy Savings Technology Review - Savings, Costs & TRC Results for the Low Income Social Housing Sector.** February 2006.

Summary: The report illustrates various energy-savings measures that might be included in a program design. This study identifies the key characteristics for each technology that represent the key inputs to calculating the savings, costs and Total Resource Cost (TRC) test results for the low-income and social housing sectors.

Seeline Group Inc. **Review of Low-Income Social Housing Load Reduction Measures & Opportunities.** February 2006.

Summary: Prepared an estimate of savings and a total resource cost test for a suite of prescriptive measures to be offered as part of a low-income and/or social housing program.

SeeLine Group Inc. **Review of Ontario Building Code and Energy Reduction Estimates.** March 2006.

Summary: An analysis of the expected energy savings and resulting total resource cost test outcomes from the proposed amendments to the Ontario Building Code made by the Ontario Ministry of Municipal Affairs and Housing. This report provides a review and commentary on the proposed amendments.

SeeLine Group Inc. **Technology Assessment Study and Total Resource Cost Analysis.** February 2006.

Summary: An assessment of the key market features, including cost-effectiveness results, for a selection of residential technologies.

Summit Blue Consulting. **Quick-Hit Demand Response Programs.** October 2005.

Summary: Examination of the characteristics of a demand response program used during California's energy crisis of 2001, termed the 20-20 Program. This report was commissioned to determine lessons learned that might be relevant for large customers that have interval metering in Ontario.

Toronto Environmental Alliance, Keith Stewart. **Low-Income Energy Efficiency Program Report.** March 2006.

Summary: The report includes a detailed summary of options for defining low-income, identification of the energy-efficiency needs of the sector, characteristics of the low-income housing market for the purpose of energy efficiency, and recommendations on program design.

University of Toronto, Civil Engineering Department, Professor K.D. Pressnail. **Technical Research of Energy Efficiency for the Ontario Building Code.** March 2006.

Summary: A prescriptive method for reaching an EnerGuide 80 equivalent for new houses to inform the Conservation Bureau's submission to the Ministry of Municipal Affairs and Housing regarding the Ontario Building Code. For more information on what was recommended, please read our Ontario Building Code Paper entitled "The Power of Building Better."

APPENDIX 5.

POLLING STUDY RESULTS

Study #1: Every Kilowatt Counts Focus Group by National, April 2006

On April 19 and 20, 2006, NATIONAL Public Relations conducted a focus group on behalf of the Ontario Power Authority for the Conservation Bureau's residential program, Every Kilowatt Counts.. The study consisted of four focus groups – two for homeowners, one for tenants and one for the multicultural community – to find out about the public's energy conservation habits, to gauge knowledge of the Conservation Bureau and its programs, and to gain suggestions on how to best motivate the public into conserving energy and redeeming coupons. Participants in the focus groups felt they were energy conscious, for example, many individuals turn off lights when they do not need them. For the tenants or individuals who do not pay for their hydro bills, there was a split between people who continue to conserve energy because they feel it is the right thing to do, and individuals who do not conserve energy since the cost of energy is covered by their rental payments. Some individuals whose parents come from an area of the world where energy is scarce were more energy conscious due to the values instilled in them from their family to conserve energy. Overall, the primary motivator for the participants in the study to conserve energy was to save money. In general, participants thought that the slogan Every Kilowatt Counts was effective, since it signifies that everyone has a role to play in energy conservation. Some individuals stated that the message would be more persuasive if the elements of monetary savings are tied into the slogan.

Study #2: Baseline Survey Report by OraclePoll Research, April 2006

The baseline survey report prepared for the Ontario Power Authority by OraclePoll Research in April 2006. The purpose of this study was to track the impact of the Every Kilowatt Counts residential program. Respondents were asked what they felt was the most important issue facing Ontario at this time. The issue of energy (23 per cent) is now seen as being as important a concern as health care (24 per cent) in the minds of Ontarians, while other topics such as the environment (six per cent), taxes (five per cent) and education (four per cent) are more distant. When asked what first comes to mind when respondents think about conservation, the conservation of energy or electricity was most cited by those interviewed (32 per cent), followed by issues related to the high cost of utility bills (14 per cent). Respondents cited shortages (26 per cent) and high costs (26 per cent) as being the most important issues facing Ontario's electricity system. Other responses related to high usage or waste (12 per cent), conservation (five per cent) and alternative energy (five per cent) including wind and solar power. When asked what they could most do to reduce energy consumption at their home, 15 per cent said turn off lights, 15 per cent said use less heating or air conditioning, 12 per cent said turn off appliances not being used, four per cent said conserve energy and three per cent said get energy-efficient appliances.

A follow-up report on the Conservation Bureau's residential Every Kilowatt Counts program by Oracle Poll Research was released in July 2006. This study compared results with the April 2006 responses. Results were positive. In April 2006, 31 per cent of respondents had a programmable thermostat and 17 per cent stated that they were very likely to install one in the next three months. In June 2006, 49 per cent of respondents had a programmable thermostat,

which represents an 18 per cent increase over April. More than one-quarter or 26 per cent of respondents had seen or heard something about the Every Kilowatt Counts program. Compact fluorescent light bulbs were the biggest drawing card in the program, and they were also seen as having the best price point as evidenced by the high coupon redemption rate. The biggest single motivator to redeem a coupon was the monetary angle, followed by need. There was a 13 per cent increase in June in the number of Ontarians who were aware of conservation initiatives compared to April.

Study #3: Baseline Summer Messaging Report by National, June 2006

The Baseline Summer Messaging Report, prepared for National by OraclePoll Research in June 2006, showed some interesting results from polling respondents on actions in their homes to conserve energy. Toronto residents were most likely to have turned off lights when not in use (47 per cent), followed by turning up the temperature on their air conditioner or using it less (37 per cent), changing to compact fluorescent light bulbs (24 per cent) and turning off or unplugging appliances when not in use (17 per cent). The most likely sources for respondents' sources of information on energy were television news stories (35 per cent) and newspaper advertisements (21 per cent), followed by bill inserts (11 per cent), newspaper stories (nine per cent), radio and TV advertisements (eight percent and seven percent respectively). The 36 per cent of Torontonians who had heard an advertisement were also asked to recall the main message of the advertisements. The most cited theme by 29 per cent of respondents was to use electricity wisely, 25 per cent did not remember, while 13 per cent recall messages related to turning up or using their air conditioner less, and 10 percent stated conserving energy.

Results from Other Polling Studies

A 2006 executive summary and survey report commissioned by the Conservation Council of Ontario, January 2006, and conducted by OraclePoll Research, included telephone interviews of 452 voting-age residents in the Greater Toronto Area (excluding Toronto). The survey report found that the conservation of energy or electricity was most cited by respondents when asked what first comes to mind when they think of conservation (22 per cent of respondents). When asked about their efforts to conserve energy, almost seven in 10 respondents (69 per cent) stated that they make a conscious effort to conserve on a daily basis. The survey report also indicated a strong belief in energy conservation being important to respondents and the need for Ontarians to do a better job at conservation. Almost all homeowners interviewed claim to turn off lights when not in use, while 72 per cent of homeowners changed to compact fluorescent bulbs, 69 per cent of homeowners draft proofed doors and windows, and 64 per cent of homeowners upgraded their appliances, all within the last year. Furthermore, 87 per cent of respondents claim to use air conditioning sparingly or not at all. Respondents were less likely to have upgraded insulation in the last year. However, results indicate that a significant number of Ontarians feel that they need to do a better job at conservation, especially in the winter months.

A polling study, Ontarians' Behaviours and Attitudes Towards Energy Conservation conducted by POLLARA and presented to the Ontario Ministry of Energy in April 2006, found similar results to the previously mentioned studies. Telephone interviews were conducted with at least 1,500 Ontarians aged 18 years of age and older between April 7 and 12, 2006. As in studies conducted by POLLARA in 2004 and 2005, Ontarians unanimously agree that it is important for them to conserve electricity and the vast majority (97 per cent) reported that they take efforts at home to conserve. Interestingly, the primary factors for conserving electricity in order of

importance were to save money (primary), to protect the environment, and to protect our energy supply. The main reasons for not conserving electricity in order of highest ranking are: 'no need/there is enough electricity' and 'don't know,' 'not worth it,' 'don't think about it/forgot,' 'already use very little electricity,' 'I rent/I live in a condo and cannot make many changes to my home,' 'do not pay electricity bills,' 'would not save enough money,' and 'I need/want to use electricity.'

APPENDIX 6.

2006 CONSERVATION FUND PROJECTS

Title of Initiative	Proponent	Description	Sector	OPA \$ Committed for 2006
Demand Side Management Energy Program-Agricultural Sector "Learning Locations"	AgEnergy	This farm-based conservation program starts with the selection of 20 farms for intensive energy audits, monitoring and equipment changes from a pool of farms that have already received a walk-through audit. Earlier pilots funded by the Ministry of Energy and the Conservation Bureau focused on developing an audit methodology which was piloted on farms across Ontario. This project involves using the new audit process to monitor energy use on farms, implement energy conservation measures and share the results with farmers across Ontario.	Agricultural	\$147,800
Skills for Energy Efficient Construction	Clean Air Partnership (working with Canadian Urban Institute-CUI)	The Clean Air Partnership, working with the Canadian Urban Institute, is examining the capacity of the Toronto construction industry to respond to increasing demand for construction of energy-efficient buildings, energy retrofits of existing buildings and the integration of renewable energy systems in buildings. The partners will invite key stakeholders to join an advisory committee to help develop a strategy to ensure that the workforce is able to meet the challenge of an emerging energy-efficient economy.	Industrial	\$26,000
Greening Health Care: Creating Conservation Action Plans in the Hospital Sector	Toronto Region Conservation Authority	The Toronto Region Conservation Authority is developing and rolling out an on-line template that provides hospitals with a standardized, practical approach to preparing energy conservation plans, which will soon be required under provincial legislation. The template will be piloted in hospitals across the province. The intent is to provide every hospital with the means to prepare its own customized energy conservation plan, based upon its current benchmarked performance and identified energy conservation opportunities. The hospitals will then be able to use the system to monitor their actual monthly energy savings.	Municipalities, Universities, Colleges, Schools and Hospitals	\$62,000

Efficient Sudbury - A Retail/ Consumer Level Community Conservation Program	EarthCare Sudbury	Earthcare Sudbury is developing and implementing an innovative market transformation program using community-based social marketing tools to increase retailer and consumer awareness of products and services in Sudbury that enhance energy conservation and efficiency. This involves a unique "street-level" program to encourage customer commitment and demand for energy-efficient products and services available in the Greater Sudbury Area. It builds on the awareness of national programs such as ENERGY STAR and Eco-Options, through a coordinated market strategy across the retail sector.	Residential	\$85,920
Greening Sacred Spaces	Faith and the Common Good - Toronto School of Theology	Faith and the Common Good and the Toronto School of Theology are working with the increasing number of faith communities (churches, mosques, synagogues, temples, etc.) endeavoring to "green" their sacred spaces by reducing their electricity consumption and promoting a less energy-intensive lifestyle to their members. Faith groups from the GTA and Ottawa are already involved, and more groups across the province have expressed interest.	Institutional	\$122,000
Compressed air system audit and sustainable air leak control program.	Ontario Mining Association	The Ontario Mining Association is developing a program to manage leaks in compressed air systems in three underground mines in Northern Ontario. Compressed air is one of the largest users of electricity in mines, and leaks cause compressors to overwork, leading to higher operating costs, wasted electricity and inefficiently used equipment. This pilot will result in a set of best practices and a program template that can be used not only in other mines, but also in other industries that use compressed air systems.	Industrial	\$218,760

Re-Wire: Applying Community- Based Social Marketing Tools to Reduce Electricity Use at U of T	The Sustainability Office at the University of Toronto	The Sustainability Office of the University of Toronto is piloting a program to encourage students and staff to make simple changes in their daily behaviours to reduce electricity use in certain campus buildings by up to 10 per cent. This results-based project will combine targeted communications with rigorous monitoring and research, and will involve hundreds of campus members in fostering a culture of conservation on campus. The social marketing tools used in Rewire will be used to create transferable best practice toolkits that can be widely applied in other institutional, office and select residential settings.	Institutional	\$54,400
The Energy Drill Schools Program	Toronto District School Board (TDSB)	A demand response pilot led by the Toronto District School Board with the potential for significant electricity savings in eight Toronto-area schools (four from the Toronto District School Board and four from the Toronto Catholic District School Board). The pilot will run from September 2006 to October 2007 and involves the entire school community – teachers, students, parents, administrative and caretaking staff – actively reducing electricity use in their school buildings in times of greatest need (when the price is high, during a power alert or during extreme weather events). This pilot was first run by Milton Hydro and is modeled after fire drills. It involves designating an Energy Team and training Energy Marshals in each participating school who will be responsible for taking no-cost actions to reduce electricity use during an Energy Drill	Municipalities, Universities, Colleges, Schools and Hospitals	\$159,290

Conservation through Dialogue and Design	Association of Major Power Consumers in Ontario (AMPCO)	Administered through the Association of Major Power Consumers of Ontario, this pilot consists of a series of focused workshop sessions designed to raise conservation awareness at senior levels, gather comprehensive data related to industrial electricity users, and generate pertinent, usable analysis and recommendations on conservation activities, opportunities and issues facing industrial consumers. The project will engage a broad range of industrial electricity users of all sizes, while identifying conservation opportunities, issues, concerns and barriers. Results of the project will include data and analysis that will provide a foundation for future work, beginning with the development of a comprehensive communications and implementation strategy for conservation action programs that will lead to measurable reductions in electricity consumption and improved demand management by industrial customers across the province.	Industrial	114\$,100
greenTbiz	The Toronto Association for Business Improvement Areas (TABIA)	greenTbiz is a program delivery unit operated under the auspices of the Toronto Association of Business Improvement Areas (TABIA) that provides programs and services to the Toronto BIAs, for the benefit of its members and the environment. The aim of this delivery unit is to develop and deliver comprehensive energy conservation and environmental programs that will have significant public benefits, while improving the bottom line of the BIA businesses. Within greenTbiz, the Conservation Fund will support the Smart Mentoring, green Talks and greenAssist programs.	Commercial	\$92,500

APPENDIX 7.

CERTIFICATES OF RECOGNITION November 2005 to September 2006

Recipient (Organization/ Person)	Rationale/Occasion	Date of Award
Halminen Homes	Significant commitment to build all new Halminen homes to the ENERGY STAR® for New Homes specifications	11/22/05
Georgian College	For successfully promoting energy efficiency and conservation in Province of Ontario	12/02/05
Lakehead Public Schools	For launching a renewal and energy management program which contributes to energy efficiency and conservation in Ontario	12/13/05
City of Mississauga	In recognition of leadership in sustainable energy practices leading to energy efficiency and conservation in the Province of Ontario	12/14/05
Burlington Hydro Inc.	On the development and implementation of an innovative energy conservation partnership with the City of Burlington, Environment Canada, Canada Centre for Inland Waters and Province of Ontario to promote energy efficiency and conservation in Burlington and Province of Ontario.	19/01/06
City of Burlington	Innovative energy conservation partnership with Burlington Hydro, Environment Canada, Canada Centre for Inland Waters and Province of Ontario to promote energy efficiency and conservation in Burlington and Province of Ontario.	19/01/06
Environment Canada, Canada Centre for Inland Waters	Innovative energy conservation partnership with Burlington Hydro, City of Burlington and Province of Ontario to promote energy efficiency and conservation in Burlington and Province of Ontario.	19/01/06
St. Joseph's Healthcare, London – Parkwood Hospital	Successful implementation of Energy Retrofit Program contributing to energy efficiency and conservation in Ontario.	09/03/06
Veridian Corporation	In recognition of progress towards achieving “10% by 2007” and for leadership in building conservation culture in Ontario.	14/03/06
Rosehaven Homes	In recognition of outstanding commitment to energy conservation by being part of Riverstone – Canada’ first Energuide and ENERGY STAR® Golf and Country Club Community.	28/03/06
Townwood Homes	In recognition of outstanding commitment to energy conservation by being part of Riverstone – Canada’ first Energuide and ENERGY STAR® Golf and Country Club Community.	28/03/06
Sequoia Grove Homes	In recognition of outstanding commitment to energy conservation by being part of Riverstone – Canada’ first Energuide and ENERGY STAR® Golf and Country Club Community.	28/03/06
Cachet Estate Homes	In recognition of outstanding commitment to energy conservation by being part of Riverstone – Canada’ first Energuide and ENERGY STAR® Golf and Country Club Community.	28/03/06
Marvin Goldman of Durham Homes	On the occasion of building last ENERGY STAR® Home and recognition of 55 years of outstanding commitment to energy conservation in new housing sector.	26/04/06
MintoUrban Communities Inc.	Outstanding commitment to building energy efficient rental and condominium communities and promoting energy conservation and awareness in the Province of Ontario.	05/05/06

McKee Public School	Outstanding commitment to educational programs promoting environmental awareness and energy conservation in the Province of Ontario.	05/05/06
Town of East Gwillimbury	Being first town in Canada to adopt ENERGY STAR® standards for new homes within municipality.	15/05/06
North Simcoe Hospital Alliance	Successfully completing an Energy Saving Retrofit Program at Huronia District Hospital to promote energy efficiency and conservation in the Province of Ontario.	30/05/06
Town of Newmarket	Launching Energy Saving Retrofit Program.	05/07/06
Ottawa-Carleton District School Board	Leadership in energy conservation and promoting classroom awareness (annual electricity savings of \$3 million)	12/09/06
Ameresco Canada Inc.	Leadership role in promoting energy efficiency and conservation in the Province of Ontario	12/09/06
City of Woodstock	Leadership and commitment to energy conservation by promoting conservation culture through Voluntary Blackout Day Challenge	15/09/06
Woodstock Hydro	Leadership and commitment to energy conservation by promoting conservation culture through Voluntary Blackout Day Challenge	15/09/06

APPENDIX 8.

ENERGY EFFICIENCY IN THE 2006 BUILDING CODE (JUNE 2006)

The 2006 Ontario Building Code enhances the province's leadership in energy-efficiency requirements for buildings through the introduction of higher requirements than the 1997 building code and previous codes.

The higher energy-efficiency requirements balance energy efficiency with the affordability of a home. For example, the extra cost to build a home in 2007 to the new higher energy-efficiency standards will be recovered in three years through reduced energy bills. This will result in substantial long-term savings for Ontario households as well as reduced greenhouse gas production.

Over the next eight years alone, the building code's increased energy-efficiency requirements will save enough energy to power 380,000 homes and reduce greenhouse gas emissions equal to 250,000 fewer cars on Ontario's roads.

Houses:

A typical new house built in 2007 under the new building code will be more than 21 per cent more energy efficient than one built under the current building code. This will be achieved through requirements for:

- More energy-efficient windows (67 per cent increase in energy efficiency)
- Higher insulation levels (ceilings are being increased by 29 per cent, walls by 12 per cent and foundation walls by 50 per cent)
- High-efficiency gas and propane-fired furnaces (efficiency rating of 90 per cent).

Further building code changes related to energy efficiency will be phased in:

- New houses built under permits applied for in 2009 will require near-full-height basement insulation.
- New houses built under permits applied for in 2012 will be required to meet standards substantially in accordance with the national guideline, EnerGuide 80.

Estimated Increased Capital Costs, Energy Savings and Payback Periods for Houses

	Estimated Energy Savings*	Estimated Increased Capital Cost*	Simple Payback Periods
December 31, 2006	21.5 %	\$1,600	3.0 years
December 31, 2008	28 %	\$2,700	4.4 years

December 31, 2011	35 %	\$5,900 - 6,600	6.9 - 7.9 years
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Note: Figures are based on a typical 2,000 square foot gas-heated house in the Greater Toronto Area

*Compared to the 1997 building code

Non-residential and larger residential buildings:

Energy-efficiency requirements are being increased for non-residential buildings and larger residential buildings built under the new Ontario Building Code in 2007.

New non-residential and larger residential buildings built under permits applied for in 2012 will be required to meet standards 25 per cent higher than the Model National Energy Code for Buildings.

Estimated Increased Capital Costs, Energy Savings and Payback Periods for Non-residential and Larger Residential Buildings

	Estimated Energy Savings*	Estimated Increased Capital Cost*	Simple Payback Periods
December 31, 2006	16 - 18%	\$0.98 - 1.11/ft ²	3.3 - 4.7 years
December 31, 2011	2,5 %	\$1.40 - 3.46/ft ²	5.0 - 7.7 years

Note: The range depends on the size, climatic location, quality and method of construction of the building. Estimated cost increases are based on typical high-rise residential and high-rise office buildings.

*Compared to the 1997 Building Code

Green Technologies:

New provisions will promote the use of green technologies such as:

- solar photovoltaic systems
- active solar hot water systems
- rooftop storm water retention
- storm and grey water use.

These changes come into force immediately.

The Ministry of Municipal Affairs and Housing held province-wide public consultations on these energy-efficiency changes from February to April 2006. A technical advisory committee comprising designers, builders, regulators, manufacturers, and energy suppliers and advocates

reviewed the input from these consultations. The technical committee's recommendations were reviewed and are closely reflected in the Ontario Building Code changes.

Source: Ministry of Municipal Affairs and Housing
http://www.mah.gov.on.ca/userfiles/HTML/nts_1_27483_1.html

APPENDIX 9

FOLLOW UP ON 2005 RECOMMENDATIONS

Provincial Energy and Conservation Policy

In the Chief Energy Conservation Officer's 2005 annual report, four recommendations were made regarding government energy policy. The following provides an update on actions taken related to these recommendations.

1. The government continue public consultations on its conservation strategy and goals.
2. The government complete the various elements of its energy strategy and publish the policy, strategy tactics and a plan for ongoing success measurement in one document.

In late 2005 and early 2006, the Ministry of Energy undertook a multi-component consultation process to gain public input on the *Supply Mix Advice Report*, submitted to the Minister of Energy by the Ontario Power Authority in December 2005. The goal was to ensure Ontarians could play a role in determining the future energy supply mix in Ontario, including the role of conservation.

The Minister of Energy has continued to meet with members of the public, groups and associations on conservation issues. More recently, the minister has started discussions on a more formal stakeholder advisory group to build on the province-wide consultations associated with the supply mix directive and the ongoing work with local utilities and interested parties.

The government has also continued to provide direction to the Conservation Bureau regarding conservation targets, as discussed in Chapter 2 of this report.

The ministry prepared a detailed submission to the Canadian Energy Efficiency Alliance, which contained a summary of energy conservation activities and policies undertaken for the fiscal year ending March 31, 2006. The report, which was posted online, together with the supply mix directive issued in June 2006, constitute a comprehensive summary of the government's conservation strategy, the results to date and the targets that set out the conservation goals for the future. The report was prepared both in response to a recommendation by the Chief Energy Conservation Officer and to participate in the Alliance's national report card on energy efficiency, which rates provinces on their contributions and support for energy-efficiency activities.

3. The government, the Conservation Bureau, the Ontario Energy Board and the Independent Electricity System Operator build on informal meetings currently being held to establish a formal working group to review the criteria for conservation program delivery and funding.

In January 2006, the Ministry of Energy formally established the Energy Conservation Working Group to provide advice to the government on conservation issues. The working group consisted of representatives from local distribution companies, the Independent Electricity System Operator, the Ontario Energy Board and the Conservation Bureau. It is chaired by the Ministry

of Energy and met several times between January and June 2006. The primary issue on the working group's agenda was the role of the Conservation Bureau and local distribution companies in conservation. Initially, the Conservation Bureau was exploring this issue and seeking advice from the Energy Conservation Working Group. In July 2006, the government announced that the Ontario Power Authority will be responsible for funding a variety of conservation programs for local distribution companies starting in 2007.

4. The Conservation Action Team should play a policy integration and monitoring role within government.

The Conservation Action Team is an inter-ministerial committee of parliamentary assistants. In 2005, the team undertook extensive stakeholder consultation on conservation and set out recommendations for conservation action to the government and the market. The team had one meeting in the first half of 2006, and members continue to assist the ministry in coordinating conservation activities across several ministries.

Energy-Efficiency Standards in Ontario

In the Chief Energy Conservation Officer's 2005 annual report, three recommendations were made regarding energy-efficiency standards. The following provides an update on actions taken related to these recommendations.

1. The Ministry of Energy dedicate staff and resources for further study of appropriate energy-efficiency standards through either the Canadian Standards Association process or the government's own assessment.

The Ministry of Energy has had an active role in standards development and at the Canadian Standards Association for many years. However, in the recent past, the ministry has not committed funds to the Canadian Standards Association process. The process is member-funded; new standards get developed through targeted funding. In 2006, the ministry increased staff resources dedicated to the administration of the *Energy Efficiency Act* and the development of energy performance standards. The ministry also renewed its commitment to participate in the association's process, including on the Strategic Steering Committee on Performance, Energy Efficiency and Renewables to work cooperatively with the Conservation Bureau on standards work, as well as committing as much as \$400,000 to standards development. The Ministry of Energy has strengthened ties with standards development officials in California and the United States, and is in discussions with the Canadian Standards Association about standards for devices with significant standby energy use.

2. Further analysis be done on ways to phase out the installation of T12 fluorescent lamps and to promote the use of T8 or T5 lamps.

The Ministry of Energy continues to research the issue of fluorescent lamps using industry information, including regulatory amendments to set stricter performance standards for T12 lamp ballasts, in addition to requiring higher efficiency standards for T12 lamp ballasts manufactured after April 1, 2010.

Discussions with several lighting product manufacturers and technology developers have demonstrated improved performance from existing T12 installations through the use of advanced

dimming and other control technology. This indicates to the ministry that regulatory elimination of T12 fluorescent lamps may not be necessary. In several pilot installations using advanced electronic control technologies with standard T12 lamps, measured efficiencies for equivalent lighting levels often met and sometimes exceeded that for T8 installations. Further discussion is needed with the industry and the standards community. The Ministry of Energy is confident that advances to current lighting technology, along with the increase in use of electronic ballasts in replacement installations, will dramatically improve lighting efficiency. The ministry is supportive of incentive programs to increase the market share of high-efficiency lighting products and will continue to assess the need for regulations setting improved energy-efficiency standards.

The Conservation Bureau joined the Strategic Lighting Initiative Committee, which includes Natural Resources Canada, the Canadian Electricity Association, most major electric utilities, representatives of provincial governments and their agencies, to transform the majority of the incandescent lighting market to high-efficiency alternatives by 2015.

3. Canadian Standards Association window performance standard A440.2-04 be reviewed and consideration be given to incorporating these changes into the *Ontario Energy Efficiency Act*.

The Ministry of Energy continues to review a range of standards for building components including windows. Work began in 2005 on harmonizing the A440.2-04 window performance standard with the United States National Fenestration Rating Council standard and is expected to be complete by the end of 2006. The ministry expects to begin the consultation process later this year on whether or not to include a referenced minimum level for all residential windows sold in the province (for use between heated space and non-heated space) with a regulation under the *Ontario Energy Efficiency Act*. Changes to the Ontario Building Code incorporated minimum energy-efficiency standards for windows used in new homes.

Ontario Building Code

In the Chief Energy Conservation Officer's 2005 annual report, two recommendations were made regarding the Ontario Building Code. The following provides an update on actions taken related to these recommendations.

1. Consider incorporating higher minimum energy-efficiency standards into the Ontario Building Code such as those presented in the Commercial Building Incentive Program (Model National Energy Code for Buildings plus 25 per cent) for Part 2 buildings, reinstating the pre-1997 minimum energy-efficiency requirements, increasing the minimum energy-efficiency standards for electrically heated houses, and requiring renovations to meet the same minimum energy-efficiency requirements as new buildings.
2. Expedite the public consultation and approvals process to make changes to the Ontario Building Code in recognition of the urgent need to address energy conservation issues.

Between February 24, 2006, and April 3, 2006, the Ministry of Municipal Affairs and Housing invited public comment on a package of proposed technical changes to the building code to increase energy efficiency of buildings, including houses. Following the public consultation, a technical advisory committee comprising designers, builders, regulators, manufacturers, and

energy suppliers and advocates, including the Conservation Bureau, reviewed the input from the consultations. Partly in response to calls by the Conservation Bureau for quick action, these consultations were fast-tracked so that they could be considered for inclusion as part of the planned 2006 Building Code.

Other Regulatory Opportunities and Barriers

In the Chief Energy Conservation Officer's 2005 annual report, recommendations were made regarding some other legal barriers and opportunities. The following provides an update on actions taken related to these recommendations:

1. Expedite the review and public process necessary for the adoption of CSA C282 (Natural Gas Back-up Generators) in both the Ontario Building Code and the Ontario Fire Code.

The updated CSA C282 Emergency Electricity Power Supply for Buildings standard was published at the end of 2005. This edition includes the option of feeding a building's natural gas emergency generator directly from the gas utility in lieu of necessarily having to have on-site fuel storage. The Ministry of Municipal Affairs and Housing and the Ontario Fire Marshall have amended the building code and the fire code to reference this new standard.

2. Broaden the group eligible for low-cost financing to include hospitals and schools.

The Ministry has indicated that consultations are underway on how to provide access to low-cost financing for conservation activities related to these building types.

3. Establish minimum standards of energy efficiency for municipalities, universities, schools and hospitals sector investment.

The *Energy Conservation Leadership Act, 2006*, provides the authority for the government to pass regulations in this area. Ministry staff are working with other ministries to better understand issues associated with these sorts of requirements and to develop options for further consideration and discussion.

4. Offer provincial sales tax rebates to encourage replacement of older technologies with energy-efficient alternatives.

Further to this recommendation, the Conservation Bureau submitted a written proposal to the government during the pre-budget submission process calling for provincial sales tax rebates on certain commercial and industrial equipment, as well as residential appliances. In the 2006 budget, provincial sales tax rebates were not adopted. The government recognizes that incentives to purchase new, more efficient equipment should normally be coupled with programs to ensure that old inefficient goods are permanently removed from the system.

5. Establish water conservation.

The new Ontario Building Code has provisions facilitating the use of storm and grey water in homes and buildings.

The Great Lakes-St. Lawrence River Basin Sustainable Water Resources Agreement was signed by Ontario, Quebec and the eight U.S. Great Lake states in December 2005 and includes commitments regarding water conservation. The Great Lake jurisdictions are expected to collectively develop regional basin-wide conservation goals and objectives (Ontario's ministries of natural resources and of energy will be Ontario's regional representatives).

6. Discontinue the provision of flat rate water heating by local distribution utilities standards.

This is no longer an issue because local distribution companies are not allowed by the Ontario Energy Board to be in the water heater business.

While Toronto Hydro hasn't offered flat-rate contracts for a number of years, the flat rate water heaters still exist in some Toronto homes and businesses and would require prohibitively expensive rewiring to remove. However, Toronto Hydro will have all these water heaters metered once the smart meter installations are complete. About 400,000 smart meters are expected to be in place by the end of 2007, with the remaining 250,000 installed by 2010.

7. Further energy-efficiency communications and education in schools and public forums.

The Minister of Energy authorized local utilities to spend more than \$160 million on conservation initiatives over a three-year period. In addition, the Conservation Bureau has been active in coordinating and supporting a number of initiatives since its creation. As a result, some of the programs launched in the last two years have focused on energy efficiency communications and education in schools and public forums, such as Environmental Earth Angels, EcoSchools, Greenlearning.ca, Reduce the Juice, Diversity Outreach and 20/20 Way to Clean Air.

APPENDIX 10

BACKGROUND ON OZONE DEPLETING SUBSTANCES REGULATION

Background

The Ontario government believes that stratospheric ozone depletion is an important environmental problem. Over the last 13 years, Ontario has actively pursued policies and regulations that control the use of ozone-depleting substances and their halocarbon replacements, and implemented procedures to minimize their release to the atmosphere.

The Ontario Ministry of Environment has proposed amendments to Ontario's Refrigerants Regulation that would prohibit the refill of commercial refrigeration and air conditioning units with ozone depleting refrigerants.

Quantification of CFC Chillers in Ontario

The Heating, Refrigeration and Air Conditioning Institute of Canada (HRAI) publishes annual conversion and replacement figures for CFC chillers in Canada. This data shows that there were 3,644 CFC chillers still in operation in Canada at the end of 2004. This represents chillers in the size range of 100 to 1,200 tons of refrigeration from all sectors of the market including industrial, commercial and institutional regardless of whether the chiller is used for space conditioning or process loads. Since this data is not disaggregated by province, the proportion of these chillers in Ontario was estimated using statistics from the *Commercial and Institutional Building Energy Use Survey (CIBEUS) 2000 - Detailed Statistical Report*, from Natural Resources Canada. Although some chillers will be servicing industrial process loads, this data was considered to be a reasonable proxy for determining the percentage of chillers in Ontario.

The CIBEUS data was used to determine that 41 per cent of buildings (greater than 10,000 m²) in Canada are in Ontario. On the assumption that CFC chillers exist in Ontario in the same proportion as the number of large buildings, it was estimated that 41 per cent of the CFC chillers remaining in Canada were in Ontario as of the end of 2004 – this translate into 1,492 CFC chillers. Again, this includes CFC chillers used in industrial applications and facilities as well as commercial and institutional facilities.

Base Case Replacement Scenario

To calculate the impacts from various replacement scenarios, we first established the base case performance characteristics of the existing CFC chiller stock. Because the majority of these chillers were installed in and around the 1970s, we have assumed an average cooling performance of 0.8 kW/ton (typical performance for a chiller of that vintage) and assumed the average size of the remaining CFC chillers to be 350 tons of refrigeration capacity (Todesco). All savings calculations will be based on a comparison to this base case.

Replacement Action profiles

For the purpose of this analysis we established four action profiles or replacement options for an existing CFC chiller from the base case stated above. The action profile defines both the physical changes to the chiller and building as well as the changes in performance of the chiller. Each

action profile is then used to determine the impacts on system peak demand and energy consumption attributable to the chiller alone.

Replacements of CFC chillers can achieve significant energy and demand savings and current high-performance chillers can achieve performance levels as low as 0.48 kW/ton at peak load and significantly lower at part load. *ASHRAE Standard 90.1, 2004 – Energy Standard for Buildings Except Low-Rise Residential Buildings* indicates the minimum efficiency requirements for Centrifugal (water cooled) chillers is a COP of 6.10 (0.58 kW/ton). Water-cooled reciprocating chillers are a bit higher at ~ 0.64 kW per ton – air-cooled chillers are even higher.

For the purposes of this analysis, we have assumed a standard replacement would have a peak load performance of 0.58 kW/ton. Note that additional savings could be achieved through the promotion of high-performance chillers. The action profile on high-performance chillers assumes a peak load performance of 0.5 kW/ton.

In addition to the above two scenarios, we considered the potential impact from downsizing the chiller at the time of replacement. This would be reasonable in a number of cases including when:

- 1) chiller was originally oversized
- 2) chiller is now oversized due to energy-efficiency upgrades previously conducted in the building resulting in lower net internal loads or
- 3) a lighting retrofit is conducted in concert with a chiller replacement, thereby resulting in a lower cooling load and the opportunity to downsize the chiller.

To determine the potential savings impacts from downsizing the chiller, we assumed a scenario where the base lighting loads of 1.8 W/ft² (approximately equal to commercial lighting loads of the 1970s and 1980s) were upgraded to 1.2 W/ft² (reasonable according to good standard professional practice and approximately equivalent to T8 fluorescent lighting with electronic ballasts in a typical large office complex). This lighting upgrade results in approximately a 10 per cent reduction in cooling load in the building, which translates directly into a smaller required chiller.

Energy and demand impacts of action profile scenarios

The following four scenarios have been assessed for demand and energy impacts in the phase-out of CFC chillers currently in operation in Ontario.

Scenario 1: The first scenario assumes 100 per cent replacements to new standard performance chillers. This scenario applies action profile 1 to 100 per cent of the existing CFC chiller stock.

Scenario 2: This scenario assumes 100 per cent replacements to new standard performance chillers, in concert with chiller downsizing, either done in concert with an energy-efficiency upgrade or as part of a sizing optimization process. A 10 per cent chiller capacity reduction has been assumed. Note that significant market education and incentives would need to be provided to achieve chiller downsizing where feasible. This scenario applies action profile 2 to 100 per cent of the existing CFC chillers.

Scenario 3: This scenario assumes 100 per cent replacements to new high-performance chillers. This scenario would require either a legislated minimum chiller performance or financial

incentives for selecting high-performance chillers. This scenario applies action profile 3 to 100 per cent of existing CFC chillers.

Scenario 4: This scenario assumes 100 per cent replacement to new high-performance chillers, in concert with chiller downsizing, as in scenario 2. Significant market education and incentives would need to be provided to achieve chiller downsizing where feasible. This scenario would require legislated minimum chiller performance or financial incentives for selecting high performance chillers as well as incentives to achieve chiller downsizing where feasible. This scenario applies action profile 4 to 100 per cent of existing CFC chillers.

Note that consumer education regarding the benefits of chiller “right sizing” should be able to achieve significant impacts regarding the downsizing of chillers at time of replacement and should be considered as part of any strategy to phase out CFC chillers and promotion of conservation in chiller optimization.

Energy and demand impacts for a typical 350 ton chiller

To determine the impacts from these scenarios, assumptions must be made regarding the size and operation of a typical 350 ton chiller applied to a building in Ontario. For the purposes of this analysis, it has been assumed that 400 ft² of space can be cooled by each ton of cooling and, therefore, a 350 ton chiller would cool the equivalent of 140,000 ft² of space.

Action profiles 1, 2, 3 and 4 result in demand reductions of 77 kW, 92 kW, 105 kW and 118 kW respectively. These results are on a typical building/chiller basis and must be applied to the scenarios to determine the market impacts of each.

Market Scenario Results

Scenario 1 shows a demand savings potential of 115 MW. Adding the impacts of downsizing the chiller due to reduced lighting loads in Scenario 2, results in savings potential of 137 MW. Note this additional 22 MW of savings does not include the lighting savings used to justify the chiller downsizing. Approximately 70 per cent of buildings have already upgraded their lighting systems to more efficient systems. The impact of retrofitting the remaining 30 per cent of buildings to T8 lamps and electronic ballasts would be approximately 34 MW of peak demand savings.

The final two scenarios are for high-performance chiller replacements, with and without downsizing due to reduced internal loads from energy efficiency upgrades such as lighting. Savings from these would be 157 MW without downsizing and 175 MW with downsizing.

Without intervention, it can be expected that most building owners would choose the same size standard performance chillers and not high-performance chillers or right-sized chillers due to first cost economic, fears of insufficient cooling capacity and other barriers. Without any additional market intervention, it would be reasonable to expect the lower result of 115 MW of savings (100 per cent replacement to new standard performance chillers).

With education and financial incentives for improved performance, this could be increased to 137 MW with downsizing, or to 157 MW and 175 MW for high-performance chillers and downsizing respectively.

As a sensitivity analysis, the range of results provided between the four scenarios provides, in Marbek's opinion, a reasonable assessment of the potential impacts from a CFC phase-out and resulting CFC chiller replacement potential. Scenario 1 represents the most likely result on a legislated basis, while Scenario 4 would represent the most aggressive result requiring further market intervention such as minimum performance levels, financial incentives, and education for downsizing.

Demand savings impacts

With the demand savings impacts ranging between 115 kW and 175 kW, it is clear a significant peak demand reduction could be obtained in Ontario through the replacement of existing CFC chillers with new replacement equipment. In coordination with any proposed changes to environmental legislation, it would appear that opportunities present themselves for a financial incentive program to reduce barriers with building owners and assist them in achieving the demand savings.

Issues that may need to be addressed include:

- incremental capital cost of high performance versus standard performance chillers
- education issues regarding the opportunities and risks to "right sizing" chillers at time of replacement and the costs of "over sizing", both first cost and long term energy costs
- coordination between a chiller replacement and other energy efficiency upgrades at a facility to enable the potential for downsizing the chiller at time of replacement.

Source: Marbek Resource Consultants Ltd., CFC Chiller Replacement Potential, February 2006.



Conservation Bureau

a division of the [Ontario Power Authority](#)
The power of conservation

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Annual Report 2006

Chief Energy Conservation Officer

Ontario—a new era in electricity conservation

Highlights

- Ontario received a B+ grade from the Canadian Energy Efficiency Alliance in its 2006 national report card on energy efficiency. This grade is up from a C- in 2004 and represents a significant improvement.
- The Report makes 17 recommendations in 5 areas energy efficiency improvements to the Ontario Building Code, continuing to match California's standards, and ensuring power savings are considered in the implementation of the Greenbelt Protection Plan.
- Ontario electricity consumers have reduced peak demand by approximately 950 megawatts since 2004, including 328 megawatts of naturally occurring conservation.
- Consumers have reduced electricity consumption per capita by 2.5 per cent, weather-adjusted, during the period January to August 2006, compared with the previous year.
- The Conservation Bureau launched 10 programs in 2006, including a demand response program, which on August 1 delivered maximum savings of 182 megawatts, with an average of 133 megawatts over eight hours.
- Energy-efficiency 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 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. • Conservation programs run by local distribution companies achieved 2005 savings of
- 121 million kilowatt hours and will result in 868 million kilowatt hour savings over the life of the installed equipment.
- Energy management companies have achieved an estimated 20 megawatts of peak demand reductions in 2005 and in 2006.
- Investment in electricity conservation in Ontario, including the activities of energy management firms and local distribution companies, is estimated at \$300 million to \$350 million per year, creating 10,000 new jobs.

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Ontario's Chief Energy
Conservation Officer, Peter
Love

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